

# **SPECIFICATIONS**

**PROJECT:**

**20 THAMES STREET  
PORTLAND, MAINE**

**DEVELOPER:**

**ESSEXNORTH PORTLAND LLC  
PO BOX 394  
TOPSFIELD MA 01983**

**ARCHITECT:**

**ARCHETYPE, P. A.  
48 UNION WHARF  
PORTLAND, MAINE 04101**

**July 21, 2017  
Bid Set**

**INDEX TO  
PROJECT MANUAL**

**Section:**

**Division 00 00 00 – Contracting Requirements**

00 01 10	Index to Project Manual
00 73 00	Supplementary Conditions of the Contract for Construction
AIA A133	2009 Standard Form of Agreement between Owner and Construction Manager
AIA A201	General Conditions of the Contract for Construction
AIA A312	Labor and Material Payment Bond
AIA A312	Performance Bond
AIA G702	Application and Certification for Payment
AIA G703	Continuation Sheet

**Division 01 00 00 – General Requirements**

01 31 00	Submittals, Meetings & Record Documents
01 33 00	Submittal Procedures
01 33 10	Products and Substitutions
01 45 00	Quality Control Services
01 50 00	Temporary Facilities
01 58 00	Project Identification
01 73 29	Cutting and Patching
01 77 00	Project Closeout

**Division 02 00 00 – Existing Conditions**

02 32 00	Geotechnical Investigations Report (for reference)
----------	--

**Division 03 00 00 – Concrete**

03 30 00	Cast-In-Place Concrete
03 45 00	Architectural Precast Concrete

**Division 04 00 00 – Masonry**

04 20 00	Unit Masonry
----------	--------------

**Division 05 00 00 – Metals**

05 12 00	Structural Steel Framing
05 21 00	Steel Joist Framing
05 31 00	Steel Decking
05 41 00	Lightgage Metal Framing
05 50 00	Metal Fabrications



## **20 THAMES STREET – PORTLAND, ME**

### **Division 06 00 00 – Wood & Plastics**

06 16 43 Gypsum Sheathing  
06 20 00 Finish Carpentry

### **Division 07 00 00 – Thermal & Moisture Protection**

07 11 13 Bituminous Dampproofing  
07 16 13 Polymer Modified Cement Waterproofing  
07 21 16 Thermal and Acoustic Insulation  
07 21 19 Moisture and Thermal Protection Spray Foam Insulation  
07 21 26 Cellulose Insulation  
07 24 00 Exterior Insulation & Finish System  
07 26 16 Under-Slab Vapor Barrier  
07 27 31 Spray Applied Waterproofing  
07 50 00 Membrane Roofing  
07 65 10 Flexible Flashing Drainage Plane System  
07 81 16 Sprayed Cementitious Fireproofing  
07 84 13 Fire Stopping  
07 92 00 Joint Sealers

### **Division 08 00 00 – Doors & Windows**

08 11 13 Steel Doors and Frames  
08 14 23 Interior Apartment Doors  
08 41 13 Aluminum Framed Storefronts  
08 81 00 Glazing

### **Division 09 00 00 – Finishes**

09 21 16 Gypsum Board Assemblies on Metal Framing  
09 29 00 Gypsum Board  
09 90 00 Painting

### **Division 10 00 00 – Specialties**

10 55 13 Postal Specialties (Mailboxes)

### **Division 11 00 00 – Equipment**

- NOT USED -

### **Division 12 00 00 – Furnishings**

- NOT USED -

### **Division 13 00 00 – Special Construction**

- NOT USED -

## **20 THAMES STREET – PORTLAND, ME**

### **Division 14 00 00 – Conveying System**

14 21 00 Electric Traction Elevator

### **Division 21 00 00 – Fire Suppression**

21 13 13 Sprinkler System

### **Division 22 00 00 – Plumbing**

22 00 00 Plumbing  
22 00 10 Plumbing Equipment Cut Sheets  
22 11 13 Facility Water Distribution Piping  
22 13 13 Facility Sanitary Sewers

### **Division 23 00 00 – Heating, Ventilating and Air Conditioning**

23 00 00 HVAC System  
23 05 00 Common Work Results for HVAC  
23 05 93 Testing, Adjusting and Balancing for HVAC  
23 07 00 Insulation  
23 09 00 Instrumentation and Controls for HVAC  
23 30 00 HVAC for Distribution

### **Division 26 00 00 – Electrical**

26 00 00 General Electrical Requirements  
26 00 10 Lighting Cut Sheets  
26 05 19 Low Voltage Electrical Power Conductors & Cables  
26 05 26 Groundings & Bonding for Electrical Systems  
26 05 33 Raceways & Boxes for Electrical Systems  
26 05 53 Identification for Electrical Systems  
26 09 24 Lighting Control Devices  
26 24 16 Panelboards  
26 27 13 Electricity Metering  
26 27 26 Wiring Devices  
26 32 13 Engine Generators  
26 36 23 Automatic Transfer Switches  
26 51 00 Interior Lighting  
26 56 00 Exterior Lighting  
27 15 00 Communication Cabling  
28 31 11 Digital Addressable Fire Alarm System

### **Division 31 00 00 – Earthwork**

31 20 00 Earth Moving

**20 THAMES STREET – PORTLAND, ME**

**Division 32 00 00 – Exterior Improvements**

- 32 14 00 Unit Paving
- 32 30 00 Site Improvements
- 32 93 00 Plants

**Division 33 00 00 – Utilities**

- 33 41 00 Storm Utility Drainage Piping

**END OF SECTION**

SECTION 00 73 00

SUPPLEMENTARY CONDITION  
OF THE CONTRACT FOR CONSTRUCTION

1. GENERAL

1.1 CHANGE ORDERS

A. Delete Subparagraph 7.2.2 and substitute the following:

7.2.2 The General Contractor will be allowed the following Profit and Overhead on Change Orders: OH&P General Contractor = 10% on own work, 5% on Subcontractors and Sub-subcontractors.

1.2 INSURANCE

A. Refer to General Conditions, Article 11, Insurance and Bonds for general provisions concerning insurance.

B. Amend, General Conditions, Article 11, as follows:

1. Add to Sub-sub-paragraph 11.1.1.7 the following: Liability insurance shall include all major divisions of coverage, and be on a comprehensive basis including:

- a. Premises operations (including XCU as applicable).
- b. Independent contractors' protective.
- c. Products and completed operations.
- d. Personal injury liability with employment exclusion deleted.
- e. Contractual, including specified provisions for Contractor's obligation under Paragraph 4.18.
- f. Owned, non-owned, and hired motor vehicles.
- g. Broad form property damage, including completed operations.
- h. Umbrella excess liability.

2. Sub-paragraph 11.1.2, add Sub-sub-paragraph 11.1.2.1 as follows: "11.1.2.1: Insurance required by Sub-paragraph 11.1.1 shall be written for not less than following, or greater if required by law:

- a. Statutory Workman's Compensation and Employer's Liability.
- b. Comprehensive General Liability (including Premises-Operations; Independent Contractors' Protective; Products and Completed Operations' Broad Form Property Damage):
  - i. Bodily Injury:
    - \$1,000,000 each person
    - \$3,000,000 annual aggregate

## 20 THAMES STREET – PORTLAND, ME

- ii. Property Damage
  - \$1,000,000 each occurrence
  - \$3,000,000 annual aggregate
- iii. Products and Completed Operations shall be maintained for two years after final payment.
- iv. Property Damage Liability Insurance shall provide X, C, and U coverage (explosion, collapse, underground utilities) as applicable.
- c. Contractual Liability:
  - i. Property Injury:
    - \$1,000,000 each occurrence
  - ii. Property Damage:
    - \$1,000,000 each occurrence
    - \$3,000,000 annual aggregate
- d. Personal Injury, with Employment Exclusion deleted:
  - \$1,000,000 annual aggregate
- e. Comprehensive Automobile Liability:
  - i. Bodily Injury:
    - \$1,000,000 each occurrence
    - \$3,000,000 annual aggregate
  - ii. Property Damage:
    - \$1,000,000 each occurrence
- f. Umbrella Excess Liability
  - i. \$1,000,000 over primary insurance
  - \$ 3,000 retention for self-insured hazards, each occurrence

### 1.3 MSHA REQUIREMENTS

- A. Change Orders - all Change Orders or Change Order Proposals must be approved by the MaineHousing Construction Analyst. Prior to the Change Order becoming a valid amendment to the Contract.
- B. Applications for Payment require MaineHousing Construction Analyst approval.
- C. Retainage - withhold retainage (10%) on payment requisitions/applications. Reductions in retainage if approved by the Owner and MaineHousing Construction Analyst.
- D. Closeout Requirements - MaineHousing Closeout requirements are included in Appendix A to this section.
- E. MaineHousing Incomplete Work Escrow policy and form is included in Appendix B to this section
- F. All required MaineHousing forms are published in the Appendix.

**END OF SECTION**

# DRAFT AIA® Document A133™ – 2009

## **Standard Form of Agreement Between Owner and Construction Manager as Constructor where the basis of payment is the Cost of the Work Plus a Fee with a Guaranteed Maximum Price**

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

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

EssexNorth Portland LLC  
PO Box 394  
Topsfield MA 01983

and the Construction Manager:  
(Name, legal status and address)

«»  
«»

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

«20 Thames Street»  
«Portland, ME»

The Architect:  
(Name, legal status and address)

«Archetype, PA»  
«48 Union Wharf  
Portland, ME 04101»

The Owner's Designated Representative:  
(Name, address and other information)

«»  
«»  
«»  
«»  
«»  
«»

The Construction Manager's Designated Representative:  
(Name, address and other information)

«»  
«»  
«»  
«»  
«»

### **ADDITIONS AND DELETIONS:**

The author of this document has added information needed for its completion. The author may also have revised the text of the original AIA standard form. An *Additions and Deletions Report* that notes added information as well as revisions to the standard form text is available from the author and should be reviewed.

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

AIA Document A201™-2007, General Conditions of the Contract for Construction, is adopted in this document by reference. Do not use with other general conditions unless this document is modified.

**ELECTRONIC COPYING** of any portion of this AIA® Document to another electronic file is prohibited and constitutes a violation of copyright laws as set forth in the footer of this document.

<< >>

The Architect's Designated Representative:  
(Name, address and other information)

<< >>

<< >>

<< >>

<< >>

<< >>

<< >>

The Owner and Construction Manager agree as follows.



## TABLE OF ARTICLES

- 1 GENERAL PROVISIONS
- 2 CONSTRUCTION MANAGER'S RESPONSIBILITIES
- 3 OWNER'S RESPONSIBILITIES
- 4 COMPENSATION AND PAYMENTS FOR PRECONSTRUCTION PHASE SERVICES
- 5 COMPENSATION FOR CONSTRUCTION PHASE SERVICES
- 6 COST OF THE WORK FOR CONSTRUCTION PHASE
- 7 PAYMENTS FOR CONSTRUCTION PHASE SERVICES
- 8 INSURANCE AND BONDS
- 9 DISPUTE RESOLUTION
- 10 TERMINATION OR SUSPENSION
- 11 MISCELLANEOUS PROVISIONS
- 12 SCOPE OF THE AGREEMENT

## EXHIBIT A GUARANTEED MAXIMUM PRICE AMENDMENT

### ARTICLE 1 GENERAL PROVISIONS

#### § 1.1 The Contract Documents

The Contract Documents consist of this Agreement, Conditions of the Contract (General, Supplementary and other Conditions), Drawings, Specifications, Addenda issued prior to the execution of this Agreement, other documents listed in this Agreement, and Modifications issued after execution of this Agreement, all of which form the Contract and are as fully a part of the Contract as if attached to this Agreement or repeated herein. Upon the Owner's acceptance of the Construction Manager's Guaranteed Maximum Price proposal, the Contract Documents will also include the documents described in Section 2.2.3 and identified in the Guaranteed Maximum Price Amendment and revisions prepared by the Architect and furnished by the Owner as described in Section 2.2.8. The Contract represents the entire and integrated agreement between the parties hereto and supersedes prior negotiations, representations or agreements, either written or oral. If anything in the other Contract Documents, other than a Modification, is inconsistent with this Agreement, this Agreement shall govern.

#### § 1.2 Relationship of the Parties

The Construction Manager accepts the relationship of trust and confidence established by this Agreement and covenants with the Owner to cooperate with the Architect and exercise the Construction Manager's skill and judgment in furthering the interests of the Owner; to furnish efficient construction administration, management services and supervision; to furnish at all times an adequate supply of workers and materials; and to perform the Work in an expeditious and economical manner consistent with the Owner's interests. The Owner agrees to furnish or approve, in a timely manner, information required by the Construction Manager and to make payments to the Construction Manager in accordance with the requirements of the Contract Documents.

#### § 1.3 General Conditions

For the Preconstruction Phase, AIA Document A201™–2007, General Conditions of the Contract for Construction, shall apply only as specifically provided in this Agreement. For the Construction Phase, the general conditions of the contract shall be as set forth in A201–2007, which document is incorporated herein by reference. The term "Contractor" as used in A201–2007 shall mean the Construction Manager.



## ARTICLE 2 CONSTRUCTION MANAGER'S RESPONSIBILITIES

The Construction Manager's Preconstruction Phase responsibilities are set forth in Sections 2.1 and 2.2. The Construction Manager's Construction Phase responsibilities are set forth in Section 2.3. The Owner and Construction Manager may agree, in consultation with the Architect, for the Construction Phase to commence prior to completion of the Preconstruction Phase, in which case, both phases will proceed concurrently. The Construction Manager shall identify a representative authorized to act on behalf of the Construction Manager with respect to the Project.

### § 2.1 Preconstruction Phase

§ 2.1.1 The Construction Manager shall provide a preliminary evaluation of the Owner's program, schedule and construction budget requirements, each in terms of the other.

### § 2.1.2 Consultation

The Construction Manager shall schedule and conduct meetings with the Architect and Owner to discuss such matters as procedures, progress, coordination, and scheduling of the Work. The Construction Manager shall advise the Owner and the Architect on proposed site use and improvements, selection of materials, and building systems and equipment. The Construction Manager shall also provide recommendations consistent with the Project requirements to the Owner and Architect on constructability; availability of materials and labor; time requirements for procurement, installation and construction; and factors related to construction cost including, but not limited to, costs of alternative designs or materials, preliminary budgets, life-cycle data, and possible cost reductions.

§ 2.1.3 When Project requirements in Section 3.1.1 have been sufficiently identified, the Construction Manager shall prepare and periodically update a Project schedule for the Architect's review and the Owner's acceptance. The Construction Manager shall obtain the Architect's approval for the portion of the Project schedule relating to the performance of the Architect's services. The Project schedule shall coordinate and integrate the Construction Manager's services, the Architect's services, other Owner consultants' services, and the Owner's responsibilities and identify items that could affect the Project's timely completion. The updated Project schedule shall include the following: submission of the Guaranteed Maximum Price proposal; components of the Work; times of commencement and completion required of each Subcontractor; ordering and delivery of products, including those that must be ordered well in advance of construction; and the occupancy requirements of the Owner.

### § 2.1.4 Phased Construction

The Construction Manager shall provide recommendations with regard to accelerated or fast-track scheduling, procurement, or phased construction. The Construction Manager shall take into consideration cost reductions, cost information, constructability, provisions for temporary facilities and procurement and construction scheduling issues.

### § 2.1.5 Preliminary Cost Estimates

§ 2.1.5.1 Based on the preliminary design and other design criteria prepared by the Architect, the Construction Manager shall prepare preliminary estimates of the Cost of the Work or the cost of program requirements using area, volume or similar conceptual estimating techniques for the Architect's review and Owner's approval. If the Architect or Construction Manager suggests alternative materials and systems, the Construction Manager shall provide cost evaluations of those alternative materials and systems.

§ 2.1.5.2 As the Architect progresses with the preparation of the Schematic Design, Design Development and Construction Documents, the Construction Manager shall prepare and update, at appropriate intervals agreed to by the Owner, Construction Manager and Architect, estimates of the Cost of the Work of increasing detail and refinement and allowing for the further development of the design until such time as the Owner and Construction Manager agree on a Guaranteed Maximum Price for the Work. Such estimates shall be provided for the Architect's review and the Owner's approval. The Construction Manager shall inform the Owner and Architect when estimates of the Cost of the Work exceed the latest approved Project budget and make recommendations for corrective action.

### § 2.1.6 Subcontractors and Suppliers

The Construction Manager shall develop bidders' interest in the Project.

**§ 2.1.7** The Construction Manager shall prepare, for the Architect's review and the Owner's acceptance, a procurement schedule for items that must be ordered well in advance of construction. The Construction Manager shall expedite and coordinate the ordering and delivery of materials that must be ordered well in advance of construction. If the Owner agrees to procure any items prior to the establishment of the Guaranteed Maximum Price, the Owner shall procure the items on terms and conditions acceptable to the Construction Manager. Upon the establishment of the Guaranteed Maximum Price, the Owner shall assign all contracts for these items to the Construction Manager and the Construction Manager shall thereafter accept responsibility for them.

#### **§ 2.1.8 Extent of Responsibility**

The Construction Manager shall exercise reasonable care in preparing schedules and estimates. The Construction Manager, however, does not warrant or guarantee estimates and schedules except as may be included as part of the Guaranteed Maximum Price. The Construction Manager is not required to ascertain that the Drawings and Specifications are in accordance with applicable laws, statutes, ordinances, codes, rules and regulations, or lawful orders of public authorities, but the Construction Manager shall promptly report to the Architect and Owner any nonconformity discovered by or made known to the Construction Manager as a request for information in such form as the Architect may require.

#### **§ 2.1.9 Notices and Compliance with Laws**

The Construction Manager shall comply with applicable laws, statutes, ordinances, codes, rules and regulations, and lawful orders of public authorities applicable to its performance under this Contract, and with equal employment opportunity programs, and other programs as may be required by governmental and quasi governmental authorities for inclusion in the Contract Documents.

#### **§ 2.2 Guaranteed Maximum Price Proposal and Contract Time**

**§ 2.2.1** At a time to be mutually agreed upon by the Owner and the Construction Manager and in consultation with the Architect, the Construction Manager shall prepare a Guaranteed Maximum Price proposal for the Owner's review and acceptance. The Guaranteed Maximum Price in the proposal shall be the sum of the Construction Manager's estimate of the Cost of the Work, including contingencies described in Section 2.2.4, and the Construction Manager's Fee.

**§ 2.2.2** To the extent that the Drawings and Specifications are anticipated to require further development by the Architect, the Construction Manager shall provide in the Guaranteed Maximum Price for such further development consistent with the Contract Documents and reasonably inferable therefrom. Such further development does not include such things as changes in scope, systems, kinds and quality of materials, finishes or equipment, all of which, if required, shall be incorporated by Change Order.

**§ 2.2.3** The Construction Manager shall include with the Guaranteed Maximum Price proposal a written statement of its basis, which shall include the following:

- .1 A list of the Drawings and Specifications, including all Addenda thereto, and the Conditions of the Contract;
- .2 A list of the clarifications and assumptions made by the Construction Manager in the preparation of the Guaranteed Maximum Price proposal, including assumptions under Section 2.2.2, to supplement the information provided by the Owner and contained in the Drawings and Specifications;
- .3 A statement of the proposed Guaranteed Maximum Price, including a statement of the estimated Cost of the Work organized by trade categories or systems, allowances, contingency, and the Construction Manager's Fee;
- .4 The anticipated date of Substantial Completion upon which the proposed Guaranteed Maximum Price is based; and
- .5 A date by which the Owner must accept the Guaranteed Maximum Price.

**§ 2.2.4** In preparing the Construction Manager's Guaranteed Maximum Price proposal, the Construction Manager shall include its contingency for the Construction Manager's exclusive use to cover those costs considered reimbursable as the Cost of the Work but not included in a Change Order.

**§ 2.2.5** The Construction Manager shall meet with the Owner and Architect to review the Guaranteed Maximum Price proposal. In the event that the Owner and Architect discover any inconsistencies or inaccuracies in the

information presented, they shall promptly notify the Construction Manager, who shall make appropriate adjustments to the Guaranteed Maximum Price proposal, its basis, or both.

**§ 2.2.6** If the Owner notifies the Construction Manager that the Owner has accepted the Guaranteed Maximum Price proposal in writing before the date specified in the Guaranteed Maximum Price proposal, the Guaranteed Maximum Price proposal shall be deemed effective without further acceptance from the Construction Manager. Following acceptance of a Guaranteed Maximum Price, the Owner and Construction Manager shall execute the Guaranteed Maximum Price Amendment amending this Agreement, a copy of which the Owner shall provide to the Architect. The Guaranteed Maximum Price Amendment shall set forth the agreed upon Guaranteed Maximum Price with the information and assumptions upon which it is based.

**§ 2.2.7** The Construction Manager shall not incur any cost to be reimbursed as part of the Cost of the Work prior to the commencement of the Construction Phase, unless the Owner provides prior written authorization for such costs.

**§ 2.2.8** The Owner shall authorize the Architect to provide the revisions to the Drawings and Specifications to incorporate the agreed upon assumptions and clarifications contained in the Guaranteed Maximum Price Amendment. The Owner shall promptly furnish those revised Drawings and Specifications to the Construction Manager as they are revised. The Construction Manager shall notify the Owner and Architect of any inconsistencies between the Guaranteed Maximum Price Amendment and the revised Drawings and Specifications.

**§ 2.2.9** The Construction Manager shall include in the Guaranteed Maximum Price all sales, consumer, use and similar taxes for the Work provided by the Construction Manager that are legally enacted, whether or not yet effective, at the time the Guaranteed Maximum Price Amendment is executed.

## **§ 2.3 Construction Phase**

### **§ 2.3.1 General**

**§ 2.3.1.1** For purposes of Section 8.1.2 of A201–2007, the date of commencement of the Work shall mean the date of commencement of the Construction Phase.

**§ 2.3.1.2** The Construction Phase shall commence upon the Owner's acceptance of the Construction Manager's Guaranteed Maximum Price proposal or the Owner's issuance of a Notice to Proceed, whichever occurs earlier.

### **§ 2.3.2 Administration**

**§ 2.3.2.1** Those portions of the Work that the Construction Manager does not customarily perform with the Construction Manager's own personnel shall be performed under subcontracts or by other appropriate agreements with the Construction Manager. The Owner may designate specific persons from whom, or entities from which, the Construction Manager shall obtain bids. The Construction Manager shall obtain bids from Subcontractors and from suppliers of materials or equipment fabricated especially for the Work and shall deliver such bids to the Architect. The Owner shall then determine, with the advice of the Construction Manager and the Architect, which bids will be accepted. The Construction Manager shall not be required to contract with anyone to whom the Construction Manager has reasonable objection.

**§ 2.3.2.2** If the Guaranteed Maximum Price has been established and when a specific bidder (1) is recommended to the Owner by the Construction Manager, (2) is qualified to perform that portion of the Work, and (3) has submitted a bid that conforms to the requirements of the Contract Documents without reservations or exceptions, but the Owner requires that another bid be accepted, then the Construction Manager may require that a Change Order be issued to adjust the Contract Time and the Guaranteed Maximum Price by the difference between the bid of the person or entity recommended to the Owner by the Construction Manager and the amount and time requirement of the subcontract or other agreement actually signed with the person or entity designated by the Owner.

**§ 2.3.2.3** Subcontracts or other agreements shall conform to the applicable payment provisions of this Agreement, and shall not be awarded on the basis of cost plus a fee without the prior consent of the Owner. If the Subcontract is awarded on a cost plus fee basis, the Construction Manager shall provide in the Subcontract for the Owner to receive the same audit rights with regard to the Subcontractor as the Owner receives with regard to the Construction Manager in Section 6.11 below.

§ 2.3.2.4 If the Construction Manager recommends a specific bidder that may be considered a “related party” according to Section 6.10, then the Construction Manager shall promptly notify the Owner in writing of such relationship and notify the Owner of the specific nature of the contemplated transaction, according to Section 6.10.2.

§ 2.3.2.5 The Construction Manager shall schedule and conduct meetings to discuss such matters as procedures, progress, coordination, scheduling, and status of the Work. The Construction Manager shall prepare and promptly distribute minutes to the Owner and Architect.

§ 2.3.2.6 Upon the execution of the Guaranteed Maximum Price Amendment, the Construction Manager shall prepare and submit to the Owner and Architect a construction schedule for the Work and submittal schedule in accordance with Section 3.10 of A201–2007.

§ 2.3.2.7 The Construction Manager shall record the progress of the Project. On a monthly basis, or otherwise as agreed to by the Owner, the Construction Manager shall submit written progress reports to the Owner and Architect, showing percentages of completion and other information required by the Owner. The Construction Manager shall also keep, and make available to the Owner and Architect, a daily log containing a record for each day of weather, portions of the Work in progress, number of workers on site, identification of equipment on site, problems that might affect progress of the work, accidents, injuries, and other information required by the Owner.

§ 2.3.2.8 The Construction Manager shall develop a system of cost control for the Work, including regular monitoring of actual costs for activities in progress and estimates for uncompleted tasks and proposed changes. The Construction Manager shall identify variances between actual and estimated costs and report the variances to the Owner and Architect and shall provide this information in its monthly reports to the Owner and Architect, in accordance with Section 2.3.2.7 above.

#### § 2.4 Professional Services

Section 3.12.10 of A201–2007 shall apply to both the Preconstruction and Construction Phases.

#### § 2.5 Hazardous Materials

Section 10.3 of A201–2007 shall apply to both the Preconstruction and Construction Phases.

### ARTICLE 3 OWNER'S RESPONSIBILITIES

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

§ 3.1.1 The Owner shall provide information with reasonable promptness, regarding requirements for and limitations on the Project, including a written program which shall set forth the Owner’s objectives, constraints, and criteria, including schedule, space requirements and relationships, flexibility and expandability, special equipment, systems, sustainability and site requirements.

§ 3.1.2 Prior to the execution of the Guaranteed Maximum Price Amendment, the Construction Manager may request in writing that the Owner provide reasonable evidence that the Owner has made financial arrangements to fulfill the Owner’s obligations under the Contract. Thereafter, the Construction Manager may only request such evidence if (1) the Owner fails to make payments to the Construction Manager as the Contract Documents require, (2) a change in the Work materially changes the Contract Sum, or (3) the Construction Manager identifies in writing a reasonable concern regarding the Owner’s ability to make payment when due. The Owner shall furnish such evidence as a condition precedent to commencement or continuation of the Work or the portion of the Work affected by a material change. After the Owner furnishes the evidence, the Owner shall not materially vary such financial arrangements without prior notice to the Construction Manager and Architect.

§ 3.1.3 The Owner shall establish and periodically update the Owner’s budget for the Project, including (1) the budget for the Cost of the Work as defined in Section 6.1.1, (2) the Owner’s other costs, and (3) reasonable contingencies related to all of these costs. If the Owner significantly increases or decreases the Owner’s budget for the Cost of the Work, the Owner shall notify the Construction Manager and Architect. The Owner and the Architect, in consultation with the Construction Manager, shall thereafter agree to a corresponding change in the Project’s scope and quality.

§ 3.1.4 **Structural and Environmental Tests, Surveys and Reports.** During the Preconstruction Phase, the Owner shall furnish the following information or services with reasonable promptness. The Owner shall also furnish any other

information or services under the Owner's control and relevant to the Construction Manager's performance of the Work with reasonable promptness after receiving the Construction Manager's written request for such information or services. The Construction Manager shall be entitled to rely on the accuracy of information and services furnished by the Owner but shall exercise proper precautions relating to the safe performance of the Work.

**§ 3.1.4.1** The Owner shall furnish tests, inspections and reports required by law and as otherwise agreed to by the parties, such as structural, mechanical, and chemical tests, tests for air and water pollution, and tests for hazardous materials.

**§ 3.1.4.2** 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 surveys and legal information shall include, as applicable, grades and lines of streets, alleys, pavements and adjoining property and structures; designated wetlands; adjacent drainage; rights-of-way, restrictions, easements, encroachments, zoning, deed restrictions, boundaries and contours of the site; locations, dimensions and necessary data with respect to existing buildings, other improvements and trees; and information concerning available utility services and lines, both public and private, above and below grade, including inverts and depths. All the information on the survey shall be referenced to a Project benchmark.

**§ 3.1.4.3** The Owner, when such services are requested, shall furnish services of geotechnical engineers, which may include but are not limited to test borings, test pits, determinations of soil bearing values, percolation tests, evaluations of hazardous materials, seismic evaluation, ground corrosion tests and resistivity tests, including necessary operations for anticipating subsoil conditions, with written reports and appropriate recommendations.

**§ 3.1.4.4** During the Construction Phase, 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 Construction Manager's performance of the Work with reasonable promptness after receiving the Construction Manager's written request for such information or services.

### **§ 3.2 Owner's Designated Representative**

The Owner shall identify a representative authorized to act on behalf of the Owner with respect to the Project. The Owner's representative shall render decisions promptly and furnish information expeditiously, so as to avoid unreasonable delay in the services or Work of the Construction Manager. Except as otherwise provided in Section 4.2.1 of A201-2007, the Architect does not have such authority. The term "Owner" means the Owner or the Owner's authorized representative.

**§ 3.2.1 Legal Requirements.** The Owner shall furnish all legal, insurance and accounting services, including auditing services, that may be reasonably necessary at any time for the Project to meet the Owner's needs and interests.

### **§ 3.3 Architect**

The Owner shall retain an Architect to provide services, duties and responsibilities as described in AIA Document B133™-2014, Standard Form of Agreement Between Owner and Architect, Construction Manager as Constructor Edition. The Owner shall provide the Construction Manager a copy of the executed agreement between the Owner and the Architect, and any further modifications to the agreement.

## **ARTICLE 4 COMPENSATION AND PAYMENTS FOR PRECONSTRUCTION PHASE SERVICES**

### **§ 4.1 Compensation**

**§ 4.1.1** For the Construction Manager's Preconstruction Phase services, the Owner shall compensate the Construction Manager as follows:

**§ 4.1.2** For the Construction Manager's Preconstruction Phase services described in Sections 2.1 and 2.2:  
*(Insert amount of, or basis for, compensation and include a list of reimbursable cost items, as applicable.)*

« »

**§ 4.1.3** If the Preconstruction Phase services covered by this Agreement have not been completed within « » ( « » ) months of the date of this Agreement, through no fault of the Construction Manager, the Construction Manager's compensation for Preconstruction Phase services shall be equitably adjusted.



§ 4.1.4 Compensation based on Direct Personnel Expense includes the direct salaries of the Construction Manager's personnel providing Preconstruction Phase services on the Project and the Construction Manager's costs for the mandatory and customary contributions and benefits related thereto, such as employment taxes and other statutory employee benefits, insurance, sick leave, holidays, vacations, employee retirement plans and similar contributions.

§ 4.2 Payments

§ 4.2.1 Unless otherwise agreed, payments for services shall be made monthly in proportion to services performed.

§ 4.2.2 Payments are due and payable upon presentation of the Construction Manager's invoice. Amounts unpaid « » ( « » ) days after the invoice date shall bear interest at the rate entered below, or in the absence thereof at the legal rate prevailing from time to time at the principal place of business of the Construction Manager.  
(Insert rate of monthly or annual interest agreed upon.)

« » % « »

ARTICLE 5 COMPENSATION FOR CONSTRUCTION PHASE SERVICES

§ 5.1 For the Construction Manager's performance of the Work as described in Section 2.3, the Owner shall pay the Construction Manager the Contract Sum in current funds. The Contract Sum is the Cost of the Work as defined in Section 6.1.1 plus the Construction Manager's Fee.

§ 5.1.1 The Construction Manager's Fee:

(State a lump sum, percentage of Cost of the Work or other provision for determining the Construction Manager's Fee.)

« »

§ 5.1.2 The method of adjustment of the Construction Manager's Fee for changes in the Work:

« »

§ 5.1.3 Limitations, if any, on a Subcontractor's overhead and profit for increases in the cost of its portion of the Work:

« »

§ 5.1.4 Rental rates for Construction Manager-owned equipment shall not exceed « » percent ( « » %) of the standard rate paid at the place of the Project.

§ 5.1.5 Unit prices, if any:

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

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

§ 5.2 Guaranteed Maximum Price

§ 5.2.1 The Construction Manager guarantees that the Contract Sum shall not exceed the Guaranteed Maximum Price set forth in the Guaranteed Maximum Price Amendment, as it is amended from time to time. To the extent the Cost of the Work exceeds the Guaranteed Maximum Price, the Construction Manager shall bear such costs in excess of the Guaranteed Maximum Price without reimbursement or additional compensation from the Owner.

(Insert specific provisions if the Construction Manager is to participate in any savings.)

« »

§ 5.2.2 The Guaranteed Maximum Price is subject to additions and deductions by Change Order as provided in the Contract Documents and the Date of Substantial Completion shall be subject to adjustment as provided in the Contract Documents.

### § 5.3 Changes in the Work

§ 5.3.1 The Owner may, without invalidating the Contract, order changes in the Work within the general scope of the Contract consisting of additions, deletions or other revisions. The Owner shall issue such changes in writing. The Architect may make minor changes in the Work as provided in Section 7.4 of AIA Document A201–2007, General Conditions of the Contract for Construction. The Construction Manager shall be entitled to an equitable adjustment in the Contract Time as a result of changes in the Work.

§ 5.3.2 Adjustments to the Guaranteed Maximum Price on account of changes in the Work subsequent to the execution of the Guaranteed Maximum Price Amendment may be determined by any of the methods listed in Section 7.3.3 of AIA Document A201–2007, General Conditions of the Contract for Construction.

§ 5.3.3 In calculating adjustments to subcontracts (except those awarded with the Owner’s prior consent on the basis of cost plus a fee), the terms “cost” and “fee” as used in Section 7.3.3.3 of AIA Document A201–2007 and the term “costs” as used in Section 7.3.7 of AIA Document A201–2007 shall have the meanings assigned to them in AIA Document A201–2007 and shall not be modified by Sections 5.1 and 5.2, Sections 6.1 through 6.7, and Section 6.8 of this Agreement. Adjustments to subcontracts awarded with the Owner’s prior consent on the basis of cost plus a fee shall be calculated in accordance with the terms of those subcontracts.

§ 5.3.4 In calculating adjustments to the Guaranteed Maximum Price, the terms “cost” and “costs” as used in the above-referenced provisions of AIA Document A201–2007 shall mean the Cost of the Work as defined in Sections 6.1 to 6.7 of this Agreement and the term “fee” shall mean the Construction Manager’s Fee as defined in Section 5.1 of this Agreement.

§ 5.3.5 If no specific provision is made in Section 5.1.2 for adjustment of the Construction Manager’s Fee in the case of changes in the Work, or if the extent of such changes is such, in the aggregate, that application of the adjustment provisions of Section 5.1.2 will cause substantial inequity to the Owner or Construction Manager, the Construction Manager’s Fee shall be equitably adjusted on the same basis that was used to establish the Fee for the original Work, and the Guaranteed Maximum Price shall be adjusted accordingly.

## ARTICLE 6 COST OF THE WORK FOR CONSTRUCTION PHASE

### § 6.1 Costs to Be Reimbursed

§ 6.1.1 The term Cost of the Work shall mean costs necessarily incurred by the Construction Manager in the proper performance of the Work. Such costs shall be at rates not higher than the standard paid at the place of the Project except with prior consent of the Owner. The Cost of the Work shall include only the items set forth in Sections 6.1 through 6.7.

§ 6.1.2 Where any cost is subject to the Owner’s prior approval, the Construction Manager shall obtain this approval prior to incurring the cost. The parties shall endeavor to identify any such costs prior to executing Guaranteed Maximum Price Amendment.

### § 6.2 Labor Costs

§ 6.2.1 Wages of construction workers directly employed by the Construction Manager to perform the construction of the Work at the site or, with the Owner’s prior approval, at off-site workshops.

§ 6.2.2 Wages or salaries of the Construction Manager’s supervisory and administrative personnel when stationed at the site with the Owner’s prior approval.

*(If it is intended that the wages or salaries of certain personnel stationed at the Construction Manager’s principal or other offices shall be included in the Cost of the Work, identify in Section 11.5, the personnel to be included, whether for all or only part of their time, and the rates at which their time will be charged to the Work.)*

§ 6.2.3 Wages and salaries of the Construction Manager’s supervisory or administrative personnel engaged at factories, workshops or on the road, in expediting the production or transportation of materials or equipment required for the Work, but only for that portion of their time required for the Work.

§ 6.2.4 Costs paid or incurred by the Construction Manager for taxes, insurance, contributions, assessments and benefits required by law or collective bargaining agreements and, for personnel not covered by such agreements,

customary benefits such as sick leave, medical and health benefits, holidays, vacations and pensions, provided such costs are based on wages and salaries included in the Cost of the Work under Sections 6.2.1 through 6.2.3.

**§ 6.2.5** Bonuses, profit sharing, incentive compensation and any other discretionary payments paid to anyone hired by the Construction Manager or paid to any Subcontractor or vendor, with the Owner's prior approval.

### **§ 6.3 Subcontract Costs**

Payments made by the Construction Manager to Subcontractors in accordance with the requirements of the subcontracts.

### **§ 6.4 Costs of Materials and Equipment Incorporated in the Completed Construction**

**§ 6.4.1** Costs, including transportation and storage, of materials and equipment incorporated or to be incorporated in the completed construction.

**§ 6.4.2** Costs of materials described in the preceding Section 6.4.1 in excess of those actually installed to allow for reasonable waste and spoilage. Unused excess materials, if any, shall become the Owner's property at the completion of the Work or, at the Owner's option, shall be sold by the Construction Manager. Any amounts realized from such sales shall be credited to the Owner as a deduction from the Cost of the Work.

### **§ 6.5 Costs of Other Materials and Equipment, Temporary Facilities and Related Items**

**§ 6.5.1** Costs of transportation, storage, installation, maintenance, dismantling and removal of materials, supplies, temporary facilities, machinery, equipment and hand tools not customarily owned by construction workers that are provided by the Construction Manager at the site and fully consumed in the performance of the Work. Costs of materials, supplies, temporary facilities, machinery, equipment and tools that are not fully consumed shall be based on the cost or value of the item at the time it is first used on the Project site less the value of the item when it is no longer used at the Project site. Costs for items not fully consumed by the Construction Manager shall mean fair market value.

**§ 6.5.2** Rental charges for temporary facilities, machinery, equipment and hand tools not customarily owned by construction workers that are provided by the Construction Manager at the site and costs of transportation, installation, minor repairs, dismantling and removal. The total rental cost of any Construction Manager-owned item may not exceed the purchase price of any comparable item. Rates of Construction Manager-owned equipment and quantities of equipment shall be subject to the Owner's prior approval.

**§ 6.5.3** Costs of removal of debris from the site of the Work and its proper and legal disposal.

**§ 6.5.4** Costs of document reproductions, facsimile transmissions and long-distance telephone calls, postage and parcel delivery charges, telephone service at the site and reasonable petty cash expenses of the site office.

**§ 6.5.5** That portion of the reasonable expenses of the Construction Manager's supervisory or administrative personnel incurred while traveling in discharge of duties connected with the Work.

**§ 6.5.6** Costs of materials and equipment suitably stored off the site at a mutually acceptable location, subject to the Owner's prior approval.

### **§ 6.6 Miscellaneous Costs**

**§ 6.6.1** Premiums for that portion of insurance and bonds required by the Contract Documents that can be directly attributed to this Contract. Self-insurance for either full or partial amounts of the coverages required by the Contract Documents, with the Owner's prior approval.

**§ 6.6.2** Sales, use or similar taxes imposed by a governmental authority that are related to the Work and for which the Construction Manager is liable.

**§ 6.6.3** Fees and assessments for the building permit and for other permits, licenses and inspections for which the Construction Manager is required by the Contract Documents to pay.



§ 6.6.4 Fees of laboratories for tests required by the Contract Documents, except those related to defective or nonconforming Work for which reimbursement is excluded by Section 13.5.3 of AIA Document A201–2007 or by other provisions of the Contract Documents, and which do not fall within the scope of Section 6.7.3.

§ 6.6.5 Royalties and license fees paid for the use of a particular design, process or product required by the Contract Documents; the cost of defending suits or claims for infringement of patent rights arising from such requirement of the Contract Documents; and payments made in accordance with legal judgments against the Construction Manager resulting from such suits or claims and payments of settlements made with the Owner's consent. However, such costs of legal defenses, judgments and settlements shall not be included in the calculation of the Construction Manager's Fee or subject to the Guaranteed Maximum Price. If such royalties, fees and costs are excluded by the last sentence of Section 3.17 of AIA Document A201–2007 or other provisions of the Contract Documents, then they shall not be included in the Cost of the Work.

§ 6.6.6 Costs for electronic equipment and software, directly related to the Work with the Owner's prior approval.

§ 6.6.7 Deposits lost for causes other than the Construction Manager's negligence or failure to fulfill a specific responsibility in the Contract Documents.

§ 6.6.8 Legal, mediation and arbitration costs, including attorneys' fees, other than those arising from disputes between the Owner and Construction Manager, reasonably incurred by the Construction Manager after the execution of this Agreement in the performance of the Work and with the Owner's prior approval, which shall not be unreasonably withheld.

§ 6.6.9 Subject to the Owner's prior approval, expenses incurred in accordance with the Construction Manager's standard written personnel policy for relocation and temporary living allowances of the Construction Manager's personnel required for the Work.

#### § 6.7 Other Costs and Emergencies

§ 6.7.1 Other costs incurred in the performance of the Work if, and to the extent, approved in advance in writing by the Owner.

§ 6.7.2 Costs incurred in taking action to prevent threatened damage, injury or loss in case of an emergency affecting the safety of persons and property, as provided in Section 10.4 of AIA Document A201–2007.

§ 6.7.3 Costs of repairing or correcting damaged or nonconforming Work executed by the Construction Manager, Subcontractors or suppliers, provided that such damaged or nonconforming Work was not caused by negligence or failure to fulfill a specific responsibility of the Construction Manager and only to the extent that the cost of repair or correction is not recovered by the Construction Manager from insurance, sureties, Subcontractors, suppliers, or others.

§ 6.7.4 The costs described in Sections 6.1 through 6.7 shall be included in the Cost of the Work, notwithstanding any provision of AIA Document A201–2007 or other Conditions of the Contract which may require the Construction Manager to pay such costs, unless such costs are excluded by the provisions of Section 6.8.

#### § 6.8 Costs Not To Be Reimbursed

§ 6.8.1 The Cost of the Work shall not include the items listed below:

- .1 Salaries and other compensation of the Construction Manager's personnel stationed at the Construction Manager's principal office or offices other than the site office, except as specifically provided in Section 6.2, or as may be provided in Article 11;
- .2 Expenses of the Construction Manager's principal office and offices other than the site office;
- .3 Overhead and general expenses, except as may be expressly included in Sections 6.1 to 6.7;
- .4 The Construction Manager's capital expenses, including interest on the Construction Manager's capital employed for the Work;
- .5 Except as provided in Section 6.7.3 of this Agreement, costs due to the negligence or failure of the Construction Manager, Subcontractors and suppliers or anyone directly or indirectly employed by any of them or for whose acts any of them may be liable to fulfill a specific responsibility of the Contract;
- .6 Any cost not specifically and expressly described in Sections 6.1 to 6.7;

- .7 Costs, other than costs included in Change Orders approved by the Owner, that would cause the Guaranteed Maximum Price to be exceeded; and
- .8 Costs for services incurred during the Preconstruction Phase.

### § 6.9 Discounts, Rebates and Refunds

§ 6.9.1 Cash discounts obtained on payments made by the Construction Manager shall accrue to the Owner if (1) before making the payment, the Construction Manager included them in an Application for Payment and received payment from the Owner, or (2) the Owner has deposited funds with the Construction Manager with which to make payments; otherwise, cash discounts shall accrue to the Construction Manager. Trade discounts, rebates, refunds and amounts received from sales of surplus materials and equipment shall accrue to the Owner, and the Construction Manager shall make provisions so that they can be obtained.

§ 6.9.2 Amounts that accrue to the Owner in accordance with the provisions of Section 6.9.1 shall be credited to the Owner as a deduction from the Cost of the Work.

### § 6.10 Related Party Transactions

§ 6.10.1 For purposes of Section 6.10, the term “related party” shall mean a parent, subsidiary, affiliate or other entity having common ownership or management with the Construction Manager; any entity in which any stockholder in, or management employee of, the Construction Manager owns any interest in excess of ten percent in the aggregate; or any person or entity which has the right to control the business or affairs of the Construction Manager. The term “related party” includes any member of the immediate family of any person identified above.

§ 6.10.2 If any of the costs to be reimbursed arise from a transaction between the Construction Manager and a related party, the Construction Manager shall notify the Owner of the specific nature of the contemplated transaction, including the identity of the related party and the anticipated cost to be incurred, before any such transaction is consummated or cost incurred. If the Owner, after such notification, authorizes the proposed transaction, then the cost incurred shall be included as a cost to be reimbursed, and the Construction Manager shall procure the Work, equipment, goods or service from the related party, as a Subcontractor, according to the terms of Sections 2.3.2.1, 2.3.2.2 and 2.3.2.3. If the Owner fails to authorize the transaction, the Construction Manager shall procure the Work, equipment, goods or service from some person or entity other than a related party according to the terms of Sections 2.3.2.1, 2.3.2.2 and 2.3.2.3.

### § 6.11 Accounting Records

The Construction Manager shall keep full and detailed records and accounts related to the cost of the Work and exercise such controls as may be necessary for proper financial management under this Contract and to substantiate all costs incurred. The accounting and control systems shall be satisfactory to the Owner. The Owner and the Owner’s auditors shall, during regular business hours and upon reasonable notice, be afforded access to, and shall be permitted to audit and copy, the Construction Manager’s records and accounts, including complete documentation supporting accounting entries, books, correspondence, instructions, drawings, receipts, subcontracts, Subcontractor’s proposals, purchase orders, vouchers, memoranda and other data relating to this Contract. The Construction Manager shall preserve these records for a period of three years after final payment, or for such longer period as may be required by law.

## ARTICLE 7 PAYMENTS FOR CONSTRUCTION PHASE SERVICES

### § 7.1 Progress Payments

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

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

« »

§ 7.1.3 Provided that an Application for Payment is received by the Architect not later than the « » day of a month, the Owner shall make payment of the certified amount to the Construction Manager not later than the « » day of the « » month. If an Application for Payment is received by the Architect after the application date fixed above,

payment shall be made by the Owner not later than «» ( «» ) days after the Architect receives the Application for Payment.

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

**§ 7.1.4** With each Application for Payment, the Construction Manager shall submit payrolls, petty cash accounts, receipted invoices or invoices with check vouchers attached, and any other evidence required by the Owner or Architect to demonstrate that cash disbursements already made by the Construction Manager on account of the Cost of the Work equal or exceed progress payments already received by the Construction Manager, less that portion of those payments attributable to the Construction Manager's Fee, plus payrolls for the period covered by the present Application for Payment.

**§ 7.1.5** Each Application for Payment shall be based on the most recent schedule of values submitted by the Construction Manager in accordance with the Contract Documents. The schedule of values shall allocate the entire Guaranteed Maximum Price among the various portions of the Work, except that the Construction Manager's Fee shall be shown as a single separate item. The schedule of values shall be prepared in such form and supported by such data to substantiate its accuracy as the Architect may require. This schedule, unless objected to by the Architect, shall be used as a basis for reviewing the Construction Manager's Applications for Payment.

**§ 7.1.6** Applications for Payment shall show the percentage of completion of each portion of the Work as of the end of the period covered by the Application for Payment. The percentage of completion shall be the lesser of (1) the percentage of that portion of the Work which has actually been completed, or (2) the percentage obtained by dividing (a) the expense that has actually been incurred by the Construction Manager on account of that portion of the Work for which the Construction Manager has made or intends to make actual payment prior to the next Application for Payment by (b) the share of the Guaranteed Maximum Price allocated to that portion of the Work in the schedule of values.

**§ 7.1.7** Subject to other provisions of the Contract Documents, the amount of each progress payment shall be computed as follows:

- .1 Take that portion of the Guaranteed Maximum Price properly allocable to completed Work as determined by multiplying the percentage of completion of each portion of the Work by the share of the Guaranteed Maximum Price allocated to that portion of the Work in the schedule of values. Pending final determination of cost to the Owner of changes in the Work, amounts not in dispute shall be included as provided in Section 7.3.9 of AIA Document A201-2007;
- .2 Add that portion of the Guaranteed Maximum Price properly allocable to materials and equipment delivered and suitably stored at the site for subsequent incorporation in the Work, or if approved in advance by the Owner, suitably stored off the site at a location agreed upon in writing;
- .3 Add the Construction Manager's Fee, less retainage of «» percent ( «» % ). The Construction Manager's Fee shall be computed upon the Cost of the Work at the rate stated in Section 5.1 or, if the Construction Manager's Fee is stated as a fixed sum in that Section, shall be an amount that bears the same ratio to that fixed-sum fee as the Cost of the Work bears to a reasonable estimate of the probable Cost of the Work upon its completion;
- .4 Subtract retainage of «» percent ( «» % ) from that portion of the Work that the Construction Manager self-performs;
- .5 Subtract the aggregate of previous payments made by the Owner;
- .6 Subtract the shortfall, if any, indicated by the Construction Manager in the documentation required by Section 7.1.4 to substantiate prior Applications for Payment, or resulting from errors subsequently discovered by the Owner's auditors in such documentation; and
- .7 Subtract amounts, if any, for which the Architect has withheld or nullified a Certificate for Payment as provided in Section 9.5 of AIA Document A201-2007.

**§ 7.1.8** The Owner and Construction Manager shall agree upon (1) a mutually acceptable procedure for review and approval of payments to Subcontractors and (2) the percentage of retainage held on Subcontracts, and the Construction Manager shall execute subcontracts in accordance with those agreements.

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

**§ 7.1.10** In taking action on the Construction Manager's Applications for Payment, the Architect shall be entitled to rely on the accuracy and completeness of the information furnished by the Construction Manager and shall not be deemed to represent that the Architect has made a detailed examination, audit or arithmetic verification of the documentation submitted in accordance with Section 7.1.4 or other supporting data; that the Architect has made exhaustive or continuous on-site inspections; or that the Architect has made examinations to ascertain how or for what purposes the Construction Manager has used amounts previously paid on account of the Contract. Such examinations, audits and verifications, if required by the Owner, will be performed by the Owner's auditors acting in the sole interest of the Owner.

## **§ 7.2 Final Payment**

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

- .1 the Construction Manager has fully performed the Contract except for the Construction Manager's responsibility to correct Work as provided in Section 12.2.2 of AIA Document A201-2007, and to satisfy other requirements, if any, which extend beyond final payment;
- .2 the Construction Manager has submitted a final accounting for the Cost of the Work and a final Application for Payment; and
- .3 a final Certificate for Payment has been issued by the Architect.

The Owner's final payment to the Construction Manager shall be made no later than 30 days after the issuance of the Architect's final Certificate for Payment, or as follows:

<< >>

**§ 7.2.2** The Owner's auditors will review and report in writing on the Construction Manager's final accounting within 30 days after delivery of the final accounting to the Architect by the Construction Manager. Based upon such Cost of the Work as the Owner's auditors report to be substantiated by the Construction Manager's final accounting, and provided the other conditions of Section 7.2.1 have been met, the Architect will, within seven days after receipt of the written report of the Owner's auditors, either issue to the Owner a final Certificate for Payment with a copy to the Construction Manager, or notify the Construction Manager and Owner in writing of the Architect's reasons for withholding a certificate as provided in Section 9.5.1 of the AIA Document A201-2007. The time periods stated in this Section supersede those stated in Section 9.4.1 of the AIA Document A201-2007. The Architect is not responsible for verifying the accuracy of the Construction Manager's final accounting.

**§ 7.2.3** If the Owner's auditors report the Cost of the Work as substantiated by the Construction Manager's final accounting to be less than claimed by the Construction Manager, the Construction Manager shall be entitled to request mediation of the disputed amount without seeking an initial decision pursuant to Section 15.2 of A201-2007. A request for mediation shall be made by the Construction Manager within 30 days after the Construction Manager's receipt of a copy of the Architect's final Certificate for Payment. Failure to request mediation within this 30-day period shall result in the substantiated amount reported by the Owner's auditors becoming binding on the Construction Manager. Pending a final resolution of the disputed amount, the Owner shall pay the Construction Manager the amount certified in the Architect's final Certificate for Payment.

**§ 7.2.4** If, subsequent to final payment and at the Owner's request, the Construction Manager incurs costs described in Section 6.1.1 and not excluded by Section 6.8 to correct defective or nonconforming Work, the Owner shall reimburse the Construction Manager such costs and the Construction Manager's Fee applicable thereto on the same basis as if such costs had been incurred prior to final payment, but not in excess of the Guaranteed Maximum Price. If the Construction Manager has participated in savings as provided in Section 5.2.1, the amount of such savings shall be recalculated and appropriate credit given to the Owner in determining the net amount to be paid by the Owner to the Construction Manager.

## **ARTICLE 8 INSURANCE AND BONDS**

For all phases of the Project, the Construction Manager and the Owner shall purchase and maintain insurance, and the Construction Manager shall provide bonds as set forth in Article 11 of AIA Document A201-2007.

*(State bonding requirements, if any, and limits of liability for insurance required in Article 11 of AIA Document A201-2007.)*

**ARTICLE 9 DISPUTE RESOLUTION**

**§ 9.1** Any Claim between the Owner and Construction Manager shall be resolved in accordance with the provisions set forth in this Article 9 and Article 15 of A201–2007. However, for Claims arising from or relating to the Construction Manager’s Preconstruction Phase services, no decision by the Initial Decision Maker shall be required as a condition precedent to mediation or binding dispute resolution, and Section 9.3 of this Agreement shall not apply.

**§ 9.2** For any Claim subject to, but not resolved by mediation pursuant to Section 15.3 of AIA Document A201–2007, the method of binding dispute resolution shall be as follows:

*(Check the appropriate box. If the Owner and Construction Manager do not select a method of binding dispute resolution below, or do not subsequently agree in writing to a binding dispute resolution method other than litigation, Claims will be resolved by litigation in a court of competent jurisdiction.)*

[  ] Arbitration pursuant to Section 15.4 of AIA Document A201–2007

[  ] Litigation in a court of competent jurisdiction

[  ] Other: *(Specify)*

<< >>

**§ 9.3 Initial Decision Maker**

The Architect will serve as the Initial Decision Maker pursuant to Section 15.2 of AIA Document A201–2007 for Claims arising from or relating to the Construction Manager’s Construction Phase services, unless the parties appoint below another individual, not a party to the Agreement, to serve as the Initial Decision Maker.

*(If the parties mutually agree, insert the name, address and other contact information of the Initial Decision Maker, if other than the Architect.)*

<< >>  
<< >>  
<< >>  
<< >>

**ARTICLE 10 TERMINATION OR SUSPENSION****§ 10.1 Termination Prior to Establishment of the Guaranteed Maximum Price**

**§ 10.1.1** Prior to the execution of the Guaranteed Maximum Price Amendment, the Owner may terminate this Agreement upon not less than seven days’ written notice to the Construction Manager for the Owner’s convenience and without cause, and the Construction Manager may terminate this Agreement, upon not less than seven days’ written notice to the Owner, for the reasons set forth in Section 14.1.1 of A201–2007.

**§ 10.1.2** In the event of termination of this Agreement pursuant to Section 10.1.1, the Construction Manager shall be equitably compensated for Preconstruction Phase services performed prior to receipt of a notice of termination. In no event shall the Construction Manager’s compensation under this Section exceed the compensation set forth in Section 4.1.

**§ 10.1.3** If the Owner terminates the Contract pursuant to Section 10.1.1 after the commencement of the Construction Phase but prior to the execution of the Guaranteed Maximum Price Amendment, the Owner shall pay to the Construction Manager an amount calculated as follows, which amount shall be in addition to any compensation paid to the Construction Manager under Section 10.1.2:

- 1 Take the Cost of the Work incurred by the Construction Manager to the date of termination;
- 2 Add the Construction Manager’s Fee computed upon the Cost of the Work to the date of termination at the rate stated in Section 5.1 or, if the Construction Manager’s Fee is stated as a fixed sum in that Section, an amount that bears the same ratio to that fixed-sum Fee as the Cost of the Work at the time



- of termination bears to a reasonable estimate of the probable Cost of the Work upon its completion;  
and  
.3 Subtract the aggregate of previous payments made by the Owner for Construction Phase services.

The Owner shall also pay the Construction Manager fair compensation, either by purchase or rental at the election of the Owner, for any equipment owned by the Construction Manager which the Owner elects to retain and which is not otherwise included in the Cost of the Work under Section 10.1.3.1. To the extent that the Owner elects to take legal assignment of subcontracts and purchase orders (including rental agreements), the Construction Manager shall, as a condition of receiving the payments referred to in this Article 10, execute and deliver all such papers and take all such steps, including the legal assignment of such subcontracts and other contractual rights of the Construction Manager, as the Owner may require for the purpose of fully vesting in the Owner the rights and benefits of the Construction Manager under such subcontracts or purchase orders. All Subcontracts, purchase orders and rental agreements entered into by the Construction Manager will contain provisions allowing for assignment to the Owner as described above.

If the Owner accepts assignment of subcontracts, purchase orders or rental agreements as described above, the Owner will reimburse or indemnify the Construction Manager for all costs arising under the subcontract, purchase order or rental agreement, if those costs would have been reimbursable as Cost of the Work if the contract had not been terminated. If the Owner chooses not to accept assignment of any subcontract, purchase order or rental agreement that would have constituted a Cost of the Work had this agreement not been terminated, the Construction Manager will terminate the subcontract, purchase order or rental agreement and the Owner will pay the Construction Manager the costs necessarily incurred by the Construction Manager because of such termination.

#### **§ 10.2 Termination Subsequent to Establishing Guaranteed Maximum Price**

Following execution of the Guaranteed Maximum Price Amendment and subject to the provisions of Section 10.2.1 and 10.2.2 below, the Contract may be terminated as provided in Article 14 of AIA Document A201–2007.

**§ 10.2.1** If the Owner terminates the Contract after execution of the Guaranteed Maximum Price Amendment, the amount payable to the Construction Manager pursuant to Sections 14.2 and 14.4 of A201–2007 shall not exceed the amount the Construction Manager would otherwise have received pursuant to Sections 10.1.2 and 10.1.3 of this Agreement.

**§ 10.2.2** If the Construction Manager terminates the Contract after execution of the Guaranteed Maximum Price Amendment, the amount payable to the Construction Manager under Section 14.1.3 of A201–2007 shall not exceed the amount the Construction Manager would otherwise have received under Sections 10.1.2 and 10.1.3 above, except that the Construction Manager’s Fee shall be calculated as if the Work had been fully completed by the Construction Manager, utilizing as necessary a reasonable estimate of the Cost of the Work for Work not actually completed.

#### **§ 10.3 Suspension**

The Work may be suspended by the Owner as provided in Article 14 of AIA Document A201–2007. In such case, the Guaranteed Maximum Price and Contract Time shall be increased as provided in Section 14.3.2 of AIA Document A201–2007, except that the term “profit” shall be understood to mean the Construction Manager’s Fee as described in Sections 5.1 and 5.3.5 of this Agreement.

### **ARTICLE 11 MISCELLANEOUS PROVISIONS**

**§ 11.1** Terms in this Agreement shall have the same meaning as those in A201–2007.

#### **§ 11.2 Ownership and Use of Documents**

Section 1.5 of A201–2007 shall apply to both the Preconstruction and Construction Phases.

#### **§ 11.3 Governing Law**

Section 13.1 of A201–2007 shall apply to both the Preconstruction and Construction Phases.

#### **§ 11.4 Assignment**

The Owner and Construction Manager, respectively, bind themselves, their agents, successors, assigns and legal representatives to this Agreement. Neither the Owner nor the Construction Manager shall assign this Agreement

without the written consent of the other, except that the Owner may assign this Agreement to a lender providing financing for the Project if the lender agrees to assume the Owner's rights and obligations under this Agreement. Except as provided in Section 13.2.2 of A201-2007, neither party to the Contract shall assign the Contract as a whole without written consent of the other. If either party attempts to make such an assignment without such consent, that party shall nevertheless remain legally responsible for all obligations under the Contract.

§ 11.5 Other provisions:

« »

**ARTICLE 12 SCOPE OF THE AGREEMENT**

§ 12.1 This Agreement represents the entire and integrated agreement between the Owner and the Construction Manager and supersedes all prior negotiations, representations or agreements, either written or oral. This Agreement may be amended only by written instrument signed by both Owner and Construction Manager.

§ 12.2 The following documents comprise the Agreement:

- .1 AIA Document A133-2009, Standard Form of Agreement Between Owner and Construction Manager as Constructor where the basis of payment is the Cost of the Work Plus a Fee with a Guaranteed Maximum Price
- .2 AIA Document A201-2007, General Conditions of the Contract for Construction
- .3 AIA Document E201™-2007, Digital Data Protocol Exhibit, if completed, or the following:

«»

- .4 AIA Document E202™-2008, Building Information Modeling Protocol Exhibit, if completed, or the following:

«»

- .5 Other documents:

*(List other documents, if any, forming part of the Agreement.)*

« »

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

« »

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

« »« »

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

« »

\_\_\_\_\_  
**CONSTRUCTION MANAGER** *(Signature)*

« »« »

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

# DRAFT AIA® Document A201™ – 2017

## General Conditions of the Contract for Construction

### for the following PROJECT:

(Name and location or address)

«20 Thames Street»

« »

### THE OWNER:

(Name, legal status and address)

«EssexNorth Portland LLC»«»

«PO Box 394

Topsfield MA 01983»

### THE ARCHITECT:

(Name, legal status and address)

«Archetype, PA»« »

«48 Union Wharf

Portland, ME 04101»

### TABLE OF ARTICLES

- 1 GENERAL PROVISIONS
- 2 OWNER
- 3 CONTRACTOR
- 4 ARCHITECT
- 5 SUBCONTRACTORS
- 6 CONSTRUCTION BY OWNER OR BY SEPARATE CONTRACTORS
- 7 CHANGES IN THE WORK
- 8 TIME
- 9 PAYMENTS AND COMPLETION
- 10 PROTECTION OF PERSONS AND PROPERTY
- 11 INSURANCE AND BONDS
- 12 UNCOVERING AND CORRECTION OF WORK
- 13 MISCELLANEOUS PROVISIONS

#### ADDITIONS AND DELETIONS:

The author of this document has added information needed for its completion. The author may also have revised the text of the original AIA standard form. An *Additions and Deletions Report* that notes added information as well as revisions to the standard form text is available from the author and should be reviewed.

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.

**ELECTRONIC COPYING** of any portion of this AIA® Document to another electronic file is prohibited and constitutes a violation of copyright laws as set forth in the footer of this document.



14 TERMINATION OR SUSPENSION OF THE CONTRACT

15 CLAIMS AND DISPUTES



## INDEX

(Topics and numbers in bold are Section headings.)

### Acceptance of Nonconforming Work

9.6.6, 9.9.3, **12.3**

Acceptance of Work

9.6.6, 9.8.2, 9.9.3, 9.10.1, 9.10.3, 12.3

### Access to Work

**3.16**, 6.2.1, 12.1

Accident Prevention

10

Acts and Omissions

3.2, 3.3.2, 3.12.8, 3.18, 4.2.3, 8.3.1, 9.5.1, 10.2.5,  
10.2.8, 13.3.2, 14.1, 15.1.2, 15.2

Addenda

1.1.1

Additional Costs, Claims for

3.7.4, 3.7.5, 10.3.2, 15.1.5

### Additional Inspections and Testing

9.4.2, 9.8.3, 12.2.1, **13.4**

### Additional Time, Claims for

3.2.4, 3.7.4, 3.7.5, 3.10.2, 8.3.2, **15.1.6**

### Administration of the Contract

3.1.3, **4.2**, 9.4, 9.5

Advertisement or Invitation to Bid

1.1.1

Aesthetic Effect

4.2.13

### Allowances

**3.8**

### Applications for Payment

4.2.5, 7.3.9, 9.2, **9.3**, 9.4, 9.5.1, 9.5.4, 9.6.3, 9.7, 9.10

Approvals

2.1.1, 2.3.1, 2.5, 3.1.3, 3.10.2, 3.12.8, 3.12.9,

3.12.10.1, 4.2.7, 9.3.2, 13.4.1

### Arbitration

8.3.1, 15.3.2, **15.4**

## ARCHITECT

**4**

Architect, Definition of

**4.1.1**

Architect, Extent of Authority

2.5, 3.12.7, 4.1.2, 4.2, 5.2, 6.3, 7.1.2, 7.3.4, 7.4, 9.2,  
9.3.1, 9.4, 9.5, 9.6.3, 9.8, 9.10.1, 9.10.3, 12.1, 12.2.1,  
13.4.1, 13.4.2, 14.2.2, 14.2.4, 15.1.4, 15.2.1

Architect, Limitations of Authority and  
Responsibility

2.1.1, 3.12.4, 3.12.8, 3.12.10, 4.1.2, 4.2.1, 4.2.2,  
4.2.3, 4.2.6, 4.2.7, 4.2.10, 4.2.12, 4.2.13, 5.2.1, 7.4,  
9.4.2, 9.5.4, 9.6.4, 15.1.4, 15.2

Architect's Additional Services and Expenses

2.5, 12.2.1, 13.4.2, 13.4.3, 14.2.4

Architect's Administration of the Contract

3.1.3, 3.7.4, 15.2, 9.4.1, 9.5

Architect's Approvals

2.5, 3.1.3, 3.5, 3.10.2, 4.2.7

Architect's Authority to Reject Work

3.5, 4.2.6, 12.1.2, 12.2.1

Architect's Copyright

1.1.7, 1.5

Architect's Decisions

3.7.4, 4.2.6, 4.2.7, 4.2.11, 4.2.12, 4.2.13, 4.2.14, 6.3,  
7.3.4, 7.3.9, 8.1.3, 8.3.1, 9.2, 9.4.1, 9.5, 9.8.4, 9.9.1,  
13.4.2, 15.2

Architect's Inspections

3.7.4, 4.2.2, 4.2.9, 9.4.2, 9.8.3, 9.9.2, 9.10.1, 13.4

Architect's Instructions

3.2.4, 3.3.1, 4.2.6, 4.2.7, 13.4.2

Architect's Interpretations

4.2.11, 4.2.12

Architect's Project Representative

4.2.10

Architect's Relationship with Contractor

1.1.2, 1.5, 2.3.3, 3.1.3, 3.2.2, 3.2.3, 3.2.4, 3.3.1, 3.4.2,  
3.5, 3.7.4, 3.7.5, 3.9.2, 3.9.3, 3.10, 3.11, 3.12, 3.16,  
3.18, 4.1.2, 4.2, 5.2, 6.2.2, 7, 8.3.1, 9.2, 9.3, 9.4, 9.5,  
9.7, 9.8, 9.9, 10.2.6, 10.3, 11.3, 12, 13.3.2, 13.4, 15.2

Architect's Relationship with Subcontractors

1.1.2, 4.2.3, 4.2.4, 4.2.6, 9.6.3, 9.6.4, 11.3

Architect's Representations

9.4.2, 9.5.1, 9.10.1

Architect's Site Visits

3.7.4, 4.2.2, 4.2.9, 9.4.2, 9.5.1, 9.9.2, 9.10.1, 13.4

Asbestos

10.3.1

Attorneys' Fees

3.18.1, 9.6.8, 9.10.2, 10.3.3

Award of Separate Contracts

6.1.1, 6.1.2

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

**5.2**

### Basic Definitions

**1.1**

Bidding Requirements

1.1.1

Binding Dispute Resolution

8.3.1, 9.7, 11.5, 13.1, 15.1.2, 15.1.3, 15.2.1, 15.2.5,  
15.2.6.1, 15.3.1, 15.3.2, 15.3.3, 15.4.1

Bonds, Lien

7.3.4.4, 9.6.8, 9.10.2, 9.10.3

### Bonds, Performance, and Payment

7.3.4.4, 9.6.7, 9.10.3, **11.1.2**, 11.1.3, **11.5**

### Building Information Models Use and Reliance

**1.8**

Building Permit

3.7.1

### Capitalization

**1.3**

Certificate of Substantial Completion

9.8.3, 9.8.4, 9.8.5

### Certificates for Payment

4.2.1, 4.2.5, 4.2.9, 9.3.3, **9.4**, 9.5, 9.6.1, 9.6.6, 9.7, 9.10.1, 9.10.3, 14.1.1.3, 14.2.4, 15.1.4  
Certificates of Inspection, Testing or Approval  
13.4.4  
Certificates of Insurance  
9.10.2  
**Change Orders**  
1.1.1, 3.4.2, 3.7.4, 3.8.2.3, 3.11, 3.12.8, 4.2.8, 5.2.3, 7.1.2, 7.1.3, **7.2**, 7.3.2, 7.3.7, 7.3.9, 7.3.10, 8.3.1, 9.3.1.1, 9.10.3, 10.3.2, 11.2, 11.5, 12.1.2  
**Change Orders**, Definition of  
**7.2.1**  
**CHANGES IN THE WORK**  
2.2.2, 3.11, 4.2.8, **7**, 7.2.1, 7.3.1, 7.4, 8.3.1, 9.3.1.1, 11.5  
**Claims**, Definition of  
**15.1.1**  
Claims, Notice of  
1.6.2, 15.1.3  
**CLAIMS AND DISPUTES**  
3.2.4, 6.1.1, 6.3, 7.3.9, 9.3.3, 9.10.4, 10.3.3, **15**, 15.4  
Claims and Timely Assertion of Claims  
15.4.1  
**Claims for Additional Cost**  
3.2.4, 3.3.1, 3.7.4, 7.3.9, 9.5.2, 10.2.5, 10.3.2, **15.1.5**  
**Claims for Additional Time**  
3.2.4, 3.3.1, 3.7.4, 6.1.1, 8.3.2, 9.5.2, 10.3.2, **15.1.6**  
**Concealed or Unknown Conditions, Claims for**  
**3.7.4**  
Claims for Damages  
3.2.4, 3.18, 8.3.3, 9.5.1, 9.6.7, 10.2.5, 10.3.3, 11.3, 11.3.2, 14.2.4, 15.1.7  
Claims Subject to Arbitration  
15.4.1  
**Cleaning Up**  
**3.15**, 6.3  
Commencement of the Work, Conditions Relating to  
2.2.1, 3.2.2, 3.4.1, 3.7.1, 3.10.1, 3.12.6, 5.2.1, 5.2.3, 6.2.2, 8.1.2, 8.2.2, 8.3.1, 11.1, 11.2, **15.1.5**  
**Commencement of the Work**, Definition of  
**8.1.2**  
**Communications**  
3.9.1, **4.2.4**  
Completion, Conditions Relating to  
3.4.1, 3.11, 3.15, 4.2.2, 4.2.9, 8.2, 9.4.2, 9.8, 9.9.1, 9.10, 12.2, 14.1.2, 15.1.2  
**COMPLETION, PAYMENTS AND**  
**9**  
Completion, Substantial  
3.10.1, 4.2.9, 8.1.1, 8.1.3, 8.2.3, 9.4.2, 9.8, 9.9.1, 9.10.3, 12.2, 15.1.2  
Compliance with Laws  
2.3.2, 3.2.3, 3.6, 3.7, 3.12.10, 3.13, 9.6.4, 10.2.2, 13.1, 13.3, 13.4.1, 13.4.2, 13.5, 14.1.1, 14.2.1.3, 15.2.8, 15.4.2, 15.4.3  
Concealed or Unknown Conditions  
3.7.4, 4.2.8, 8.3.1, 10.3

Conditions of the Contract  
1.1.1, 6.1.1, 6.1.4  
Consent, Written  
3.4.2, 3.14.2, 4.1.2, 9.8.5, 9.9.1, 9.10.2, 9.10.3, 13.2, 15.4.4.2  
**Consolidation or Joinder**  
**15.4.4**  
**CONSTRUCTION BY OWNER OR BY SEPARATE CONTRACTORS**  
1.1.4, **6**  
**Construction Change Directive**, Definition of  
**7.3.1**  
**Construction Change Directives**  
1.1.1, 3.4.2, 3.11, 3.12.8, 4.2.8, 7.1.1, 7.1.2, 7.1.3, **7.3**, 9.3.1.1  
Construction Schedules, Contractor's  
3.10, 3.11, 3.12.1, 3.12.2, 6.1.3, 15.1.6.2  
**Contingent Assignment of Subcontracts**  
**5.4**, 14.2.2.2  
**Continuing Contract Performance**  
**15.1.4**  
**Contract**, Definition of  
**1.1.2**  
**CONTRACT, TERMINATION OR SUSPENSION OF THE**  
5.4.1.1, 5.4.2, 11.5, **14**  
Contract Administration  
3.1.3, 4, 9.4, 9.5  
Contract Award and Execution, Conditions Relating to  
3.7.1, 3.10, 5.2, 6.1  
Contract Documents, Copies Furnished and Use of  
1.5.2, 2.3.6, 5.3  
**Contract Documents**, Definition of  
**1.1.1**  
**Contract Sum**  
2.2.2, 2.2.4, 3.7.4, 3.7.5, 3.8, 3.10.2, 5.2.3, 7.3, 7.4, **9.1**, 9.2, 9.4.2, 9.5.1.4, 9.6.7, **9.7**, 10.3.2, 11.5, 12.1.2, 12.3, 14.2.4, 14.3.2, 15.1.4.2, **15.1.5**, **15.2.5**  
**Contract Sum**, Definition of  
**9.1**  
Contract Time  
1.1.4, 2.2.1, 2.2.2, 3.7.4, 3.7.5, 3.10.2, 5.2.3, 6.1.5, 7.2.1.3, 7.3.1, 7.3.5, 7.3.6, 7, 7, 7.3.10, 7.4, 8.1.1, 8.2.1, 8.2.3, 8.3.1, 9.5.1, 9.7, 10.3.2, 12.1.1, 12.1.2, 14.3.2, 15.1.4.2, 15.1.6.1, 15.2.5  
**Contract Time**, Definition of  
8.1.1  
**CONTRACTOR**  
**3**  
**Contractor**, Definition of  
**3.1**, **6.1.2**  
**Contractor's Construction and Submittal Schedules**  
**3.10**, 3.12.1, 3.12.2, 4.2.3, 6.1.3, 15.1.6.2  
Contractor's Employees

2.2.4, 3.3.2, 3.4.3, 3.8.1, 3.9, 3.18.2, 4.2.3, 4.2.6, 10.2, 10.3, 11.3, 14.1, 14.2.1.1

## **Contractor's Liability Insurance**

### **11.1**

Contractor's Relationship with Separate Contractors and Owner's Forces

3.12.5, 3.14.2, 4.2.4, 6, 11.3, 12.2.4

Contractor's Relationship with Subcontractors

1.2.2, 2.2.4, 3.3.2, 3.18.1, 3.18.2, 4.2.4, 5, 9.6.2, 9.6.7, 9.10.2, 11.2, 11.3, 11.4

Contractor's Relationship with the Architect

1.1.2, 1.5, 2.3.3, 3.1.3, 3.2.2, 3.2.3, 3.2.4, 3.3.1, 3.4.2, 3.5.1, 3.7.4, 3.10, 3.11, 3.12, 3.16, 3.18, 4.2, 5.2, 6.2.2, 7, 8.3.1, 9.2, 9.3, 9.4, 9.5, 9.7, 9.8, 9.9, 10.2.6, 10.3, 11.3, 12, 13.4, 15.1.3, 15.2.1

Contractor's Representations

3.2.1, 3.2.2, 3.5, 3.12.6, 6.2.2, 8.2.1, 9.3.3, 9.8.2

Contractor's Responsibility for Those Performing the Work

3.3.2, 3.18, 5.3, 6.1.3, 6.2, 9.5.1, 10.2.8

Contractor's Review of Contract Documents

3.2

Contractor's Right to Stop the Work

2.2.2, 9.7

Contractor's Right to Terminate the Contract

14.1

Contractor's Submittals

3.10, 3.11, 3.12, 4.2.7, 5.2.1, 5.2.3, 9.2, 9.3, 9.8.2, 9.8.3, 9.9.1, 9.10.2, 9.10.3

Contractor's Superintendent

3.9, 10.2.6

Contractor's Supervision and Construction

Procedures

1.2.2, 3.3, 3.4, 3.12.10, 4.2.2, 4.2.7, 6.1.3, 6.2.4, 7.1.3, 7.3.4, 7.3.6, 8.2, 10, 12, 14, 15.1.4

Coordination and Correlation

1.2, 3.2.1, 3.3.1, 3.10, 3.12.6, 6.1.3, 6.2.1

Copies Furnished of Drawings and Specifications

1.5, 2.3.6, 3.11

Copyrights

1.5, **3.17**

Correction of Work

2.5, 3.7.3, 9.4.2, 9.8.2, 9.8.3, 9.9.1, 12.1.2, **12.2**, 12.3, 15.1.3.1, 15.1.3.2, 15.2.1

**Correlation and Intent of the Contract Documents**

### **1.2**

**Cost**, Definition of

### **7.3.4**

Costs

2.5, 3.2.4, 3.7.3, 3.8.2, 3.15.2, 5.4.2, 6.1.1, 6.2.3, 7.3.3.3, 7.3.4, 7.3.8, 7.3.9, 9.10.2, 10.3.2, 10.3.6, 11.2, 12.1.2, 12.2.1, 12.2.4, 13.4, 14

**Cutting and Patching**

### **3.14**, 6.2.5

Damage to Construction of Owner or Separate

Contractors

3.14.2, 6.2.4, 10.2.1.2, 10.2.5, 10.4, 12.2.4

Damage to the Work

3.14.2, 9.9.1, 10.2.1.2, 10.2.5, 10.4, 12.2.4

Damages, Claims for

3.2.4, 3.18, 6.1.1, 8.3.3, 9.5.1, 9.6.7, 10.3.3, 11.3.2, 11.3, 14.2.4, 15.1.7

Damages for Delay

6.2.3, 8.3.3, 9.5.1.6, 9.7, 10.3.2, 14.3.2

**Date of Commencement of the Work**, Definition of

### **8.1.2**

**Date of Substantial Completion**, Definition of

### **8.1.3**

**Day**, Definition of

### **8.1.4**

Decisions of the Architect

3.7.4, 4.2.6, 4.2.7, 4.2.11, 4.2.12, 4.2.13, 6.3, 7.3.4, 7.3.9, 8.1.3, 8.3.1, 9.2, 9.4, 9.5.1, 9.8.4, 9.9.1, 13.4.2, 14.2.2, 14.2.4, 15.1, 15.2

**Decisions to Withhold Certification**

9.4.1, **9.5**, 9.7, 14.1.1.3

Defective or Nonconforming Work, Acceptance, Rejection and Correction of

2.5, 3.5, 4.2.6, 6.2.3, 9.5.1, 9.5.3, 9.6.6, 9.8.2, 9.9.3, 9.10.4, 12.2.1

Definitions

1.1, 2.1.1, 3.1.1, 3.5, 3.12.1, 3.12.2, 3.12.3, 4.1.1, 5.1, 6.1.2, 7.2.1, 7.3.1, 8.1, 9.1, 9.8.1, 15.1.1

**Delays and Extensions of Time**

**3.2**, **3.7.4**, 5.2.3, 7.2.1, 7.3.1, **7.4**, **8.3**, 9.5.1, **9.7**, 10.3.2, **10.4**, 14.3.2, **15.1.6**, 15.2.5

**Digital Data Use and Transmission**

### **1.7**

Disputes

6.3, 7.3.9, 15.1, 15.2

**Documents and Samples at the Site**

### **3.11**

**Drawings**, Definition of

### **1.1.5**

Drawings and Specifications, Use and Ownership of

3.11

Effective Date of Insurance

8.2.2

**Emergencies**

### **10.4**, 14.1.1.2, **15.1.5**

Employees, Contractor's

3.3.2, 3.4.3, 3.8.1, 3.9, 3.18.2, 4.2.3, 4.2.6, 10.2, 10.3.3, 11.3, 14.1, 14.2.1.1

Equipment, Labor, or Materials

1.1.3, 1.1.6, 3.4, 3.5, 3.8.2, 3.8.3, 3.12, 3.13, 3.15.1, 4.2.6, 4.2.7, 5.2.1, 6.2.1, 7.3.4, 9.3.2, 9.3.3, 9.5.1.3, 9.10.2, 10.2.1, 10.2.4, 14.2.1.1, 14.2.1.2

Execution and Progress of the Work

1.1.3, 1.2.1, 1.2.2, 2.3.4, 2.3.6, 3.1, 3.3.1, 3.4.1, 3.7.1, 3.10.1, 3.12, 3.14, 4.2, 6.2.2, 7.1.3, 7.3.6, 8.2, 9.5.1, 9.9.1, 10.2, 10.3, 12.1, 12.2, 14.2, 14.3.1, 15.1.4

Extensions of Time

3.2.4, 3.7.4, 5.2.3, 7.2.1, 7.3, 7.4, 9.5.1, 9.7, 10.3.2, 10.4, 14.3, 15.1.6, **15.2.5**

## **Failure of Payment**

9.5.1.3, **9.7**, 9.10.2, 13.5, 14.1.1.3, 14.2.1.2

### **Faulty Work**

(See Defective or Nonconforming Work)

## **Final Completion and Final Payment**

4.2.1, 4.2.9, 9.8.2, **9.10**, 12.3, 14.2.4, 14.4.3

### **Financial Arrangements, Owner's**

2.2.1, 13.2.2, 14.1.1.4

## **GENERAL PROVISIONS**

### **1**

#### **Governing Law**

##### **13.1**

Guarantees (See Warranty)

#### **Hazardous Materials and Substances**

10.2.4, **10.3**

Identification of Subcontractors and Suppliers

5.2.1

#### **Indemnification**

3.17, **3.18**, 9.6.8, 9.10.2, 10.3.3, 11.3

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

2.1.2, **2.2**, 2.3, 3.2.2, 3.12.10.1, 6.1.3, 6.1.4, 6.2.5,

9.6.1, 9.9.2, 9.10.3, 10.3.3, 11.2, 13.4.1, 13.4.2,

14.1.1.4, 14.1.4, 15.1.4

#### **Initial Decision**

**15.2**

#### **Initial Decision Maker, Definition of**

1.1.8

Initial Decision Maker, Decisions

14.2.4, 15.1.4.2, 15.2.1, 15.2.2, 15.2.3, 15.2.4, 15.2.5

Initial Decision Maker, Extent of Authority

14.2.4, 15.1.4.2, 15.2.1, 15.2.2, 15.2.3, 15.2.4, 15.2.5

#### **Injury or Damage to Person or Property**

**10.2.8**, 10.4

#### **Inspections**

3.1.3, 3.3.3, 3.7.1, 4.2.2, 4.2.6, 4.2.9, 9.4.2, 9.8.3,

9.9.2, 9.10.1, 12.2.1, 13.4

#### **Instructions to Bidders**

1.1.1

Instructions to the Contractor

3.2.4, 3.3.1, 3.8.1, 5.2.1, 7, 8.2.2, 12, 13.4.2

#### **Instruments of Service, Definition of**

**1.1.7**

#### **Insurance**

6.1.1, 7.3.4, 8.2.2, 9.3.2, 9.8.4, 9.9.1, 9.10.2, 10.2.5,

**11**

#### **Insurance, Notice of Cancellation or Expiration**

**11.1.4**, **11.2.3**

#### **Insurance, Contractor's Liability**

**11.1**

Insurance, Effective Date of

8.2.2, 14.4.2

#### **Insurance, Owner's Liability**

**11.2**

#### **Insurance, Property**

**10.2.5**, 11.2, 11.4, 11.5

Insurance, Stored Materials

9.3.2

## **INSURANCE AND BONDS**

### **11**

Insurance Companies, Consent to Partial Occupancy

9.9.1

Insured loss, Adjustment and Settlement of

11.5

Intent of the Contract Documents

1.2.1, 4.2.7, 4.2.12, 4.2.13

#### **Interest**

**13.5**

#### **Interpretation**

1.1.8, 1.2.3, **1.4**, 4.1.1, 5.1, 6.1.2, 15.1.1

Interpretations, Written

4.2.11, 4.2.12

Judgment on Final Award

15.4.2

#### **Labor and Materials, Equipment**

1.1.3, 1.1.6, **3.4**, 3.5, 3.8.2, 3.8.3, 3.12, 3.13, 3.15.1,

5.2.1, 6.2.1, 7.3.4, 9.3.2, 9.3.3, 9.5.1.3, 9.10.2, 10.2.1,

10.2.4, 14.2.1.1, 14.2.1.2

Labor Disputes

8.3.1

Laws and Regulations

1.5, 2.3.2, 3.2.3, 3.2.4, 3.6, 3.7, 3.12.10, 3.13, 9.6.4,

9.9.1, 10.2.2, 13.1, 13.3.1, 13.4.2, 13.5, 14, 15.2.8,

15.4

Liens

2.1.2, 9.3.1, 9.3.3, 9.6.8, 9.10.2, 9.10.4, 15.2.8

Limitations, Statutes of

12.2.5, 15.1.2, 15.4.1.1

Limitations of Liability

3.2.2, 3.5, 3.12.10, 3.12.10.1, 3.17, 3.18.1, 4.2.6,

4.2.7, 6.2.2, 9.4.2, 9.6.4, 9.6.7, 9.6.8, 10.2.5, 10.3.3,

11.3, 12.2.5, 13.3.1

Limitations of Time

2.1.2, 2.2, 2.5, 3.2.2, 3.10, 3.11, 3.12.5, 3.15.1, 4.2.7,

5.2, 5.3, 5.4.1, 6.2.4, 7.3, 7.4, 8.2, 9.2, 9.3.1, 9.3.3,

9.4.1, 9.5, 9.6, 9.7, 9.8, 9.9, 9.10, 12.2, 13.4, 14, 15,

15.1.2, 15.1.3, 15.1.5

#### **Materials, Hazardous**

10.2.4, **10.3**

Materials, Labor, Equipment and

1.1.3, 1.1.6, 3.4.1, 3.5, 3.8.2, 3.8.3, 3.12, 3.13, 3.15.1,

5.2.1, 6.2.1, 7.3.4, 9.3.2, 9.3.3, 9.5.1.3, 9.10.2,

10.2.1.2, 10.2.4, 14.2.1.1, 14.2.1.2

Means, Methods, Techniques, Sequences and

Procedures of Construction

3.3.1, 3.12.10, 4.2.2, 4.2.7, 9.4.2

Mechanic's Lien

2.1.2, 9.3.1, 9.3.3, 9.6.8, 9.10.2, 9.10.4, 15.2.8

#### **Mediation**

8.3.1, 15.1.3.2, 15.2.1, 15.2.5, 15.2.6, **15.3**, 15.4.1,

15.4.1.1

#### **Minor Changes in the Work**

1.1.1, 3.4.2, 3.12.8, 4.2.8, 7.1, **7.4**

## **MISCELLANEOUS PROVISIONS**

### **13**

**Modifications, Definition of**  
**1.1.1**  
Modifications to the Contract  
1.1.1, 1.1.2, 2.5, 3.11, 4.1.2, 4.2.1, 5.2.3, 7, 8.3.1, 9.7, 10.3.2

**Mutual Responsibility**  
**6.2**  
**Nonconforming Work, Acceptance of**  
9.6.6, 9.9.3, **12.3**  
Nonconforming Work, Rejection and Correction of  
2.4, 2.5, 3.5, 4.2.6, 6.2.4, 9.5.1, 9.8.2, 9.9.3, 9.10.4, 12.2

**Notice**  
**1.6**, 1.6.1, 1.6.2, 2.1.2, 2.2.2., 2.2.3, 2.2.4, 2.5, 3.2.4, 3.3.1, 3.7.4, 3.7.5, 3.9.2, 3.12.9, 3.12.10, 5.2.1, 7.4, 8.2.2, 9.6.8, 9.7, 9.10.1, 10.2.8, 10.3.2, 11.5, 12.2.2.1, 13.4.1, 13.4.2, 14.1, 14.2.2, 14.4.2, 15.1.3, 15.1.5, 15.1.6, 15.4.1

Notice of Cancellation or Expiration of Insurance  
11.1.4, 11.2.3

**Notice of Claims**  
1.6.2, 2.1.2, 3.7.4, 9.6.8, 10.2.8, **15.1.3**, 15.1.5, 15.1.6, 15.2.8, 15.3.2, 15.4.1

Notice of Testing and Inspections  
13.4.1, 13.4.2

Observations, Contractor's  
3.2, 3.7.4

Occupancy  
2.3.1, 9.6.6, 9.8

Orders, Written  
1.1.1, 2.4, 3.9.2, 7, 8.2.2, 11.5, 12.1, 12.2.2.1, 13.4.2, 14.3.1

**OWNER**  
**2**  
**Owner, Definition of**  
**2.1.1**  
**Owner, Evidence of Financial Arrangements**  
**2.2**, 13.2.2, 14.1.1.4

**Owner, Information and Services Required of the**  
2.1.2, **2.2**, 2.3, 3.2.2, 3.12.10, 6.1.3, 6.1.4, 6.2.5, 9.3.2, 9.6.1, 9.6.4, 9.9.2, 9.10.3, 10.3.3, 11.2, 13.4.1, 13.4.2, 14.1.1.4, 14.1.4, 15.1.4

Owner's Authority  
1.5, 2.1.1, 2.3.32.4, 2.5, 3.4.2, 3.8.1, 3.12.10, 3.14.2, 4.1.2, 4.2.4, 4.2.9, 5.2.1, 5.2.4, 5.4.1, 6.1, 6.3, 7.2.1, 7.3.1, 8.2.2, 8.3.1, 9.3.2, 9.5.1, 9.6.4, 9.9.1, 9.10.2, 10.3.2, 11.4, 11.5, 12.2.2, 12.3, 13.2.2, 14.3, 14.4, 15.2.7

**Owner's Insurance**  
**11.2**  
Owner's Relationship with Subcontractors  
1.1.2, 5.2, 5.3, 5.4, 9.6.4, 9.10.2, 14.2.2

**Owner's Right to Carry Out the Work**  
**2.5**, 14.2.2

**Owner's Right to Clean Up**  
**6.3**  
**Owner's Right to Perform Construction and to**

**Award Separate Contracts**  
**6.1**  
**Owner's Right to Stop the Work**  
**2.4**  
Owner's Right to Suspend the Work  
14.3  
Owner's Right to Terminate the Contract  
14.2, 14.4

**Ownership and Use of Drawings, Specifications and Other Instruments of Service**  
1.1.1, 1.1.6, 1.1.7, **1.5**, 2.3.6, 3.2.2, 3.11, 3.17, 4.2.12, 5.3

**Partial Occupancy or Use**  
9.6.6, **9.9**

**Patching, Cutting and**  
**3.14**, 6.2.5

Patents  
3.17

**Payment, Applications for**  
4.2.5, 7.3.9, 9.2, **9.3**, 9.4, 9.5, 9.6.3, 9.7, 9.8.5, 9.10.1, 14.2.3, 14.2.4, 14.4.3

**Payment, Certificates for**  
4.2.5, 4.2.9, 9.3.3, **9.4**, 9.5, 9.6.1, 9.6.6, 9.7, 9.10.1, 9.10.3, 14.1.1.3, 14.2.4

**Payment, Failure of**  
9.5.1.3, **9.7**, 9.10.2, 13.5, 14.1.1.3, 14.2.1.2

Payment, Final  
4.2.1, 4.2.9, **9.10**, 12.3, 14.2.4, 14.4.3

**Payment Bond, Performance Bond and**  
7.3.4.4, 9.6.7, 9.10.3, **11.1.2**

**Payments, Progress**  
9.3, **9.6**, 9.8.5, 9.10.3, 14.2.3, 15.1.4

**PAYMENTS AND COMPLETION**  
**9**  
Payments to Subcontractors  
5.4.2, 9.5.1.3, 9.6.2, 9.6.3, 9.6.4, 9.6.7, 14.2.1.2

PCB  
10.3.1

**Performance Bond and Payment Bond**  
7.3.4.4, 9.6.7, 9.10.3, **11.1.2**

**Permits, Fees, Notices and Compliance with Laws**  
2.3.1, **3.7**, 3.13, 7.3.4.4, 10.2.2

**PERSONS AND PROPERTY, PROTECTION**  
**OF**  
**10**  
Polychlorinated Biphenyl  
10.3.1

**Product Data, Definition of**  
**3.12.2**  
**Product Data and Samples, Shop Drawings**  
3.11, **3.12**, 4.2.7

**Progress and Completion**  
4.2.2, **8.2**, 9.8, 9.9.1, 14.1.4, 15.1.4

**Progress Payments**  
9.3, **9.6**, 9.8.5, 9.10.3, 14.2.3, 15.1.4

**Project, Definition of**  
**1.1.4**

Project Representatives  
4.2.10  
**Property Insurance**  
10.2.5, 11.2  
**Proposal Requirements**  
1.1.1  
**PROTECTION OF PERSONS AND PROPERTY**  
**10**  
Regulations and Laws  
1.5, 2.3.2, 3.2.3, 3.6, 3.7, 3.12.10, 3.13, 9.6.4, 9.9.1,  
10.2.2, 13.1, 13.3, 13.4.1, 13.4.2, 13.5, 14, 15.2.8,  
15.4  
Rejection of Work  
4.2.6, 12.2.1  
Releases and Waivers of Liens  
9.3.1, 9.10.2  
Representations  
3.2.1, 3.5, 3.12.6, 8.2.1, 9.3.3, 9.4.2, 9.5.1, 9.10.1  
Representatives  
2.1.1, 3.1.1, 3.9, 4.1.1, 4.2.10, 13.2.1  
Responsibility for Those Performing the Work  
3.3.2, 3.18, 4.2.2, 4.2.3, 5.3, 6.1.3, 6.2, 6.3, 9.5.1, 10  
Retainage  
9.3.1, 9.6.2, 9.8.5, 9.9.1, 9.10.2, 9.10.3  
**Review of Contract Documents and Field**  
**Conditions by Contractor**  
**3.2**, 3.12.7, 6.1.3  
Review of Contractor's Submittals by Owner and  
Architect  
3.10.1, 3.10.2, 3.11, 3.12, 4.2, 5.2, 6.1.3, 9.2, 9.8.2  
Review of Shop Drawings, Product Data and  
Samples by Contractor  
3.12  
**Rights and Remedies**  
1.1.2, 2.4, 2.5, 3.5, 3.7.4, 3.15.2, 4.2.6, 5.3, 5.4, 6.1,  
6.3, 7.3.1, 8.3, 9.5.1, 9.7, 10.2.5, 10.3, 12.2.1, 12.2.2,  
12.2.4, 13.3, 14, 15.4  
**Royalties, Patents and Copyrights**  
**3.17**  
Rules and Notices for Arbitration  
15.4.1  
**Safety of Persons and Property**  
**10.2**, 10.4  
**Safety Precautions and Programs**  
3.3.1, 4.2.2, 4.2.7, 5.3, 10.1, 10.2, 10.4  
**Samples, Definition of**  
**3.12.3**  
**Samples, Shop Drawings, Product Data and**  
3.11, 3.12, 4.2.7  
**Samples at the Site, Documents and**  
**3.11**  
**Schedule of Values**  
**9.2**, 9.3.1  
Schedules, Construction  
3.10, 3.12.1, 3.12.2, 6.1.3, 15.1.6.2  
Separate Contracts and Contractors  
1.1.4, 3.12.5, 3.14.2, 4.2.4, 4.2.7, 6, 8.3.1, 12.1.2

**Separate Contractors, Definition of**  
**6.1.1**  
**Shop Drawings, Definition of**  
**3.12.1**  
**Shop Drawings, Product Data and Samples**  
3.11, 3.12, 4.2.7  
**Site, Use of**  
**3.13**, 6.1.1, 6.2.1  
Site Inspections  
3.2.2, 3.3.3, 3.7.1, 3.7.4, 4.2, 9.9.2, 9.4.2, 9.10.1, 13.4  
Site Visits, Architect's  
3.7.4, 4.2.2, 4.2.9, 9.4.2, 9.5.1, 9.9.2, 9.10.1, 13.4  
Special Inspections and Testing  
4.2.6, 12.2.1, 13.4  
**Specifications, Definition of**  
**1.1.6**  
**Specifications**  
1.1.1, 1.1.6, 1.2.2, 1.5, 3.12.10, 3.17, 4.2.14  
Statute of Limitations  
15.1.2, 15.4.1.1  
Stopping the Work  
2.2.2, 2.4, 9.7, 10.3, 14.1  
Stored Materials  
6.2.1, 9.3.2, 10.2.1.2, 10.2.4  
**Subcontractor, Definition of**  
**5.1.1**  
**SUBCONTRACTORS**  
**5**  
Subcontractors, Work by  
1.2.2, 3.3.2, 3.12.1, 3.18, 4.2.3, 5.2.3, 5.3, 5.4,  
9.3.1.2, 9.6.7  
**Subcontractual Relations**  
**5.3**, 5.4, 9.3.1.2, 9.6, 9.10, 10.2.1, 14.1, 14.2.1  
Submittals  
3.10, 3.11, 3.12, 4.2.7, 5.2.1, 5.2.3, 7.3.4, 9.2, 9.3,  
9.8, 9.9.1, 9.10.2, 9.10.3  
Submittal Schedule  
3.10.2, 3.12.5, 4.2.7  
**Subrogation, Waivers of**  
6.1.1, 11.3  
**Substances, Hazardous**  
**10.3**  
**Substantial Completion**  
4.2.9, 8.1.1, 8.1.3, 8.2.3, 9.4.2, 9.8, 9.9.1, 9.10.3,  
12.2, 15.1.2  
**Substantial Completion, Definition of**  
**9.8.1**  
Substitution of Subcontractors  
5.2.3, 5.2.4  
Substitution of Architect  
2.3.3  
Substitutions of Materials  
3.4.2, 3.5, 7.3.8  
**Sub-subcontractor, Definition of**  
**5.1.2**  
Subsurface Conditions  
3.7.4



## Successors and Assigns

### 13.2

#### Superintendent

3.9, 10.2.6

#### Supervision and Construction Procedures

1.2.2, 3.3, 3.4, 3.12.10, 4.2.2, 4.2.7, 6.1.3, 6.2.4, 7.1.3, 7.3.4, 8.2, 8.3.1, 9.4.2, 10, 12, 14, 15.1.4

#### Suppliers

1.5, 3.12.1, 4.2.4, 4.2.6, 5.2.1, 9.3, 9.4.2, 9.5.4, 9.6, 9.10.5, 14.2.1

#### Surety

5.4.1.2, 9.6.8, 9.8.5, 9.10.2, 9.10.3, 11.1.2, 14.2.2, 15.2.7

#### Surety, Consent of

9.8.5, 9.10.2, 9.10.3

#### Surveys

1.1.7, 2.3.4

#### Suspension by the Owner for Convenience

### 14.3

#### Suspension of the Work

3.7.5, 5.4.2, 14.3

#### Suspension or Termination of the Contract

5.4.1.1, 14

#### Taxes

3.6, 3.8.2.1, 7.3.4.4

#### Termination by the Contractor

14.1, 15.1.7

#### Termination by the Owner for Cause

5.4.1.1, 14.2, 15.1.7

#### Termination by the Owner for Convenience

### 14.4

#### Termination of the Architect

2.3.3

#### Termination of the Contractor Employment

14.2.2

## TERMINATION OR SUSPENSION OF THE CONTRACT

### 14

#### Tests and Inspections

3.1.3, 3.3.3, 3.7.1, 4.2.2, 4.2.6, 4.2.9, 9.4.2, 9.8.3, 9.9.2, 9.10.1, 10.3.2, 12.2.1, 13.4

#### TIME

### 8

#### Time, Delays and Extensions of

3.2.4, 3.7.4, 5.2.3, 7.2.1, 7.3.1, 7.4, 8.3, 9.5.1, 9.7, 10.3.2, 10.4, 14.3.2, 15.1.6, 15.2.5

#### Time Limits

2.1.2, 2.2, 2.5, 3.2.2, 3.10, 3.11, 3.12.5, 3.15.1, 4.2, 5.2, 5.3, 5.4, 6.2.4, 7.3, 7.4, 8.2, 9.2, 9.3.1, 9.3.3, 9.4.1, 9.5, 9.6, 9.7, 9.8, 9.9, 9.10, 12.2, 13.4, 14, 15.1.2, 15.1.3, 15.4

#### Time Limits on Claims

3.7.4, 10.2.8, 15.1.2, 15.1.3

#### Title to Work

9.3.2, 9.3.3

## UNCOVERING AND CORRECTION OF WORK

### 12

#### Uncovering of Work

### 12.1

#### Unforeseen Conditions, Concealed or Unknown

3.7.4, 8.3.1, 10.3

#### Unit Prices

7.3.3.2, 9.1.2

#### Use of Documents

1.1.1, 1.5, 2.3.6, 3.12.6, 5.3

#### Use of Site

3.13, 6.1.1, 6.2.1

#### Values, Schedule of

9.2, 9.3.1

#### Waiver of Claims by the Architect

13.3.2

#### Waiver of Claims by the Contractor

9.10.5, 13.3.2, 15.1.7

#### Waiver of Claims by the Owner

9.9.3, 9.10.3, 9.10.4, 12.2.2.1, 13.3.2, 14.2.4, 15.1.7

#### Waiver of Consequential Damages

14.2.4, 15.1.7

#### Waiver of Liens

9.3, 9.10.2, 9.10.4

#### Waivers of Subrogation

6.1.1, 11.3

#### Warranty

3.5, 4.2.9, 9.3.3, 9.8.4, 9.9.1, 9.10.2, 9.10.4, 12.2.2, 15.1.2

#### Weather Delays

8.3, 15.1.6.2

#### Work, Definition of

### 1.1.3

#### Written Consent

1.5.2, 3.4.2, 3.7.4, 3.12.8, 3.14.2, 4.1.2, 9.3.2, 9.10.3, 13.2, 13.3.2, 15.4.4.2

#### Written Interpretations

4.2.11, 4.2.12

#### Written Orders

1.1.1, 2.4, 3.9, 7, 8.2.2, 12.1, 12.2, 13.4.2, 14.3.1



## ARTICLE 1 GENERAL PROVISIONS

### § 1.1 Basic Definitions

#### § 1.1.1 The Contract Documents

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

#### § 1.1.2 The Contract

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

#### § 1.1.3 The Work

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

#### § 1.1.4 The Project

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

#### § 1.1.5 The Drawings

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

#### § 1.1.6 The Specifications

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

#### § 1.1.7 Instruments of Service

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

#### § 1.1.8 Initial Decision Maker

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

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

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

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

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

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

### **§ 1.3 Capitalization**

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

### **§ 1.4 Interpretation**

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

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

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

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

### **§ 1.6 Notice**

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

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

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

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

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

Any use of, or reliance on, all or a portion of a building information model without agreement to protocols governing the use of, and reliance on, the information contained in the model and without having those protocols set

forth in AIA Document E203™–2013, Building Information Modeling and Digital Data Exhibit, and the requisite AIA Document G202™–2013, Project Building Information Modeling Protocol Form, shall be at the using or relying party's sole risk and without liability to the other party and its contractors or consultants, the authors of, or contributors to, the building information model, and each of their agents and employees.

## **ARTICLE 2 OWNER**

### **§ 2.1 General**

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

### ARTICLE 3 CONTRACTOR

#### § 3.1 General

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

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

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

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

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

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

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

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

## § 3.3 Supervision and Construction Procedures

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

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

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

## § 3.4 Labor and Materials

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



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

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

### § 3.5 Warranty

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

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

### § 3.6 Taxes

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

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

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

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

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

#### § 3.7.4 Concealed or Unknown Conditions

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

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

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

### **§ 3.8 Allowances**

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

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

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

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

### **§ 3.9 Superintendent**

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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



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

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

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

### **§ 3.13 Use of Site**

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

### **§ 3.14 Cutting and Patching**

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

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

### **§ 3.15 Cleaning Up**

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

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

### **§ 3.16 Access to Work**

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

### § 3.17 Royalties, Patents and Copyrights

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

### § 3.18 Indemnification

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

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

## ARTICLE 4 ARCHITECT

### § 4.1 General

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

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

### § 4.2 Administration of the Contract

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

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

**§ 4.2.3** On the basis of the site visits, the Architect will keep the Owner reasonably informed about the progress and quality of the portion of the Work completed, and promptly report to the Owner (1) known deviations from the Contract Documents, (2) known deviations from the most recent construction schedule submitted by the Contractor, and (3) defects and deficiencies observed in the Work. The Architect will not be responsible for the Contractor's failure to perform the Work in accordance with the requirements of the Contract Documents. The Architect will not

have control over or charge of, and will not be responsible for acts or omissions of, the Contractor, Subcontractors, or their agents or employees, or any other persons or entities performing portions of the Work.

#### **§ 4.2.4 Communications**

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

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

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

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

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

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

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

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

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

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

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

## ARTICLE 5 SUBCONTRACTORS

### § 5.1 Definitions

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

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

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

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

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

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

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

### § 5.3 Subcontractual Relations

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

similarly make copies of applicable portions of such documents available to their respective proposed Sub-subcontractors.

#### **§ 5.4 Contingent Assignment of Subcontracts**

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

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

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

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

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

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

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

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

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

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

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

#### **§ 6.2 Mutual Responsibility**

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

**§ 6.2.2** If part of the Contractor's Work depends for proper execution or results upon construction or operations by the Owner or a Separate Contractor, the Contractor shall, prior to proceeding with that portion of the Work, promptly notify the Architect of apparent discrepancies or defects in the construction or operations by the Owner or Separate Contractor that would render it unsuitable for proper execution and results of the Contractor's Work. Failure of the Contractor to notify the Architect of apparent discrepancies or defects prior to proceeding with the



Work shall constitute an acknowledgment that the Owner's or Separate Contractor's completed or partially completed construction is fit and proper to receive the Contractor's Work. The Contractor shall not be responsible for discrepancies or defects in the construction or operations by the Owner or Separate Contractor that are not apparent.

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

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

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

### **§ 6.3 Owner's Right to Clean Up**

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

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

### **§ 7.1 General**

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

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

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

### **§ 7.2 Change Orders**

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

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

### **§ 7.3 Construction Change Directives**

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

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

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

- .1 Mutual acceptance of a lump sum properly itemized and supported by sufficient substantiating data to permit evaluation;
- .2 Unit prices stated in the Contract Documents or subsequently agreed upon;

- .3 Cost to be determined in a manner agreed upon by the parties and a mutually acceptable fixed or percentage fee; or
- .4 As provided in Section 7.3.4.

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

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

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

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

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

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

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

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

#### **§ 7.4 Minor Changes in the Work**

The Architect may order minor changes in the Work that are consistent with the intent of the Contract Documents and do not involve an adjustment in the Contract Sum or an extension of the Contract Time. The Architect's order for minor changes shall be in writing. If the Contractor believes that the proposed minor change in the Work will affect the Contract Sum or Contract Time, the Contractor shall notify the Architect and shall not proceed to implement the change in the Work. If the Contractor performs the Work set forth in the Architect's order for a minor

change without prior notice to the Architect that such change will affect the Contract Sum or Contract Time, the Contractor waives any adjustment to the Contract Sum or extension of the Contract Time.

## **ARTICLE 8 TIME**

### **§ 8.1 Definitions**

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

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

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

**§ 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.

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

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

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

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

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

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

**§ 9.5.1** The Architect may withhold a Certificate for Payment in whole or in part, to the extent reasonably necessary to protect the Owner, if in the Architect's opinion the representations to the Owner required by Section 9.4.2 cannot

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

- .1 defective Work not remedied;
- .2 third party claims filed or reasonable evidence indicating probable filing of such claims, unless security acceptable to the Owner is provided by the Contractor;
- .3 failure of the Contractor to make payments properly to Subcontractors or suppliers for labor, materials or equipment;
- .4 reasonable evidence that the Work cannot be completed for the unpaid balance of the Contract Sum;
- .5 damage to the Owner or a Separate Contractor;
- .6 reasonable evidence that the Work will not be completed within the Contract Time, and that the unpaid balance would not be adequate to cover actual or liquidated damages for the anticipated delay; or
- .7 repeated failure to carry out the Work in accordance with the Contract Documents.

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

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

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

## **§ 9.6 Progress Payments**

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

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

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

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

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

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

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

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

### **§ 9.7 Failure of Payment**

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

### **§ 9.8 Substantial Completion**

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

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

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

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

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

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

**§ 9.9.1** The Owner may occupy or use any completed or partially completed portion of the Work at any stage when such portion is designated by separate agreement with the Contractor, provided such occupancy or use is consented

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

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

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

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

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

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

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

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

- .1 liens, Claims, security interests, or encumbrances arising out of the Contract and unsettled;
- .2 failure of the Work to comply with the requirements of the Contract Documents;

- .3 terms of special warranties required by the Contract Documents; or
- .4 audits performed by the Owner, if permitted by the Contract Documents, after final payment.

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

## ARTICLE 10 PROTECTION OF PERSONS AND PROPERTY

### § 10.1 Safety Precautions and Programs

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

### § 10.2 Safety of Persons and Property

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

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

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

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

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

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

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

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

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

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



### **§ 10.3 Hazardous Materials and Substances**

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

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

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

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

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

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

### **§ 10.4 Emergencies**

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

## **ARTICLE 11 INSURANCE AND BONDS**

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

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

Owner, Architect, and Architect's consultants shall be named as additional insureds under the Contractor's commercial general liability policy or as otherwise described in the Contract Documents.

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

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

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

## **§ 11.2 Owner's Insurance**

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

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

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

## **§ 11.3 Waivers of Subrogation**

**§ 11.3.1** The Owner and Contractor waive all rights against (1) each other and any of their subcontractors, sub-subcontractors, agents, and employees, each of the other; (2) the Architect and Architect's consultants; and (3) Separate Contractors, if any, and any of their subcontractors, sub-subcontractors, agents, and employees, for damages caused by fire, or other causes of loss, to the extent those losses are covered by property insurance required by the Agreement or other property insurance applicable to the Project, except such rights as they have to proceeds



of such insurance. The Owner or Contractor, as appropriate, shall require similar written waivers in favor of the individuals and entities identified above from the Architect, Architect's consultants, Separate Contractors, subcontractors, and sub-subcontractors. The policies of insurance purchased and maintained by each person or entity agreeing to waive claims pursuant to this section 11.3.1 shall not prohibit this waiver of subrogation. This waiver of subrogation shall be effective as to a person or entity (1) even though that person or entity would otherwise have a duty of indemnification, contractual or otherwise, (2) even though that person or entity did not pay the insurance premium directly or indirectly, or (3) whether or not the person or entity had an insurable interest in the damaged property.

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

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

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

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

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

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

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

#### **§ 12.1 Uncovering of Work**

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

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

## § 12.2 Correction of Work

### § 12.2.1 Before Substantial Completion

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

### § 12.2.2 After Substantial Completion

§ 12.2.2.1 In addition to the Contractor's obligations under Section 3.5, if, within one year after the date of Substantial Completion of the Work or designated portion thereof or after the date for commencement of warranties established under Section 9.9.1, or by terms of any applicable special warranty required by the Contract Documents, any of the Work is found to be not in accordance with the requirements of the Contract Documents, the Contractor shall correct it promptly after receipt of notice from the Owner to do so, unless the Owner has previously given the Contractor a written acceptance of such condition. The Owner shall give such notice promptly after discovery of the condition. During the one-year period for correction of Work, if the Owner fails to notify the Contractor and give the Contractor an opportunity to make the correction, the Owner waives the rights to require correction by the Contractor and to make a claim for breach of warranty. If the Contractor fails to correct nonconforming Work within a reasonable time during that period after receipt of notice from the Owner or Architect, the Owner may correct it in accordance with Section 2.5.

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

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

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

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

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

## § 12.3 Acceptance of Nonconforming Work

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

## ARTICLE 13 MISCELLANEOUS PROVISIONS

### § 13.1 Governing Law

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

### § 13.2 Successors and Assigns

§ 13.2.1 The Owner and Contractor respectively bind themselves, their partners, successors, assigns, and legal representatives to covenants, agreements, and obligations contained in the Contract Documents. Except as provided in Section 13.2.2, neither party to the Contract shall assign the Contract as a whole without written consent of the

other. If either party attempts to make an assignment without such consent, that party shall nevertheless remain legally responsible for all obligations under the Contract.

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

### **§ 13.3 Rights and Remedies**

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

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

### **§ 13.4 Tests and Inspections**

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

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

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

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

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

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

### **§ 13.5 Interest**

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

## ARTICLE 14 TERMINATION OR SUSPENSION OF THE CONTRACT

### § 14.1 Termination by the Contractor

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

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

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

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

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

### § 14.2 Termination by the Owner for Cause

§ 14.2.1 The Owner may terminate the Contract if the Contractor

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

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

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

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

§ 14.2.4 If the unpaid balance of the Contract Sum exceeds costs of finishing the Work, including compensation for the Architect's services and expenses made necessary thereby, and other damages incurred by the Owner and not expressly waived, such excess shall be paid to the Contractor. If such costs and damages exceed the unpaid balance,

the Contractor shall pay the difference to the Owner. The amount to be paid to the Contractor or Owner, as the case may be, shall be certified by the Initial Decision Maker, upon application, and this obligation for payment shall survive termination of the Contract.

### § 14.3 Suspension by the Owner for Convenience

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

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

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

### § 14.4 Termination by the Owner for Convenience

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

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

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

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

## ARTICLE 15 CLAIMS AND DISPUTES

### § 15.1 Claims

#### § 15.1.1 Definition

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

#### § 15.1.2 Time Limits on Claims

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

#### § 15.1.3 Notice of Claims

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



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

**§ 15.1.4 Continuing Contract Performance**

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

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

**§ 15.1.5 Claims for Additional Cost**

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

**§ 15.1.6 Claims for Additional Time**

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

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

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

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

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

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

**§ 15.2 Initial Decision**

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

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

Initial Decision Maker's sole discretion, it would be inappropriate for the Initial Decision Maker to resolve the Claim.

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

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

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

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

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

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

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

### **§ 15.3 Mediation**

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

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

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



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

#### § 15.4 Arbitration

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

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

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

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

#### § 15.4.4 Consolidation or Joinder

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

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

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

# DRAFT AIA<sup>®</sup> Document A312<sup>™</sup> - 2010

## Payment Bond

### CONTRACTOR:

(Name, legal status and address)

<><>  
<>

### SURETY:

(Name, legal status and principal place of business)

<><>  
<>

### OWNER:

(Name, legal status and address)

<><>  
<>

### CONSTRUCTION CONTRACT

Date: <>

Amount: \$ <0.00>

Description:

(Name and location)

<20 Thames Street>

<>

### BOND

Date:

(Not earlier than Construction Contract Date)

<>

Amount: \$ <>

Modifications to this Bond: | <> | None | <> | See Section 18

### CONTRACTOR AS PRINCIPAL

Company: (Corporate Seal)

Signature: <>

### SURETY

Company: (Corporate Seal)

Signature: <>

Name and <><>>

Title:

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

Name and <><>>

Title:

(FOR INFORMATION ONLY — Name, address and telephone)

### AGENT or BROKER:

<>  
<>  
<>

### OWNER'S REPRESENTATIVE:

(Architect, Engineer or other party:)

<>  
<>  
<>  
<>  
<>  
<>

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

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

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



**ELECTRONIC COPYING** of any portion of this AIA<sup>®</sup> Document to another electronic file is prohibited and constitutes a violation of copyright laws as set forth in the footer of this document.

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

## **§ 16 Definitions**

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

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

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

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

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

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

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

§ 18 Modifications to this bond are as follows:

« »

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

**CONTRACTOR AS PRINCIPAL**

Company: \_\_\_\_\_ (Corporate Seal)  
Signature: « »

Name and Title: « »  
Address: « »

**SURETY**

Company: \_\_\_\_\_ (Corporate Seal)  
Signature: « »

Name and Title: « »  
Address: « »

# DRAFT AIA<sup>®</sup> Document A312<sup>™</sup> - 2010

## Performance Bond

**CONTRACTOR:**

(Name, legal status and address)

« »  
« »

**SURETY:**

(Name, legal status and principal place of business)

« »  
« »

**OWNER:**

(Name, legal status and address)

« »  
« »

**CONSTRUCTION CONTRACT**

Date: « »

Amount: \$ «0.00»

Description:

(Name and location)

«20 Thames Street»

« »

**BOND**

Date:

(Not earlier than Construction Contract Date)

« »

Amount: \$ « »

Modifications to this Bond: | « » | None | « » | See Section 16

**CONTRACTOR AS PRINCIPAL**

Company: (Corporate Seal)

Signature: « »

**SURETY**

Company: (Corporate Seal)

Signature: « »

Name and Title: « »

Title:

Name and Title: « »

Title:

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

(FOR INFORMATION ONLY — Name, address and telephone)

**AGENT or BROKER:**

« »  
« »  
« »

**OWNER'S REPRESENTATIVE:**

(Architect, Engineer or other party:)

« »  
« »  
« »  
« »  
« »  
« »

**ADDITIONS AND DELETIONS:**

The author of this document has added information needed for its completion. The author may also have revised the text of the original AIA standard form. An *Additions and Deletions Report* that notes added information as well as revisions to the standard form text is available from the author and should be reviewed.

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

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



**ELECTRONIC COPYING** of any portion of this AIA<sup>®</sup> Document to another electronic file is prohibited and constitutes a violation of copyright laws as set forth in the footer of this document.

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

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

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

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

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

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

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

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

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

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

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

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



§ 7 If the Surety elects to act under Section 5.1, 5.2 or 5.3, then the responsibilities of the Surety to the Owner shall not be greater than those of the Contractor under the Construction Contract, and the responsibilities of the Owner to the Surety shall not be greater than those of the Owner under the Construction Contract. Subject to the commitment by the Owner to pay the Balance of the Contract Price, the Surety is obligated, without duplication, for

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

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

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

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

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

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

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

#### § 14 Definitions

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

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

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

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

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

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

§ 16 Modifications to this bond are as follows:

« »

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

**CONTRACTOR AS PRINCIPAL**

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

Signature: « »

Name and Title: « »« »

Address: « »

**SURETY**

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

Signature: « »

Name and Title: « »« »

Address: « »





SECTION 01 31 00

SUBMITTALS, MEETINGS AND RECORD DOCUMENTS

1. GENERAL

1.1 PRE-CONSTRUCTION MEETING

- A. Architect will schedule a pre-construction meeting within 15 days of issuance of Notice to Proceed, to be attended by the owner, all project managers, Contractor's field superintendent, representatives of financial institutes and representatives of major sub-contractors. Within 48 hours of contract signing, Contractor shall submit to Owner and the specified pre-construction submittals including the following:
1. Typed list of sub-contractors with addresses and telephone numbers.
  2. Certificates of insurance.
  3. Approved construction schedule. See General Conditions, Paragraph 3.10.
  4. Schedule of values.
  5. Start-up authorization or certificates.
  6. Completed CM Contract, Building Permits, SFMO Permits, and Bonds.
- B. Pre-construction meeting agenda will include the following:
1. Processing application for payment.
  2. Processing and distribution of submittals.
  3. Maintenance of record documents and provisions of As-Built documents.
  4. Procedure for field changes, change estimates, change orders, etc.
  5. Site and building security.
  6. Location and maintenance of temporary storage areas, field offices, vehicular parking and access, waste disposal, etc.
  7. Safety and first-aid procedures and policy for visitors and non construction personal to site.
  8. Date and time for regular monthly coordination and progress meeting (to be coordinated with monthly application for payment).

1.2 CONSTRUCTION SCHEDULE

- A. Refer to General Conditions, Paragraph 3.10, for general provisions concerning construction progress schedule. Schedule shall show activities, itemized according to specification Section, and be organized in bar-chart or graph form so as to show both projected and actual progress of work.
- B. Arrange schedule to indicate required sequencing of units, and to show time allowances for submittals, inspections, and similar time margins.

## 20 THAMES STREET – PORTLAND, ME

- C. Show critical submittal dates related to each time bar, or prepare a separate coordinated listing of critical submittal dates.
- D. Show phases of work within each time bar for major elements which involve purchase lead-time, fabrication, seasonal treatment, mockups, testing, or similar phases as well as installation.
- E. Submit updated schedule monthly, together with application for payment.

### 1.3 SCHEDULE OF VALUES

- A. Refer to General Conditions, Paragraph 9.2 for general provisions concerning schedule of values.
- B. For these submittals, use AIA Document G702/703, Application and Certificate for Payment.
- C. Use specifications Sections as listed in Table of Contents as basis for format for listing costs.
- D. Itemize separately general cost items, such as bonds and allowances.
- E. Itemize change orders separately as they are approved.

### 1.4 MEETINGS AND REPORTING

- A. Contractor shall conduct general progress and coordination meetings at least once each month, attended by a representative of each primary entity engaged for performance of work. Record discussions and decisions, and distribute copies to those attending and others affected, including Architect/Engineer, Owner.
- B. Date and time of at least one regular monthly progress and coordination meeting shall be determined at the pre-construction meeting. Timing of this monthly meeting shall be coordinated with payment requests.

### 1.5 APPLICATION FOR PAYMENT

- A. Refer to General Conditions, Paragraph 9.3, for general provisions concerning applications for payment.
- B. Use AIA Form G702/703, fully completed and executed.
- C. Submit the forms in triplicate including attachment of waivers and similar documentation with one copy.



**1.6 SHOP DRAWINGS, PROJECT DATA, SAMPLES**

- A. Refer to General Conditions, Product Data and Samples, paragraph 3.12, for general provisions covering this type of submittal. Refer to specification section 01330 - Submittal Procedures for specific provisions for all submittals.
- B. Coordinate the preparation and processing of work-related submittals with the performance of the work. Coordinate each separate submittal with other submittals and related activities that require sequential activity. Coordinate the submittal of different units of interrelated work so that one submittal will not be delayed by the necessity of reviewing a related submittal.
- C. Architect/Engineer Review:
  - 1. Allow ten working days for the Architect/Engineer's initial processing of each submittal. Allow one week for reprocessing each submittal. No extension of time will be authorized because of failure to transmit submittals to the Architect/Engineer sufficiently in advance of the work.
  - 2. The Architect/Engineer will stamp each submittal to be returned with a uniform, self-explanatory action stamp, appropriately marked and executed to indicate the status of the submittal.
- D. Mark each submittal with a permanent label for identification. Provide project name, date, name of Architect/Engineer, name of Contractor, number and title of appropriate specification section and similar definitive information. Provide a space on the label for Contractors and Architect/Engineer's review markings.
- E. Package each submittal appropriately for transmittal and handling. Send each submittal from the Contractor to the Architect/Engineer and other destinations using AIA Transmittal Form G810.
- F. Provide additional copies of submittals required by governing authorities that are in addition to copies specified for submittal to the Architect/Engineer.
- G. Where it is necessary to provide intermediate submittals between the initial and final submittals, provide and process intermediate submittals in the same manner as for initial submittals.
- H. Submit as follows:
  - 1. Shop drawings (original drawings prepared by Contractor or sub-contractor illustrating fabrication, layout, erection details, etc.): six prints, or one reproducible transparency and one opaque print, to Architect.

## 20 THAMES STREET – PORTLAND, ME

2. Manufacturers' specifications, installation instructions, charts, schedules, catalogs, brochures, etc.: number of copies required by Contractor for distribution, plus one copy for Architect's retention.
  3. Samples: one sample to Architect only, unless otherwise specified.
  4. In submitting shop drawings and product data to Architect, use separate transmittals for material in different specification Sections, with applicable specification Section clearly numbered.
- I. Architect will review submittals within ten working days, measured from date of receipt by Architect until date of mailing. Contractor shall promptly make corrections and resubmit when so directed. Where submittal is marked "Approved as Noted" or similar, assume that all items are approved other than those to which specific exception is taken. Do not delay fabrication, assembly and delivery pending receipt of entirely "Approved" submittal.
  - J. Distribute approved submittals to job site and record document files, and to suppliers and sub-contractors as required. Samples not designated by Contractor for incorporation into Work shall be kept on file until job completion. Any sample not reclaimed within 30 days after job completion will be considered unclaimed, and will be disposed of as directed by Architect.

### 1.7 PROJECT RECORD DOCUMENTS

- A. Keep on file at job site one complete set of up-to-date Contract Documents, including drawings and specifications, addenda, shop drawings and product data, testing data, change orders, field orders, and other modifications. Documents shall be neatly and securely stored in files or on racks, clearly indexed by trade activity or specification Section, and shall not be used for construction purposes.
- B. Legibly mark significant field changes such as following, using colored pencils or felt-tipped pens:
  1. Drawings: locations of concealed utilities, field changes of dimension and detail, changes resulting from change order or field order, and details not on original drawings.
  2. Specifications: manufacturer and model number of equipment actually installed.
  3. Shop drawings and manufacturers' literature: changes made after Architect's review.
- C. At completion of Work, deliver completed record documents to Architect. Final payment for Project will not be made until Architect reviews and approves these documents.

**1.8 SUBSTANTIAL COMPLETION**

- A. Refer to General Conditions, Article 9, Substantial Completion, for general provision concerning substantial Completion.
- B. Following issuance by Architect/Engineer of Certificate of Substantial Completion, Contractor may submit special payment request, provided the following have been completed:
  - 1. Obtain permits, certificates of inspection and other approval and releases by governing authorities, required for Owner's occupancy and use of project.
  - 2. Submit warranties and similar documentation.
  - 3. Submit maintenance manuals and provide instruction of Owner's operational/maintenance personnel.
  - 4. Complete final cleaning of the work.
  - 5. Submit record documents.
  - 6. Submit listing of work to be completed before final acceptance.
- C. Following completion of the following requirements, final payment request may be submitted:
  - 1. Complete work listed as incomplete at time of substantial completion, or otherwise assures Owner of subsequent completion of individual incomplete items.
  - 2. Settle liens and other claims, or assure Owner of subsequent settlement.
  - 3. Submit proof of payment on fees, taxes and similar obligations.
  - 4. Transfer operational, access, security and similar provisions to Owner; and remove temporary facilities, tools and similar items.
  - 5. Completion of requirements specified in "Project Closeout" section.
  - 6. Obtain consent of surety for final payment.

**END OF SECTION**

**SECTION 01 33 00**

**SUBMITTAL PROCEDURES**

**PART 1 GENERAL**

1.1 SECTION INCLUDES

- A. Section Includes:
  - 1. Submittal procedures.
  - 2. Product Data, Shop Drawings, and Samples.
  - 3. Assurance/Control submittals.
    - a. Certificates.
    - b. Manufacturer's installation instructions.
  - 4. Architect's action.
- B. Related Documents: The Contract Documents, as defined in Section 01 11 00 - Summary of Work, apply to the Work of this Section. Additional requirements and information necessary to complete the Work of this Section may be found in other documents.

1.2 SUBMITTALS

- A. Submit two copies of proposed Schedule of Submittals to Contracting Officer Representative within 30 days after receipt of Notice to Proceed. List all items require submittal for review and approval by Contracting Officer.
- B. Submit two copies of final Schedule of Submittals to Contracting Officer Representative within 2 days after receipt of proposed Schedule of Submittals review from Contracting Officer.
- C. Submit schedule on Contracting Officer approved form provided to Contractor by Contracting Officer Representative.
- D. Schedule of Submittals: Include the following.
  - 1. Indicate type of submittal; product data, shop drawing, sample, certificate, or other submittal.
  - 2. Identify by Specification Section number, Specification paragraph number where item is specified, and description of item being submitted.
  - 3. Indicate scheduled date for initial submittal, date for approval, and date for possible resubmittal for each submittal.
- E. Coordinate Schedule of Submittals with Construction Schedule. Revise and update Schedule of Submittals when required by changes in the Construction Schedule. Provide Contracting Officer Representative with updated schedules within 2 days of date schedule is revised.

1.3 SUBMITTAL PROCEDURES

## 20 THAMES STREET – PORTLAND, ME

- A. Transmit each submittal with Contracting Officer accepted form. Submit 3 copies of each transmittal.
- B. Sequentially number transmittal form. Revise submittals with original number and a sequential alphabetic suffix.
- C. Identify Project, Lessor, Subcontractor or supplier; pertinent drawing and detail number, and specification section number, as appropriate.
- D. Apply Contractor's stamp, signed or initialed certifying that review, verification of Products required, field dimensions, adjacent construction Work, and coordination of information, is in accordance with the requirements of the Work and Contract Documents.
- E. Schedule submittals to comply with scheduling requirements of Construction Schedule
- F. For each submittal for review, allow 10 days excluding delivery time to and from the Contractor.
- G. Identify variations from Contract Documents and Product or system limitations which may be detrimental to successful performance of the completed Work.
- H. Provide space for Contractor and Architect of Record review stamps.
- I. Revise and resubmit, identify all changes made since previous submission.
- J. Distribute copies of reviewed submittals as appropriate. Instruct parties to promptly report any inability to comply with provisions.
- K. Submittals not requested will not be recognized or processed.

### 1.4 PRODUCT DATA

- A. Product data includes printed information such as catalog cuts, manufacturer's published instructions, standard color charts, roughing-in diagrams and templates, standard wiring diagrams, performance curves and other similar items.
- A. Submit the number of copies which the Contractor requires, plus two copies which will be retained by Contracting Officer Representative and Architect of Record.
- B. Mark each copy to identify applicable products, models, options, and other data. Supplement manufacturers' standard data to provide information unique to this Project.
- C. Indicate Product utility and electrical characteristics, utility connection requirements, and location of utility outlets for service for functional equipment and appliances.

### 1.5 SHOP DRAWINGS

## 20 THAMES STREET – PORTLAND, ME

- A. Submit in the form of one reproducible transparency and one opaque reproduction.
- B. Shop Drawings: Submit for review. After review, produce copies and distribute in accordance with the SUBMITTAL PROCEDURES article above.
- C. Indicate special utility and electrical characteristics, utility connection requirements, and location of utility outlets for service for functional equipment and appliances.

### 1.5 SAMPLES

- B. Submit samples to illustrate functional and aesthetic characteristics of the Product, with integral parts and attachment devices. Coordinate sample submittals for interfacing work.
- C. Submit samples of finishes in colors selected, textures, and patterns for Contracting Officer selection.
- D. Include identification on each sample, with full Project information.
- E. Submit the number of samples specified in individual specification sections; one of which will be retained by the Contracting Officer.

### 1.6 CERTIFICATES

- A. When specified in individual specification sections, submit certification by manufacturer to Contracting Officer, in quantities specified for Product Data.
- B. Indicate material or Product conforms to or exceeds specified requirements. Submit supporting reference data, affidavits, and certifications as appropriate.
- C. Certificates may be recent or previous test results on material or Product, but must be acceptable to Contracting Officer.

### 1.7 MANUFACTURER INSTALLATION INSTRUCTIONS

- A. When specified in individual specification sections, submit printed instructions for delivery, storage, assembly, installation, adjusting, and finishing, to Contracting Officer Representative in quantities specified for Product Data.
- B. Indicate special procedures, perimeter conditions requiring special attention, and special environmental criteria required for application or installation.

### 1.8 CONTRACTING OFFICER ACTION



**20 THAMES STREET – PORTLAND, ME**

- A. For submittals where action and return is required or requested, Contracting Officer Representative will review each submittal, mark to indicate action taken, and return promptly; generally within 10 calendar days from date of receipt.
  - 1. Compliance with specified characteristics is the Lessor's responsibility.
  - 2. Submittals for information, closeout documents, record documents and other submittals for similar purposes, no action will be taken.
  
- B. Action Stamp: Architect of Record will stamp each submittal with a uniform, self-explanatory action stamp. The stamp will be appropriately marked, as follows, to indicate the action taken.
  - 1. "Accepted": Final Unrestricted Release. Where submittals are marked "Accepted", that part of the Work covered by the submittal may proceed provided it complies with requirements of the Contract Documents; final acceptance will depend upon that compliance.
  - 2. "Accepted as Noted": Final-But-Restricted Release. When submittals are marked "Accepted as Noted", that part of the Work covered by the submittal may proceed provided it complies with notations or corrections on the submittal and requirements of the Contract Documents; final acceptance will depend on that compliance.
  - 3. "Rejected: Submit Specified Item" or "Revise and Resubmit": Returned for Resubmittal. When submittal is marked "Rejected: Submit Specified Item", "Revise and Resubmit," do not proceed with that part of the Work covered by the submittal, including purchasing, fabrication, delivery, or other activity. Revise or prepare a new submittal in accordance with the notations; resubmit without delay. Repeat if necessary to obtain a different action mark.
    - a. Do not permit submittals marked "Rejected: Submit Specified Item" or "Revise and Resubmit," to be used at the Project site, or elsewhere where Work is in progress.
  - 4. "Returned - Not Required": Where a submittal is primarily for information or record purposes, special processing or other activity, the submittal will be returned, marked "Returned - Not Required".

**END OF SECTION**

SECTION 01 33 10

PRODUCTS AND SUBSTITUTIONS

1. GENERAL

1.1 PROCEDURAL REQUIREMENTS

A. Source Limitations:

1. To the fullest extent possible, provide products of the same generic kind, from a single source, for each unit of work. Where it is not possible to do so, match separate procurements as closely as possible.
2. To the extent that the product selection process is under the Contractor's control, provide products that are compatible with previously selected products.
3. Where standard products are available that comply with specified requirements, provide those standard products that have been used successfully before in similar applications, and that are recommended by the manufacturers for the applications indicated.

1.2 PRODUCT SELECTION LIMITATIONS

A. Product Selections: Comply with the following requirements in the selection of products, materials and equipment:

1. Single Product Name: Where only a single product or manufacturer is named, provide the product, unless it is not available, is incompatible with existing work, or does not comply with specified requirements or governing regulations.
2. Two or More Products Named: Where two or more products or manufacturers are named, the selection is at the Contractor's option, provided the product selected complies with specified requirements.
3. "Or Approved Equal" Provisions": Where products or manufacturers are specified by name accompanied by the term "or approved equal", provide either the product named, or comply with the requirements for gaining approval of "substitutions" for the use of an unnamed product.
4. Compliance with Standards: Where the specifications require only compliance with an imposed standard, code or regulation, the Contractor has the option of selecting any product that complies with specified requirements provided no product names are indicated.

## 20 THAMES STREET – PORTLAND, ME

5. Performance Requirements: Where the specifications require compliance with indicated performance requirements, the Contractor has the option of selecting any product that complies with the specific performance requirements, provided no product names are indicated.
  6. Visual Requirements: Where the specifications indicate that a product is to be selected from the manufacturer's standard options, without naming the manufacturer, the Architect/Engineer has the option of making the selection, after the Contractor has determined or selected the manufacturer.
- B. Nameplates: Except as otherwise indicated for required labels and operating data, do not permanently attach or imprint manufacturer's or producer's nameplates or trademarks on exposed surfaces of products which will be exposed to view either in occupied spaces or on the exterior of the completed project.

### 1.3 SUBSTITUTIONS

- A. Conditions: The Contractor's requests for substitutions will be considered when they are reasonable, timely, fully documented, and when they qualify under one or more of the following circumstances.
1. The proposed substitution is related to an "or approved equal" or similar provision in the contract documents.
  2. The required product cannot be supplied in time for compliance with Contract Time requirements.
  3. The required product is not acceptable to governing authorities.
  4. The required product cannot be properly coordinated with other materials in the work, or cannot be warranted or insured as specified.
  5. The proposed substitution will offer a substantial advantage to the Owner after deducting offsetting disadvantages including delays, additional compensation to the Architect/Engineer for redesign, evaluation and other necessary services, and similar considerations.
- B. Submittals: Include the following information, as appropriate, in each request for substitution:
1. Provide complete product documentation, including product data and samples, where appropriate.
  2. Provide detailed performance comparisons and evaluation, including testing laboratory reports where applicable.

## **20 THAMES STREET – PORTLAND, ME**

3. Provide coordination information indicating the effect of the substitution on other work and the time schedule.
4. Provide cost information for the proposed change order.
5. Provide the Contractor's general certification of the recommended substitution.

### **1.4 DELIVERY, STORAGE, AND HANDLING**

- A. Receive, store and handle products, materials and equipment in a manner which will prevent loss, deterioration and damage.
- B. Schedule deliveries so as to minimize long-term storage at the project site.

**END OF SECTION**

SECTION 01 45 00

QUALITY CONTROL SERVICES

1. GENERAL

1.1 DESCRIPTION

- A. Quality control services include inspections and tests performed by independent agencies and governing authorities, as well as by the Contractor.
- B. Inspection and testing services are intended to determine compliance of the work with requirements specified.
- C. Specific quality control requirements are specified in individual specification sections.

1.2 RESPONSIBILITIES

- A. Except where indicated as being the Owner's responsibility, quality control services are the Contractor's responsibility, including those specified to be performed by an independent agency and not by the Contractor.
- B. The Contractor shall employ and pay an independent agency, testing laboratory or other qualified firm to perform quality control services specified.
- C. The Owner will engage and pay for services of an independent agency to perform the inspections and tests that are specified as Owner's responsibilities.
- D. Where results of inspections or tests do not indicate compliance with contract document, retests are the Contractor's responsibility.
- E. The Contractor shall cooperate with independent agencies performing inspections or tests. Provide auxiliary services as are reasonable. Auxiliary services include:
  - 1. Provide access to the work.
  - 2. Assist taking samples.
  - 3. Deliver samples to test laboratory.

1.3 COORDINATION

- A. The Contractor and independent test agencies shall coordinate the sequence of their activities. Avoid removing and replacing work to accommodate inspections and tests. The Contractor is responsible for scheduling times for inspections and tests.

## **20 THAMES STREET – PORTLAND, ME**

### **1.4 QUALIFICATIONS FOR SERVICE AGENCIES**

- A. Engage inspection and test service agencies which are prequalified as complying with "Recommended Requirements for Independent Laboratory Qualification" by the American Council of Independent Laboratories.
- B. Each agency shall be employed with the approval of the Architect/Engineer.

### **1.5 SUBMITTALS**

- A. Notify the Architect/Engineer of the testing schedule.
- B. Submit a certified written report of each inspection test or similar service, in duplicate to the Architect/Engineer. Submit additional copies of each report to governing authority, when the authority so directs.

### **1.6 REPORT DATA**

- A. Written inspection or test reports shall include:
  - 1. Name of testing agency or test laboratory.
  - 2. Dates and locations of samples, tests or inspections.
  - 3. Names of individuals present.
  - 4. Complete inspection or test data.
  - 5. Test results.
  - 6. Interpretations.
  - 7. Recommendations.
  - 8. Structural Special Inspections
- B. Reports shall be provided to the Architect/Engineer in a timely manner.

### **1.7 REPAIR AND PROTECTION**

- A. Upon completion of inspection or testing repair damaged work and restore substrates and finishes. Comply with requirements for "Cutting and Patching".

**END OF SECTION**



SECTION 01 50 00

TEMPORARY FACILITIES

1. GENERAL

- 1.1 DESCRIPTION OF REQUIREMENTS: Provide temporary services and facilities ready for use when first needed to avoid delay in the work. Field office facility shall be sufficiently large to accommodate all persons and furniture/equipment convening for project meetings (progress and requisition meetings). Maintain, expand and modify as needed. Do not remove until no longer needed, or replaced by authorized use of permanent facilities.
- 1.2 USE CHARGES: Usage charges for temporary services or facilities are not chargeable to the Owner or Architect/Engineer.
- 1.3 REGULATIONS: Comply with requirements of local laws and regulations governing construction and local industry standards, in the installation and maintenance of temporary services and facilities.
- 1.4 STANDARDS: Comply with the requirements of NFPA Code 241, "Building Construction and Demolition Operations", the ANSI-A10 Series standards for "Safety Requirements for Construction and Demolition", and the NECA National Joint Guideline NJG-6 "Temporary Job Utilities and Services".
- 1.5 INSPECTIONS: Inspect and test each service before placing temporary utilities in use. Arrange for inspections and tests by governing authorities, and obtain certifications and permits for use.
- 1.6 SUBMITTALS: Submit copies of reports and permits required or necessary for installation and operation, including reports of tests, inspections and meter readings performed on temporary utilities, and permits and easements necessary for installation, use and operation.
- 1.7 MATERIALS AND EQUIPMENT
  - A. Provide materials and equipment that are suitable for the intended use.
  - B. Provide new materials and equipment for temporary services and facilities; if acceptable to the Architect/Engineer, used materials and equipment that are undamaged may be used.
- 1.8 INSTALLATION
  - A. Use qualified tradesmen for installation.
  - B. Locate temporary services and facilities where they will serve the project adequately and result in minimum interference with the work.

## 20 THAMES STREET – PORTLAND, ME

### 1.9 TEMPORARY UTILITY INSTALLATION

- A. Engage, or make arrangements if necessary with, the local utility company to make connections to existing service.
- B. Arrange with the companies and existing users for an acceptable time when service can be interrupted to make connections.
- C. Establish a service implementation and termination schedule. As early as possible change to use of permanent service, to enable removal of the temporary utility and eliminate possible interference with completion of the work.
- D. Provide adequate capacity at each stage of construction. Prior to availability at the site, provide, trucked-in services for start up of construction operations.
- E. Obtain and pay for easements required to bring temporary utilities to the site, where the Owner's easement cannot be utilized for that purpose.

### 1.10 ELECTRIC POWER SERVICE

- A. Coordinate with Owner to use existing electrical service during construction.
- B. Comply with applicable requirements of NEMA, NECA and UL standards and governing regulations.
- C. Install temporary lighting of adequate illumination levels to perform the work specified.
- D. Comply with NEC pertaining to installation of temporary wiring service and grounding. Provide meters, transformers, and overcurrent protective devices at main distribution panel for power and light circuitry. Provide disconnects for equipment circuits.

### 1.11 POWER DISTRIBUTION SYSTEM

- A. Provide circuits of proper sizes, characteristics, and ratings for each use indicated.
- B. Install wiring overhead, and risers vertically where least exposed to damage.
- C. Provide rigid steel conduit to protect wiring on grade, floors, decks or other areas exposed to possible damage.
- D. Provide 20 amp, 4-gang receptacle outlets, equipped with ground-fault circuit interrupters, reset button and pilot light, spaced that a 100 foot extension cord can reach each area of work. Use only grounded extension cords; use "hard- service" cords where exposed to abrasion and traffic.

## 20 THAMES STREET – PORTLAND, ME

- E. Provide warning signs at power outlets that are other than 110/120 volt. Provide outlets of proper NEMA configuration to prevent insertion of 110/120 volt plugs into higher voltage outlets.

### 1.12 TEMPORARY LIGHTING

- A. Provide general service incandescent lamps of wattage required for adequate illumination.
- B. Protect lamps with guard cages or tempered glass enclosures, where exposed to breakage.
- C. Provide exterior type fixtures where exposed to weather or moisture.
- D. Provide one 200-watt incandescent lamp per 1000 square feet of floor area for general construction lighting, one 100-watt incandescent lamp every 50 feet in corridors, and one lamp per story, located to illuminate each landing and flight in stairways.
- E. Install temporary lighting to fulfill security and protection requirements, without having to operate the entire temporary lighting system.

### 1.13 TEMPORARY TELEPHONES

- A. Install telephone for each temporary office and first aid station.
- B. At each telephone location post a list of operational and emergency telephone numbers.

### 1.14 TEMPORARY HEAT

- A. Provide temporary heat where needed for performance of work, for curing or drying of recently installed work or for protection of work in place from adverse effects of low temperatures or high humidity.
- B. Provide UL or FM tested and labeled heating units known to be safe and without adverse effect upon work in place or being installed. Coordinate with ventilation requirements to produce the ambient condition.
- C. Maintain a minimum temperature of 45 deg. F (7 deg. C) in permanently enclosed portions of the building and areas where finished work has been installed.
- D. Except where use of the permanent heating system is available and authorized, provide properly vented self-contained LP gas or fuel oil heaters with individual space thermostatic control for temporary heat. Do not use open burning or salamander type heating units.

## 20 THAMES STREET – PORTLAND, ME

### 1.15 FIELD OFFICES

- A. Provide standard prefabricated or mobile units, or the equivalent job-built field offices of sufficient size to accommodate required office personnel at the site.
- B. Provide insulated, weathertight units with lockable entrances.
- C. Provide vented space heater, capable of maintaining an indoor temperature of 68 deg. F (20 deg. C).

### 1.16 SANITARY FACILITIES

- A. Sanitary facilities include temporary toilets.
- B. Comply with governing regulations including safety and health codes for the type, number, location, operation and maintenance of fixtures and facilities.
- C. Supply toilet tissue, paper towels, paper cups and similar disposable materials as appropriate for each facility. Provide covered waste containers for used material.
- D. Install single occupant self-contained toilet units of the chemical, aerated recirculation or combustion type, properly vented and fully enclosed with glass fiber reinforced polyester shell. Use of pit-type privies will not be permitted.
- E. Provide separate toilet facilities for male and female construction personnel.
- F. Provide drinking water fountains where and when piped potable water, approved by local authorities, is reasonably accessible from permanent or temporary lines. Otherwise, provide containerized tap-dispenser bottled-water type drinking water units.

1.17 FIRST AID SUPPLIES: Comply with governing regulations and recognized recommendations within the construction industry.

### 1.18 DEWATERING FACILITIES AND DRAINS

- A. For temporary drainage and dewatering facilities and operations not directly associated with performance of work included under other sections, comply with dewatering requirements of applicable Division-2 sections. Where feasible, utilize the same facilities.
- B. Maintain the site, excavations and construction free of water.
- C. Dispose of rainwater in a lawful manner which will not result in flooding and project or adjoining property, nor endanger either permanent work or temporary facilities.

## 20 THAMES STREET – PORTLAND, ME

### 1.19 TEMPORARY ENCLOSURE

- A. Provide temporary enclosure of materials, equipment, work in progress and completed portions of the Work to provide protection from exposure, foul weather, other construction operations, and similar activities.
- B. Provide enclosures where temporary heat is needed and the permanent building enclosure is not completed, and there is no other provision for containment of heat. Coordinate with ventilating and material drying or curing requirements to avoid dangerous conditions.
- C. Provide temporary enclosures by installing waterproof, fire- resistant, UL labeled tarpaulins with a flame-spread rating of 15 or less, using a minimum of wood framing. Use translucent nylon reinforced laminated polyethylene tarpaulins to admit the maximum amount of daylight. Individual openings of 25 square feet or less may be closed with plywood or similar materials.
- D. Close openings through the floor or roof decks and other horizontal surfaces with substantial load-bearing wood-framed or similar construction.

### 1.20 COLLECTION AND DISPOSAL OF WASTES

- A. Establish a system for daily collection and disposal of waste materials, including separation and recycling of waste material. Do not hold collected materials longer than 7 days.
- B. Handle waste materials that are hazardous, dangerous, or unsanitary separately from other waste by containerizing.
- C. Burying or burning of waste materials on the site or washing waste material down sewers will not be permitted.

### 1.21 MISCELLANEOUS SERVICES AND FACILITIES

- A. Design, construct, and maintain miscellaneous services and facilities as needed to accommodate performance of the work, including temporary stairs, ramps, ladders, staging, shoring, scaffolding, temporary partitions, waste chutes and similar items.

### 1.22 SECURITY AND PROTECTION FACILITIES INSTALLATION

- A. Provide a neat and uniform appearance in security and protection facilities acceptable to the Architect/Engineer and the Owner.
- B. Maintain site in a safe, lawful and publicly acceptable manner.
- C. Take necessary measures to prevent erosion.

## 20 THAMES STREET – PORTLAND, ME

- D. Except for utilization of permanent fire protection facilities, as soon as available, do not change over to use of permanent facilities until substantial completion.

### 1.23 TEMPORARY FIRE PROTECTION

- A. Until fire protection needs may be fulfilled by permanent facilities, install and maintain temporary fire protection of the types needed to protect against losses.
- B. Comply with recommendations of NFPA Standard 10.
- C. Locate fire extinguishers where most effective; provide not less than one on each floor at or near each stairwell.
- D. Provide type "A" fire extinguishers for temporary offices and spaces where there is minimal danger of electrical or flammable liquid fires, and type "ABC" dry chemical extinguishers elsewhere.
- E. Store combustible materials in containers in fire-safe locations.
- F. Review fire prevention and protection needs with local fire department officials and establish procedures to be followed in the event of fire. Instruct personnel in procedures and post warnings and information.
- G. Maintain unobstructed access to fire extinguishers, temporary fire protection facilities, stairways and other access routes.
- H. Prohibit smoking in hazardous areas.
- I. Provide supervision of welding operations, combustion type temporary heating units, and similar sources of ignition.
- J. At temporary water outlets provide hoses of sufficient length to reach construction areas. Hang hoses with a warning sign, indicating that hoses are for fire protection purposes and are not to be removed.
- K. At the earliest feasible date complete installation of the permanent fire protection facility, including connected services, and place into operation and use. Instruct key personnel at the site on how to use facilities which may not be self-explanatory.

### 1.24 BARRICADES, WARNING SIGNS AND LIGHTS

- A. Comply with recognized standards and code requirements for erection of substantial, barricades where needed to prevent accidents.
- B. Paint with appropriate colors and warning signs to inform personnel at the site and the public, of the hazard being protected against.



## 20 THAMES STREET – PORTLAND, ME

- C. Provide lighting where needed, including flashing red lights where appropriate.
- 1.25 SECURITY ENCLOSURE AND LOCKUP: Where materials and equipment must be temporarily stored, and are of substantial value or attractive for possible theft, provide a secure lockup.
- 1.26 ENVIRONMENTAL PROTECTION
- A. Conduct construction activities, and by methods that comply with environmental regulations, minimize the possibility that air, waterways and subsoil might be contaminated or polluted, or that other undesirable effects might result from the performance of work at the site.
  - B. Avoid the use of tools and equipment which produce harmful noise.
  - C. Restrict the use of noise making tools and equipment to hours of use that will minimize complaints.
- 1.27 OPERATION, TERMINATION AND REMOVAL
- A. Limit availability of temporary services and facilities to essential and intended uses to minimize waste and abuse. Do not permit temporary installations to be abused or endangered.
  - B. Operate and maintain temporary services and facilities in good operating condition and in a safe and efficient manner until removal is authorized. Do not overload services or facilities. Protect from damage by freezing temperatures and similar elements.
  - C. Do not allow unsanitary conditions, public nuisances or hazardous conditions to develop or persist on the site.
  - D. 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 avoid the possibility of damage to the Work or to temporary facilities.
  - E. Prevent water filled piping from freezing. Maintain markers for underground lines. Protect from damage during excavation.
  - F. Remove each temporary service and facility promptly when need has ended, or when replaced by use of a permanent facility, but no later than substantial completion. Complete, or, if necessary, restore permanent work delayed because of interference with the temporary service or facility. Repair damaged work, clean exposed surfaces and replace work which cannot be repaired.
  - G. At substantial completion, clean and renovate permanent services and facilities that have been used to provide temporary services and facilities during the construction period.

END OF SECTION

**SECTION 01 58 00**

**PROJECT IDENTIFICATION**

**PART 1 GENERAL**

1.01 SUMMARY

- A. Section Includes:
  - 1. The Contractor shall provide and maintain at the site one project sign.
  - 2. No other signs or advertisements will be allowed to be displayed on the premises.

1.02 QUALITY ASSURANCE

- A. Design sign and structure to withstand 50 mph wind velocity.
- B. Sign Painter: Engaged as professional sign painter for not less than three years.
- C. Finishes, Painting: Adequate to withstand weathering, fading, and chipping for duration of construction.

**PART 2 PRODUCTS**

2.01 MATERIALS

- A. Structure and Framing: New wood, 4' x 4' x 8' treated posts, structurally adequate.
- B. Sign Mounting Board: 4' x 8', exterior grade, GPX yellow or green plywood with medium density overlay, minimum 3/4 inch thick.
- C. Rough Hardware: Galvanized, aluminum, or brass.
- D. Paint and Primers: Exterior quality, two coats. Color to be White.
- E. Vinyl sign to be provided by Owner and installed by Contractor.

**PART 3 EXECUTION**

3.01 CONSTRUCTION

- A. Install project identification sign within 30 days after date fixed by Owner-Contractor Contract.
- B. Erect at designated location as directed by Owner.
- C. Erect supports and framing with uprights 36 inches below surface, braced and framed to resist wind loadings.
- D. Install sign surface plumb and level, with butt joints. Anchor securely.
- E. Paint sight-exposed surfaces of sign, supports, and framing.

3.02 MAINTENANCE

- A. Maintain signs and supports clean. Repair deterioration and damages.

3.03 REMOVAL

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

**END OF SECTION**

SECTION 01 73 29

CUTTING AND PATCHING

1. GENERAL

1.1 REFERENCES

- A. Drawings and general provisions of Contract, including General and Supplementary Conditions and Division 1 Specification sections, apply to work of this Section.
- B. Divisions 2 through 16.

1.2 DESCRIPTION OF WORK

- A. Definition: "Cutting and patching" includes cutting into existing construction to provide for the installation or performance of other work and subsequent fitting and patching required to restore surfaces to their original condition. This section does not apply to new work that has been installed as part of the Work.
- B. Structural Work: Do not cut-and-patch structural work in a manner resulting in a reduction of load-carrying capacity or load/deflection ratio.
- C. Operational/Safety Limitations: Do not cut-and-patch operational elements and safety components in a manner resulting in decreased performance, shortened useful life, or increased maintenance.
- D. Visual/Quality Limitations: Do not cut-and-patch work exposed to view (exterior and interior) in a manner resulting in noticeable reduction of aesthetic qualities and similar qualities, as judged by the Architect/Engineer.
- E. Limitation on Approvals: The Architect/Engineer's approval to proceed with cutting and patching does not waive right to later require removal/replacement of work found to be cut-and-patched in an unsatisfactory manner, as judged by the Architect/Engineer.
- F. Materials marked to be removed and reused shall be repaired as necessary to maintain their existing condition. When repair is not sufficient, existing materials shall be disposed of and new materials installed to match existing materials.
- G. Refer to other sections of these specifications for specific cutting and patching requirements and limitations applicable to individual units of work.
- H. Unless otherwise specified, requirements of this Section apply to Mechanical and Electrical work. Refer to Divisions 22, 23 and 26 for additional requirements and limitations on cutting and patching of mechanical and electrical work.

## 20 THAMES STREET – PORTLAND, ME

### 1.3 QUALITY ASSURANCE

- A. Refer to Section 01 33 10, Products and Substitutions, for general provisions covering product selection, substitutions, material storage and installation.
- B. Refer to Section 01 45 00, Quality Control Services, for provisions for testing and inspections.
- C. Refer to specific Specification Section covering subject in question for quality assurance requirements.

### 1.4 SUBMITTALS

- A. Issue submittals in accordance with Section 01 33 00, Submittals.
- B. Refer to specific Specification Section covering subject in question for submittal requirements.

## 2. PRODUCTS

### 2.1 GENERAL

- A. Use materials for cutting and patching that are identical to existing materials. If identical materials are not available, or cannot be used, use materials that match existing adjacent surfaces to the fullest extent possible with regard to visual effect. Use materials for cutting and patching that will result in equal-or-better performance characteristics.
- B. Fire-stopping:
  - 1. Seal openings in fire-rated walls and floors to make a tight fit with penetrating items, using appropriate non-combustible filler material. to provide a rating equivalent to wall/floor assemble.
  - 2. Acceptable filler materials include:
    - a. Concrete
    - b. Cementitious proprietary product: Zonolite Firestop ZF-1
    - c. Blanket-type mineral-fiber or ceramic-fiber insulation (glass-fiber insulation is not acceptable)
    - d. Fire-resistant sealant: Domtar Fire-Halt, Dow Corning Fire Stop, Hilti CS 240 Firestop, or Nelson CLK or CMP
    - e. Fire-resistant silicone foam: Dow Corning RTV Foam Penetration Seal System, Hilti CB 120 Adhesive Filling and Sealing Foam, Tremco Fyre-Sil
    - f. Flexible intumescent strip wrapped around pipe penetrations: Dow Corning Fire Stop Intumescent Wrap, Hilti CS 24720 Intumescent Wrap, Nelson RSW, Tremco TREMstop WS

## 20 THAMES STREET – PORTLAND, ME

- g. Intumescent fibrous material enclosed in a polyethylene envelope: Nelson PLW, Tremco TREMstop PS
  - h. Pliable intumescent putty: Nelson FSP Flameseal, Tremco TREMstop WBM
  - i. Water-based intumescent fire-protective coating for electrical cables: Nelson CTG
3. Neatly patch and seal exposed-to-view openings, using sealants, tooled mortar joints, escutcheons, or flanged collars, as appropriate.

### 3. EXECUTION

#### 3.1 INSPECTION

- A. Before cutting, examine surfaces to be cut and patched and conditions under which the work is to be performed. If unsafe or otherwise unsatisfactory conditions are encountered, take corrective action before proceeding with the work.
- B. Cutting and patching of Structural Work shall be prohibited unless approved by the Engineer.
- C. Cutting of Operational and Safety appurtenances shall be prohibited unless approved by the Architect and that other safety provisions have been implemented.

#### 3.2 TEMPORARY SUPPORT

- A. To prevent failure provide temporary support of work to be cut.

#### 3.3 PROTECTION

- A. Protect other work during cutting and patching to prevent damage. Provide protection from adverse weather conditions for that part of the project that may be exposed during cutting and patching operations. Avoid interference with use of adjoining areas or interruption of free passage to adjoining areas.

#### 3.4 PERFORMANCE

- A. Employ skilled workmen to perform cutting and patching work. Except as otherwise indicated or as approved by the Architect/Engineer, proceed with cutting and patching at the earliest feasible time and complete work without delay.
- B. Cutting:
  - 1. Cut the work using methods that are least likely to damage work to be retained or adjoining work. Provide dust barriers to prevent dust from entering existing building beyond immediate work area. Where possible, review proposed procedures with the original installer; comply with original installer's recommendations.
  - 2. In general, where cutting is required, use hand or small power tools designed for sawing or grinding, not hammering and chopping. Cut through concrete and masonry using a cutting machine such as a carborundum saw or core drill to insure a neat

## 20 THAMES STREET – PORTLAND, ME

hole. Cut holes and slots neatly to size required with minimum disturbance of adjacent work. To avoid marring existing finished surfaces, cut or drill from the exposed or finished side into concealed surfaces. Temporarily cover openings when not in use.

3. Comply with requirements of applicable sections of Division 2 where cutting and patching requires excavating and backfilling.
4. By-pass utility services such as pipe and conduit, before cutting, where such utility services are shown or required to be removed, relocated or abandoned. Cut-off conduit and pipe in walls or partitions to be removed. After by-pass and cutting, cap, valve or plug and seal tight remaining portion of pipe and conduit to prevent entrance of moisture or other foreign matter.

### C. Patching:

1. Patch with seams which are durable and as invisible as possible. Comply with specified tolerances for the work.
2. Where feasible, inspect and test patched areas to demonstrate integrity of work.
3. Restore exposed finishes of patched areas and where necessary extend finish restoration into retained adjoining work in a manner which will eliminate evidence of patching and refinishing.
4. Where removal of walls or partitions extends one finished area into another finished area, patch and repair floor and wall surfaces in the new space to provide an even surface of uniform color and appearance. If necessary to achieve uniform color and appearance, remove existing floor and wall coverings and replace with new materials.
5. Where patch occurs in a smooth painted surface, extend final paint coat over entire unbroken surface containing patch, after patched area has received prime and base coat.
6. Patch, repair or rehang existing ceilings as necessary to provide an even plane surface of uniform appearance.

## 3.5 MAINTENANCE OF TRAFFIC, ACCESS, AND UTILITIES

- A. Maintain accessibility from street at all times to any fire hydrants within construction area. Ensure that utilities serving adjacent buildings remain in service.

**END OF SECTION**



**SECTION 01 77 00**

**PROJECT CLOSEOUT**

**1. GENERAL**

**1.1 DESCRIPTION OF REQUIREMENTS**

- A. Provisions of this section apply to the procedural requirements for the actual closeout of the Work, not to administrative matters such as final payment or the change over of insurance.
- B. Closeout requirements relate to both substantial and final completion of the Work; they also apply to individual portions of completed work as well as the total Work.
- C. Specific requirements contained in other sections have precedence over the general requirements contained in this section.

**1.2 PROCEDURES AT SUBSTANTIAL COMPLETION**

- A. Prerequisites: Comply with General Conditions and complete the following before requesting Architect's/Engineer's inspection of the Work, or a designated portion of the Work, for certification of substantial completion.
  - 1. Submit executed warranties, workmanship bonds, maintenance agreements, inspection certificates and similar required documentation for specific units of work, enabling owner's unrestricted occupancy and use.
  - 2. Submit record documentation, maintenance manuals, tools, spare parts, keys and similar operational items.
  - 3. Complete instruction of Owner's operating personnel, and start-up of systems.
  - 4. Complete final cleaning, and remove temporary facilities and tools.
- B. Inspection Procedures:
  - 1. Upon receipt of Contractor's request, Architect/Engineer will either proceed with inspection or advise Contractor of prerequisites not fulfilled.
  - 2. Following initial inspection, Architect/Engineer will either prepare certificate of substantial completion, or advise Contractor of work which must be performed prior to issuance of the certificate of substantial completion.

## 20 THAMES STREET – PORTLAND, ME

3. The Architect/Engineer will repeat the inspection when requested and assure that the Work has been substantially completed.
4. Results of the completed inspection will form the initial "punch-list" for final acceptance.

### 1.3 PROCEDURES AT FINAL ACCEPTANCE

#### A. Re-inspection Procedure:

1. The Architect/Engineer will re-inspect the Work upon receipt of the Contractor's notice that, except for those items whose completion has been delayed due to circumstances that are acceptable to the Architect/Engineer; the Work has been completed, including punch-list items from earlier inspections.
2. Upon completion of re-inspection, the Architect/Engineer will either recommend final acceptance and final payment, or will advise the Contractor of work not completed or obligations not fulfilled as required for final acceptance. If necessary, this procedure will be repeated.

### 1.4 RECORD DOCUMENTATION

#### A. Record Drawings:

1. Maintain a complete set of prints of the contract drawings and shop drawing for record mark-up purposes throughout the Contract Time.
2. Mark-up these drawings during the course of the work to show both changes and the actual installation, in sufficient detail to form a complete record for the Owner's purposes. Give particular attention to work which will be concealed and difficult to measure and record at a later date, and work which may require servicing or replacement during the life of the project.
3. Require the entities marking prints to sign and date each mark-up.
4. Bind prints into manageable sets, with durable paper covers, appropriately labeled.

#### B. Maintenance Manuals:

## **20 THAMES STREET – PORTLAND, ME**

1. Provide 3-ring vinyl-covered binders containing required maintenance manuals, properly identified and indexed.
2. Include operating and maintenance instructions extended to cover emergencies, spare parts, warranties, inspection procedures, diagrams, safety, security, and similar appropriate data for each system or equipment item.

### **1.5 GENERAL CLOSEOUT REQUIREMENTS**

- A. Operator Instructions: Require each Installer of systems requiring continued operation and maintenance by owner's operating personnel, to provide on-location instruction to Owner's personnel, sufficient to ensure safe, secure, efficient, non-failing utilization and operation of systems. Provide instructions for the following categories of work:
1. Mechanical/electrical/electronic systems (not limited to work of Divisions 15 and 16).
  2. Live plant materials and lawns.
  3. Roofing, flashing, joint sealers.
  4. Floor finishes.
- B. Final Cleaning: At the time of project close out, clean or reclean the Work to the condition expected from a normal, commercial building cleaning and maintenance program. Complete the following cleaning operations before requesting the Architect/Engineer's inspection for certification of substantial completions.
1. Remove non-permanent protection and labels.
  2. Polish glass.
  3. Clean exposed finishes.
  4. Touch-up minor finish damage.
  5. Clean or replace mechanical systems filters.
  6. Remove debris.
  7. Broom-clean unoccupied spaces.
  8. Sanitize plumbing and food service facilities.
  9. Clean light fixtures and replace burned-out lamps.
  10. Sweep and wash paved areas.
  11. Police yards and grounds

**END OF SECTION**

---

*The key to success starts with a solid foundation.*  
ENGINEERING | EXPLORATION | EXPERIENCE

---

# Geotechnical Report

*Proposed Residential/Retail Building  
20 Thames Street, Portland, Maine*



**Client**  
Essexnorth Portland, LLC  
PO Box 394  
Topsfield, MA 01983

**Project #: 16300**  
**Date: 7/13/17**

July 13, 2017  
Summit #16300

Ara Aftandilian  
Essexnorth Portland, LLC  
PO Box 394  
Topsfield, MA 01983

Reference: Geotechnical Engineering Report – Proposed Retail/Residential Building  
20 Thames Street, Portland, Maine

Dear Ara;

Summit Geoengineering Services, Inc. (SGS) has completed a geotechnical investigation for the proposed mixed use building at the site referenced above. Our scope of services included the interpretation of geotechnical borings performed by Haley and Aldrich (H&A), the drilling of 18 probes within the proposed development area to supplement geotechnical borings performed H&A, and preparing this geotechnical report summarizing our findings and providing geotechnical recommendations.

Our scope of services for this project did not include an environmental site assessment or further investigation for the presence or absence of hazardous or toxic material on, below, or around the site. Any statements in this report, or on the soil boring logs, regarding odors or unusual and suspicious conditions observed are for informational purposes and are not intended to constitute an environmental assessment.

The recommendations provided within this geotechnical report are based partially upon the previous explorations performed by H&A at the site and are contingent upon a site visit during construction to observe the subgrade conditions.

## 1.0 Project and Site Description

We understand that the project consists of the construction of a new 6 story building at 20 Thames Street in Portland, Maine. We further understand that the new building will have a footprint of 8,706 square feet, will be a steel-framed structure, and will be a mixture of retail space and residential units. Based on building concepts provided by you, we understand that the first floor will be at-grade parking in the northern portion of the building and retail space in the southern portion. The upper 5 floors will consist of residential units.

Based on the Site Grading Plan prepared by Ransom Consulting Engineers, the existing grade within the site is relatively flat, ranging from approximately elevation 15 feet to 16 feet. During our explorations at the site, there was a new hotel being constructed at the neighboring lot to the east, and the proposed building site at 20 Thames Street was being used to stockpile soil and store equipment. Existing grades at the site may vary slightly from those shown on the grading plan due to this site activity.

Anticipated structural loads were provided to us by Veitas & Veitas Engineers, Inc. (V&V) for the proposed building. Based on these loads and a preliminary foundation plan prepared by V&V, we understand that isolated footing widths are anticipated to range from 3.5 feet to 11.5 feet, and strip footings will have a width of approximately 24 inches.

## 2.0 Subsurface Explorations and Laboratory Testing

### 2.1 Subsurface Explorations – Haley and Aldrich (2005 and 2007)

SGS was provided a geotechnical report, containing boring and rock core logs, prepared by Haley and Aldrich (H&A) entitled “Report on Subsurface Explorations and Geotechnical Engineering Recommendations – The Watermark, Portland, Maine” dated May 16, 2007. Based on the information contained within this report, H&A performed a total of 6 borings within and surrounding the proposed development area in September/October of 2005 and March of 2007. These borings included the following (bedrock depths are provided next to the boring title):

HA05-16 – Bedrock @ 11.6 ft.  
HA05-18 – Bedrock @ 6.6 ft.  
HA05-19 – Bedrock @ 5.0 ft. to 7.6 ft.  
HA05-21 – Bedrock @ 16.7 ft.  
HA05-22 – Bedrock @ 10.3 ft.  
HA07-101 – Bedrock @ 10.0 ft.

Note that all borings listed above were advanced to refusal and rock cores were collected. Based on the information provided within the H&A logs, the borings were performed using 3” to 4” steel casing with roller bit or with 2.5” inside diameter hollow stem augers. Split spoon sampling was performed continuously for the borings, except for HA05-22 and HA07-101, where no samples were collected.

## 2.2 Subsurface Explorations – Summit Geoengineering Services (2017)

SGS observed the subsurface conditions at the site with the drilling of 18 probes on June 9, 2017. All explorations were performed by Summit Geoengineering Services (SGS), using a rubber track mounted Power Probe 9500 VTR. The probes were advanced using 2½-inch solid stem augers to a depth of refusal, encountered at 5.5 to 15.7 feet.

The probes were located by SGS prior to drilling by taping/pacing from existing features. The probe locations were based on proposed critical footing locations from the foundation plan prepared by V&V. These locations can be seen in the SGS Exploration Plan in Appendix A. The H&A logs can be found in Appendix B.

## 2.3 Laboratory Testing

Laboratory testing, consisting of two Grain Size Analyses (*ASTM D422*), was performed by H&A on fill soil specimens collected from split spoon samples obtained during Boring HA05-19 and HA05-21 at depths 0.5' to 4.5' and 2.0' to 6.0', respectively. A summary of the results are presented below. Detailed results can be found in Appendix C.

Table 1: Laboratory Test Results

GRAIN SIZE ANALYSIS RESULTS – FILL						
Boring	Sample	Depth (ft.)	Composition			USCS
			Gravel	Sand	Silt/Clay	
HA05-19	S-1 & S-2	0.5 to 4.5	15.0%	76.0%	9.0%	SW-SM
HA05-21	S-2 & S-3	2.0 to 6.0	16.0%	72.0%	12.0%	SP-SM

USCS = Unified Soil Classification System, SM-SC = Silty Sand/Clayey Sand

## 3.0 Subsurface Conditions

### 3.1 Soil

The soil conditions within the proposed building area consist of fill overlying bedrock. Bedrock ranges in depth from 5.5 to 15.7 feet below existing ground surface.

**Fill.** In general, the fill soil consists of a mixture of sand, silt, and gravel with occasional brick, cement, wood, and glass pieces throughout the layer. Brick pieces were encountered during the probe explorations performed by SGS. Standard Penetration Number (SPT-N) of the fill ranges from 5 to 53 with an average of 21 blows per foot (bpf). The fill is loose to dense, dry to wet



(generally increasing moisture with depth) and classifies as SW-SM or SP-SM in accordance with the Unified Soil Classification System. Based on grain sizes performed on collected samples, the gravel content of the fill ranges from 15% to 16%, the sand content ranges from 72% to 76%, and the silt content ranges from 9% to 12%.

A fill stockpile, which was stored on site, was examined by SGS in December of 2016 (See Photo 1). Additionally, fill exposed in various excavations for construction of the nearby hotel were also observed by SGS (See Photo 2). In general, the fill was observed to consist entirely of mineral soil and small-sized inorganic demolition debris (bricks, etc.).



*Photo 1: Stockpile within proposed building footprint, December 2016*



*Photo 2: Foundation excavation for hotel directly east of the proposed building footprint*

### 3.2 Bedrock

Bedrock was encountered within the proposed building footprint ranging from 5.5 feet to 15.7 feet below existing ground surface (elevation -0.6 feet to 10.4 feet). In general, the bedrock surface appears to be sloping downward in a northeast direction towards the AC Hotel building neighboring the property.

Rock cores were performed in all 6 of the H&A borings at the refusal depths encountered during drilling. Rock core depths ranged from 2.9 feet to 26.4 feet below the bedrock surface. Rock Quality Designation (RQD) of the collected rock core samples, measured as the percentage of recovered rock in lengths greater than or equal to 4 inches, ranged from 0 to 100 with an average of 66. In general, the deeper the recovered core sample was, the higher the resulting RQD. H&A classified the rock as the following: "...hard to moderately hard, fresh to slightly weathered SCHIST."

The following table presents the bedrock depths and corresponding elevations encountered in the SGS probes and the H&A borings. It should be noted that the ground surface elevations for the probes were surveyed on the day of the probes using a DMH-3 rim elevation of 14.49 feet as shown on the Ransom Grading Plan. All ground surface elevations and bedrock depths for the H&A borings were obtained from the H&A report and boring logs.

Table 2: Bedrock Depth and Elevation Summary

Bedrock Depths and Elevations			
<sup>1</sup> Exploration	<sup>2</sup> Ground Surface Elevation (ft.)	Depth to Bedrock (ft.)	Bedrock Elevation (ft.)
P-1	15.1'	7.3'	7.8'
P-2	15.1'	15.7'	-0.6'
P-3	15.3'	9.2'	6.1'
P-4	15.0'	10.3'	4.7'
P-5	14.9'	9.0'	5.9'
P-6	15.3'	12.5'	2.8'
P-7	15.6'	7.4'	8.2'
P-8	15.4'	10.5'	4.9'
P-9	15.4'	12.7'	2.7'
P-10	15.9'	6.2'	9.7'
P-11	15.9'	5.5'	10.4'
P-12	15.5'	6.3'	9.2'
P-13	15.7'	6.4'	9.3'
P-14	16.3'	6.5'	9.8'
P-15	16.4'	6.8'	9.6'
P-16	15.9'	6.9'	9.0'
P-17	16.9'	7.9'	9.0'
P-18	16.3'	8.7'	7.6'
<sup>3</sup> HA05-16	18.0' +/-	11.6'	6.4' +/-
<sup>3</sup> HA05-18	16.5' +/-	6.6'	9.9' +/-
HA05-19	15.4' +/-	5.0' to 7.6'	10.4' to 7.8' +/-
<sup>3</sup> HA05-21	16.5' +/-	16.7'	-0.2' +/-
HA05-22	15.0' +/-	10.3'	4.7' +/-
<sup>3</sup> HA07-101	15.5' +/-	10.0'	5.5' +/-

<sup>1</sup>**Note:** Probes performed by SGS in 2017, Borings performed by H&A in 2005/2007. All data shown from borings was taken from the H&A report and logs.

<sup>2</sup>**Note:** Ground surface elevation for the probes was surveyed on the day of the exploration using a DMH-3 rim elevation on Thames Street of 14.49', as shown on the Ransom grading plan.

<sup>3</sup>**Note:** Boring performed outside of the proposed building footprint.

### 3.3 Groundwater

H&A installed 3 monitoring wells during their explorations at the site in areas nearby the proposed building location. Groundwater was found to vary between elevations 4.3 feet to 7.2 feet, close to or slightly below the bedrock surface elevation.

## 4.0 Geotechnical Evaluation

Based on the geotechnical information collected at the site and the structural loads and footing depth/locations provided to us by V&V, we believe that the new building foundation can be constructed using conventional spread footings on frost wall with a slab-on-grade. The subgrade beneath the footings and slabs should be prepared in accordance with the recommendations provided in Section 5.

We have identified the following geotechnical considerations in regard to the construction of the proposed foundation:

- Need for rock anchors due to the large uplift loads on the foundation.
- Potential for differential settlements between adjacent footings constructed on soil and footings constructed with rock anchors (eliminating vertical deflection).
- Potential for bedrock at or above the proposed bottom of footing elevation.

Based on the description of the fill samples recovered in the H&A borings, observations by SGS of a stockpile and excavations near the site, and the auger spoils during our probe explorations, we anticipate that some man-made material (brick, ash, coal) may be present within the existing fill. While this material does not pose an issue in small amounts, a significant presence of these soils beneath footings may pose a settlement risk due to its compressibility or degradation potential. We recommend that significant amounts of these materials, if encountered, be removed from beneath proposed footings, as outlined in Section 5. We also recommend that SGS be retained to perform footing subgrade inspections in order to verify that the subgrade is suitable for footing support.

Based on discussions with Veitas and Veitas Engineers (V&V), we understand that uplift loads on some of the isolated footings will exceed the dead weight on the footings and the overburden soil weight for practical footing depths. We anticipate that rock anchors will be required to resist these uplift loads. We have provided geotechnical recommendations for rock anchors in Section 5.

Footings which are constructed with conventional rock anchors will have limited or no vertical deflection due to the restraint of the rock anchor bar. Footings which are constructed on existing fill are anticipated to have a maximum 1.0" vertical deflection based on the total dead and live load. To eliminate the potential for excessive differential settlement between these two types of footings, we recommend footings which include uplift anchors are constructed in accordance with the recommendations provided in Section 5.5.2.

Borings performed by H&A and probes performed by us indicate that bedrock depth ranges from 5.5 feet to 15.7 feet below existing ground surface. Based on the footing depths provided by V&V, we anticipate that all of footings will be at or above bedrock elevation. If bedrock is encountered in the footing excavation above the bottom of footing elevation, we anticipate that it will be a minimal amount that requires removal and that standard breaker/hoe ram equipment will be adequate to remove the bedrock.

## 5.0 Geotechnical Recommendations

### 5.1 Foundation Bearing Pressure

Based on the proposed footing depths, we anticipate that existing fill soil will be exposed beneath footings for the building. Assuming that the recommendations below are followed, we recommend an allowable bearing pressure of 3,000 psf be used to proportion the footings for the new building. If the recommendations provided below are followed, we anticipate that post construction total settlement will be less than 1 inch and differential settlement within the building will be less than 0.5 inches between adjacent column footings:

- Prior to footing excavations, the entire building footprint should be proofrolled with a minimum of 12 passes (6 north/south and 6 east/west) with a 10 ton minimum operating weight vibratory roller.
- All footings exposed to freezing temperatures are constructed at the recommended frost protection depth of 3.5 feet below exterior finish grade, constructed on a minimum of 6" of  $\frac{3}{4}$ " crushed stone (for a total frost-protected depth of 4.0 feet). Interior footings should be constructed at a minimum depth of 1.5 feet below FFE and constructed on a minimum of 6" of  $\frac{3}{4}$ " crushed stone.
- If soft or unsuitable fill is encountered at the bottom of the excavation, it should be removed and replaced with  $\frac{3}{4}$ " crushed stone prior to proofrolling. If a significant amount of soft/unsuitable soils are encountered, SGS should be notified. Unsuitable soils should be removed from beneath footings at a 2V:1H taper beyond all edges of the footing.



- Exposed soil at the bottom of footing trenches is proofrolled with a minimum of 6 passes with a large (minimum 10 tons) vibratory roller. Proofrolling should be performed on dry, unfrozen soils. Any loose or soft areas identified during the proofrolling process should be removed and replaced with ¾" crushed stone.
- If bedrock is exposed in the footing excavation, any loose or weathered rock is removed from beneath the footing area to expose a hard, competent bedrock surface. Any large gaps or voids created by removing loose pieces of bedrock are filled with ¾" crushed stone, flowable fill, or lean concrete.
- All placed fill within the building footprint consists of Structural Fill (SF, see Section 5.6 for gradation and compaction requirement) or ¾" crushed stone.

Summit Geoengineering Services (SGS) should be retained to perform a subgrade inspection of the exposed footing subgrade soil for the reinforced retaining wall footings prior to placing the 12" of crushed stone on top of the subgrade.

## 5.2 Uplift and Sliding Capacity

Assuming that the recommendations presented in this report are followed, Foundation Backfill (FB, see Section 5.3) can be assumed to be the soil on the exterior of the foundation walls, Structural Fill (SF, see section 5.6) can be assumed to be on the interior of foundation walls and as backfill for interior footings, and ¾" crushed stone can be assumed to be at the base of footings.

PARAMETER	<sup>1</sup> Foundation Backfill	<sup>1</sup> Structural Fill	¾" Crushed Stone
Total Natural (moist) Unit Weight ( $\gamma_t$ )	125 pcf	130 pcf	140 pcf
Saturated (buoyant) Unit Weight ( $\gamma_s$ )	63 pcf	58 pcf	78 pcf
Friction Coefficient (f)	0.40	0.45	0.60
Passive Earth Pressure Coefficient ( $K_p$ )	3.0	3.0	8.0
At Rest Earth Pressure Coefficient ( $K_o$ )	0.47	0.44	0.36
Active Earth Pressure Coefficient ( $K_a$ )	0.30	0.33	0.20
Effective Friction Angle ( $\phi$ )	32 <sup>0</sup>	34 <sup>0</sup>	40 <sup>0</sup>
Undrained Shear Strength ( $S_u$ )	0	0	0 psf

<sup>1</sup>Based on 95% compaction of by ASTM D1557, Modified Proctor Test Method.

Uplift capacity of the foundation includes the dead weight of the foundation, friction of the mobilized soil along the soil-to-soil shear plane, and weight of soil above the footings. Sliding resistance of the foundation includes passive resistance of the soil against the side of the foundation wall and the friction between the bottom of the footing and the underlying soil/bedrock. If additional sliding or uplift capacity is required, bedrock doweling or rock anchors should be considered.

### 5.2.1 Rock Anchors

Based on discussions with V&V, we understand that rock anchors will be required for some of the proposed footings to withstand uplift loads. Based on the recovered rock core samples at the site, we recommend an ultimate rock-grout bond stress of 120 psi be used in the design of the rock anchors. We recommend that the bonded zone start at a minimum length of 10 feet below the bedrock surface to allow for a free stressing zone. We further recommend that the rock anchors be installed with a Class 1 corrosion protection system. A minimum factor of safety of 2.5 should be used in bond stress calculations. If a 6" diameter hole is used for an anchor, this provides approximately 16 kips of uplift resistance per foot of bonded length.

To ensure adequate rock breakout capacity, we recommend that bond length of the anchors be a minimum of 5 feet. The calculation of the rock breakout was based on a failure cone projected 45° from the midpoint of the bonded zone, using a rock unit weight of 150 pcf and a factor of safety of 1.0 on the rock weight resistance. Based on this, we recommend a minimum rock anchor spacing of 5 feet. We recommend a maximum of two rock anchors per footing. In total, the rock anchor tendons should extend a minimum of 15 feet below bedrock surface (free stress zone + bond zone). Centralizers should be used for all installed anchors.

All installed anchors should be proof tested to a minimum of 133% of the design load, not to exceed 60% of the tensile strength of the steel. We recommend that the proof testing of all of the anchors be performed in accordance with the Post Tensioning Institute 2014 recommendations.

To reduce post-construction differential settlement, we recommend that rock anchors be constructed through the footings using a bond-breaker system between the cast-in-place concrete and the rock anchor bar. This will allow the footing to compress vertically under the dead load of the building framing system during construction. Once construction is nearly complete and the dead load has been applied to the footings, the rock anchor bar and plate system can be tightened and/or grouted if necessary.

### 5.3 Frost Protection

The design air freezing index for the Portland area is approximately 1,200 degree F days (10 year, 90% probability). Based on this, a total of 4.0 feet of frost protection should be provided for the exterior footings and interior footings exposed to freezing temperatures. Interior footings constructed in continuously heated areas can be constructed at a depth of 2.0 feet below interior grade. Since the footings will be constructed on a minimum of 6 inches of drained crushed stone, the bottom of exterior and interior footings may be constructed at a minimum depth of 3.5 feet and 1.5 feet, respectively.

We recommend that the exterior of all foundation elements exposed to freezing temperatures be backfilled with Foundation Backfill (FB). The portion of FB passing the 3" sieve size should meet the following gradation requirements:

*Table 3: Foundation Backfill - Soil Gradation*

FOUNDATION BACKFILL	
Sieve Size	Percent Finer
3 inch	100
¼ inch	25 to 100
No. 40	0 to 50
No. 200	0 to 6*

**Reference:** MDOT Specification 703.06, Type E (2014)

\*Reduced from 7% to 6% from Type E Standard

Maximum particle size should be limited to 6 inches. Foundation backfill should be placed in 6 to 12 inch lifts and compacted to 95% of its optimum dry density determined in accordance with ASTM D1557. The compaction requirement can be reduced to 90% beneath landscaped areas.

### 5.4 Seismic Design

Based on the summary of field results we recommend Site Class C be used in accordance with the 2006 or 2009 International Building Code. The following seismic site coefficients should be used:



Table 4: Seismic Design Coefficients

SUBGRADE SITE SEISMIC DESIGN COEFFICIENTS - IBC	
Seismic Coefficient	Site Class C
Short period spectral response ( $S_S$ )	0.313
1 second spectral response ( $S_1$ )	0.077
Maximum short period spectral response ( $S_{MS}$ )	0.376
Maximum 1 second spectral response ( $S_{M1}$ )	0.130
Design short period spectral response ( $S_{DS}$ )	0.251
Design 1 second spectral response ( $S_{D1}$ )	0.087

Subgrade conditions are not considered susceptible to liquefaction during seismic events.

### 5.5 Groundwater Control

Based on observed groundwater levels, groundwater is anticipated to be below the bottom of footing elevation for the proposed exterior and interior footings. However, due to the potential for seasonal groundwater fluctuations and to mitigate the flow of surface water towards the building, we recommend perimeter underdrains be installed along the entire exterior foundation walls for the buildings. Perimeter underdrains should consist of 6 inch rigid perforated PVC placed adjacent to the exterior footings and surrounded by a minimum of 12 inches of crushed stone wrapped in filter fabric to prevent clogging from the migration of the fine soil particles in the foundation backfill soils. The underdrain pipe should outlet to a location where it will be free flowing. Where exposed at the ground surface, the ends of pipes should be screened or otherwise protected from entry and nesting of wildlife, which could cause clogging.

### 5.6 Ground Floor Slab-on-Grade and/or Pavement

This section provides recommendations for a concrete slab-on-grade or pavement surface in the event that both types of surface are used for the ground floor area. Additionally, this section will provide recommendations for both heated and unheated conditions. We anticipate that existing fill will be exposed in the slab excavation.

#### 5.6.1 Concrete Slab-on-Grade

We recommend that the slab for the new building be constructed on a minimum of 12" of Structural Fill (SF, see table below) or ¾" crushed stone. All exposed soil should be proofrolled with a minimum of 2 passes in each of two perpendicular directions with a 10 ton minimum

(operating weight) vibratory roller. Any exposed rubble, debris, or other non-soil materials should be removed and replaced with SF or ¾" crushed stone. If the slab area is unheated, the slab subgrade thickness should be increased to 24" and the slab should be constructed on 2" of rigid insulation. Alternatively, the subgrade soil thickness could be increased to 48" (including the slab) if rigid insulation is not used.

The portion of SF passing the 3" sieve shall meet the following gradation requirements:

*Table 5: Structural Fill - Soil Gradation*

STRUCTURAL FILL (SF)	
Sieve Size	Percent finer
3 inch	100
½ inch	35 to 80
¼ inch	25 to 65
No. 40	0 to 30
No. 200	0 to 7

**Reference:** MDOT Specification 703.06, Type D

The maximum SF particle size should be limited to 6 inches. Structural Fill should be placed in 6 to 12 inch lifts and should be compacted to a minimum of 95 percent of its maximum dry density, determined in accordance with ASTM D1557. If ¾" crushed stone is used, it should be placed in 12" lifts and be compacted with a minimum of 4 passes in each of two perpendicular directions with a vibratory roller. For the conditions described above, the slab can be designed using a subgrade modulus value of 175 pci.

### 5.6.2 Pavement

The mean annual freezing index for the Portland area is estimated at 900 degree days. Based on the subgrade and mean annual freezing index, the anticipated mean annual frost penetration depth is 36 inches.

We recommend a minimum total section thickness of 18 inches for pavement in unheated areas. The Subbase soil thickness can be reduced to 6" if the area is continuously heated. We further recommend that the pavement section consist of the following materials:

Table 6: Pavement Section Thicknesses

MATERIAL	THICKNESS (in)	SPECIFICATION
Asphalt Surface Course	1	MDOT 703.09 Type 9.5 mm or Type 12.5 mm
Asphalt Binder Course	2	MDOT 703.09 Type 19 mm
Base Soil	3	MDOT 703.06 Type A
Subbase Soil	12	MDOT 703.06 Type D

For portions of the pavement subjected to light traffic loads of cars and light trucks we recommend MDOT Type 9.5mm surface course. The following specifications are for MDOT base and subbase gravel:

Table 7: Pavement Base and Subbase Gradations

SIEVE SIZE	Percent Passing a 3-inch Sieve	
	MDOT Type A (Base)	MDOT Type D (Subbase)
3 Inch	100	100
2 Inch	100	--
½ Inch	45 – 70	35 – 80
¼ Inch	30 – 55	25 – 65
No. 40	0 – 20	0 – 30
No. 200	0 – 6	0 – 7

**Reference:** MDOT Specification 703.06, Aggregate for Base and Subbase (2014)

The recommendations above can be used for exterior pavement areas.

## 6.0 Earthwork Considerations

The table below summarizes the OSHA general excavation guidelines for occupied excavations for the soils encountered in our geotechnical explorations. All permissible slopes below apply to soil above groundwater table:

Table 8: OSHA Permissible Slopes

OSHA Excavation Slopes		
Soil	OSHA Classification	Permissible Slope
Existing Fill	Type C	1.5H:1V

The proofrolling recommendations provided in Section 5.1 and 5.6 are critical for the successful performance of the new foundation. All proofrolling should be performed with a vibratory roller with a minimum operating weight of 10 tons, and should be conducted in accordance with the minimum number of passes described in the sections above. Any soft or unsuitable soil is identified during the proofrolling, it should be removed and replaced with ¾" crushed stone.

We do not anticipate that bedrock will be encountered in the footing excavations. However, if bedrock is encountered in the footing excavation, we anticipate that it will be a minimal amount that requires removal and that standard breaker/hoe ram equipment will be adequate to remove the bedrock.

It is possible that the existing soil may meet the gradation requirements for Foundation Backfill (FB) or Structural Fill (SF) if blended with ¾" or 1 ½" crushed stone. We recommend that if this blending occurs that a representative sample of the blend is tested for its accordance with the FB and SF requirements.

Surface water should be redirected from excavation areas. Where softened, we recommend the subgrade at the base of the excavation be over-excavated and replaced with a minimum of 12 inches of Crushed Stone. Crushed Stone should be should be tamped to lock the stone structure together. Crushed Stone should meet the following gradation specification:

Table 9: ¾" Crushed Stone Gradation

CRUSHED STONE ¾ INCH	
Sieve Size	Percent finer
1 inch	100
¾ inch	90 to 100
½ inch	20 to 55
⅜ inch	0 to 15
No. 4	0 to 5

**Reference:** MDOT Specification 703.13, Crushed Stone ¾-Inch (2014)

In general, we anticipate that groundwater will enter the excavations. Dewatering may consist of shallow sumps at the base of the excavation. Diversion and control of surface water should be performed to prevent water flow from rain or snowmelt from entering the excavations.

We recommend that a qualified geotechnical consultant be retained to monitor and test soil materials used during construction and confirm that soil conditions and construction methods are consistent with this report.

## 7.0 Closure

Our recommendations are based on professional judgment and generally accepted principles of geotechnical engineering and project information provided by others. Some changes in subsurface conditions from those presented in this report may occur. Should these conditions or the proposed development differ from those described in this report, SGS should be notified so that we can re-evaluate our recommendations.

It is important that SGS be consulted during construction of the foundation in order to provide guidance on the suitability of exposed soil and to select the appropriate subgrade improvement measures.

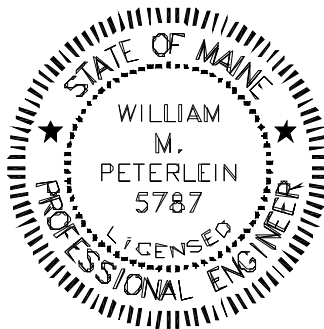
It is recommended that this report be made available in its entirety to contractors for informational purposes and be incorporated in the construction Contract Documents. We recommend that SGS be retained to review final construction documents relevant to the recommendations in this report.

We appreciate the opportunity to serve you during this phase of your project. If there are any questions or additional information is required, please do not hesitate to call.

Sincerely yours,

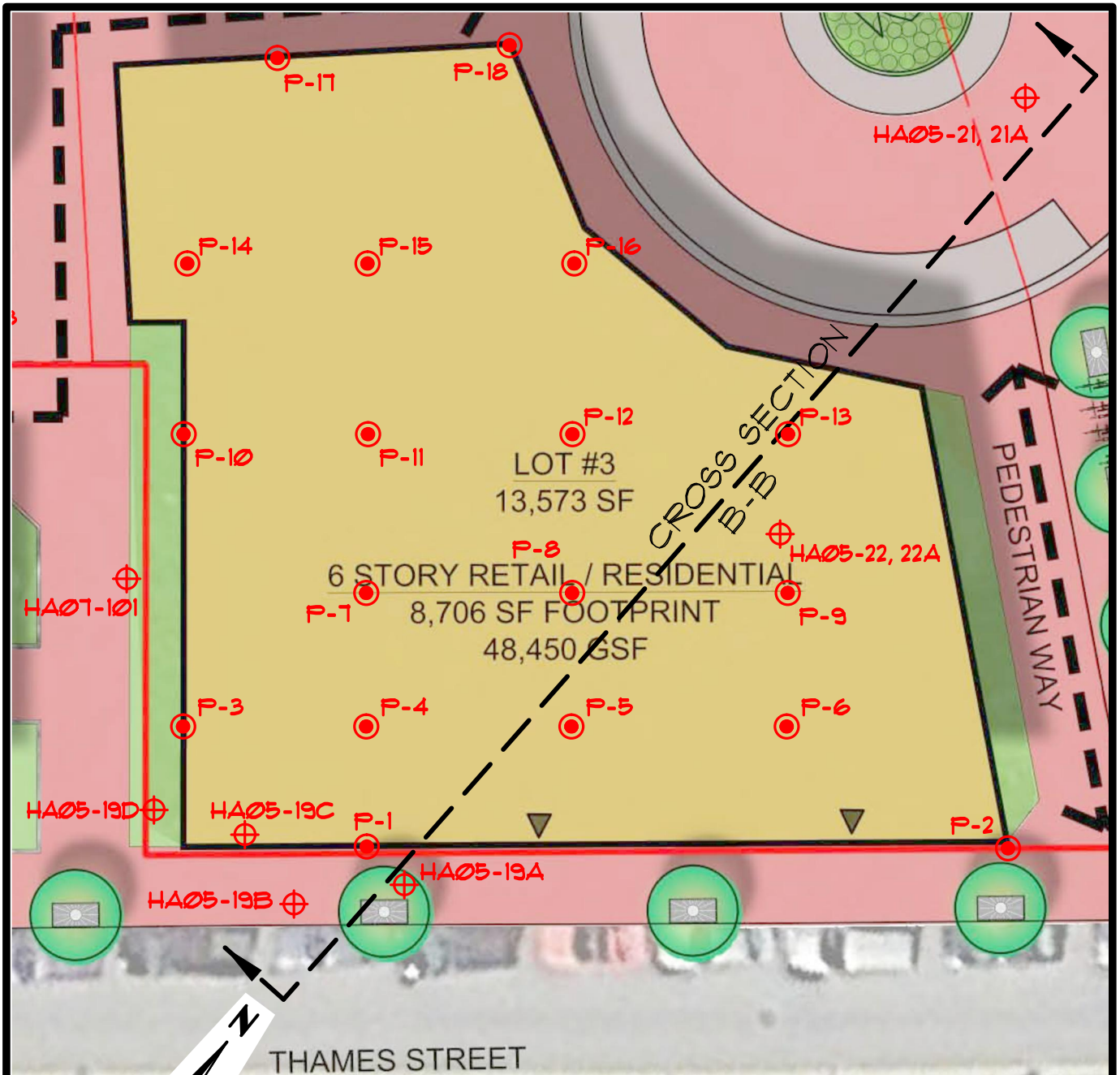


Mathew Hardison, EI  
Geotechnical Engineer



William M. Peterlein, PE  
President & Principal Engineer

**APPENDIX A**  
EXPLORATION LOCATION PLAN



**PLAN REFERENCE**

"MASTER PLAN", PORTLAND GATEWAY PROJECT", REVISION DATED NOVEMBER 8, 2016, PREPARED BY RANSON CONSULTING ENGINEERS & SCIENTISTS.

**LEGEND**

- ⊙ P-1 SUMMIT TEST PROBE (JUNE 9, 2017)
- ⊕ HA05-# HALEY & ALDRICH TEST BORING (OCTOBER 2005)
- ⊕ HA07-# HALEY & ALDRICH TEST BORING (MARCH 2007)

**EXPLORATION LOCATION PLAN  
PORTLAND GATEWAY - LOT 3**

THAMES STREET - PORTLAND, MAINE  
PREPARED FOR

**ESSEXNORTH PORTLAND, LLC**

145 LISBON ST. - SUITE 101  
LEWISTON, ME 04240  
Tel.: (207) 576-3313

173 PLEASANT STREET  
ROCKLAND, ME 04841  
Tel.: (207) 318-1161



**SUMMIT**  
GEOENGINEERING SERVICES  
www.summitgeoeng.com

DATE: 7-12-2017	DRAWN BY: KRF	CHECKED BY: WMP
JOB: 16300	SCALE: 1" = 20'	FILE: 16300 SKT

**APPENDIX B**  
HALEY & ALDRICH BORING LOGS





# TEST BORING REPORT

Boring No. HA05-16

Project THE WATERMARK Portland, ME  
 Client Riverwalk, LLC.  
 Contractor Maine Test Borings, Inc.

File No. 30322-000  
 Sheet No. 1 of 1  
 Start 4 October 2005  
 Finish 4 October 2005  
 Driller B. Enos

	Casing	Sampler	Barrel	Drilling Equipment and Procedures
Type	NW	SS	NQ	Rig Make & Model: Mobile Drill B-53 Truck
Inside Diameter (in.)	3.0	1 3/8	2.0	Bit Type: Roller Bit
Hammer Weight (lb.)	300	140	-	Drill Mud: None
Hammer Fall (in.)	30	30	-	Casing: Driven
				Hoist/Hammer: Winch/ Safety Hammer

H&A Rep. K. Stone  
 Elevation 18.0 +/-  
 Datum Portland City  
 Location See Plan

Depth (ft.)	SPT <sup>1</sup>	Sample No. & Rec. (in.)	Sample Depth (ft.)	Well Diagram	Elev./Depth (ft.)	USCS Symbol	Visual-Manual Identification and Description (Density/consistency, color, GROUP NAME, max. particle size <sup>2</sup> , structure, odor, moisture, optional descriptions, geologic interpretation)	Gravel					Sand					Field Test			
								% Coarse	% Fine	% Coarse	% Medium	% Fine	% Fines	Dilatancy	Toughness	Plasticity	Strength				
0	9 8 6 3	S1 3	0.0 2.0	NO WELL INSTALLED	11.6	SW	Medium dense, dark-brown, well graded SAND with gravel (SW), mps 1.0 in., no odor, dry.  -FILL-	40	5	15	20	20									
	3 4 8 22	S2 5	2.0 4.0			SP	Medium dense, dark-gray, poorly graded SAND with gravel (SP), mps 1.5 in., no odor, dry, pieces of brick fragments.	25	5	10	20	35	5								
	13 32 21 18	S3 16	4.0 6.0			SM	Very dense, dark brownish-gray to brown, silty SAND with gravel (SM), mps 1 in., no odor, moist, cement pieces and shell fragments present.	10	15	5	20	35	15								
5	9 8 8 12	S4 19	6.0 8.0			SP	Medium dense, brown to grayish-brown, poorly graded SAND with gravel (SP), mps 0.75 in., no odor, moist.	5	20	50	25										
	11 23 14 19	S5 21	8.0 10.0			ML	Medium dense, gray-brown, sandy SILT (ML), mps 1 mm., no odor, moist, mottled, slightly blocky.				10	30	60								
	11 23 14 19	S5 21	8.0 10.0			SM	Dense, gray to brown, silty SAND (SM), mps 10 mm., no odor, moist, brick pieces.	5		10	65	20									
10	4 11 12	S6 19	10.0 11.6	SM	Medium dense, brownish-gray, silty SAND with gravel (SM), mps 1 in., no odor, moist to wet.  -FILL-	5	10	5	20	40	20										
50(1 in.)							NOTE: Split-spoon and casing refusal at 11.6 ft. Advanced roller bit to 12.3 ft. Begin NQ rock core at 12.3 ft. See Core Boring Report HA05-16 for details.														

Water Level Data				Sample Identification		Well Diagram		Summary												
Date	Time	Elapsed Time (hr.)	Depth (ft.) to:			O Open End Rod	T Thin Wall Tube	U Undisturbed Sample	S Split Spoon	G Geoprobe	Riser Pipe	Screen	Filter Sand	Cuttings	Grout	Concrete	Bentonite Seal	Overburden (lin. ft.) 12.3	Rock Cored (lin. ft.) 7.2	Samples 6S, 2C
			Bottom of Casing	Bottom of Hole	Water															

Field Tests: Dilatancy: R-Rapid, S-Slow, N-None Plasticity: N-Nonplastic, L-Low, M-Medium, H-High  
 Toughness: L-Low, M-Medium, H-High Dry Strength: N-None, L-Low, M-Medium, H-High, V-Very High  
<sup>1</sup>SPT = Sampler blows per 6 in. <sup>2</sup>Maximum particle size is determined by direct observation within the limitations of sampler size.  
**Note: Soil identification based on visual-manual methods of the USCS as practiced by Haley & Aldrich, Inc.**



# CORE BORING REPORT

Boring No. HA05-16

File No. 30322-000

Sheet No. 1 of 1

Depth (ft)	Drilling Rate Min./ft	Run No.	Depth (ft)	Recovery/RQD		Weathering	Well Dia-gram	Elev./Depth (ft)	Visual Description and Remarks
				in.	%				
									SEE TEST BORING REPORT FOR OVERBURDEN DETAILS
10									NOTE: Encountered bedrock at 11.6 ft. Advanced roller bit to 12.3 ft. Begin NQ rock core at 12.3 ft.
		C1	12.3 15.4	37/25	100/68			12.3	Hard, fresh, gray, aphanitic to fine grained SCHIST. Primary joints dipping at moderate to high angles, very close to close, planar to stepped, smooth, tight to partly open. Secondary joints dipping at low angles. Joints fresh to slightly weathered with some calcite coatings.
15		C2	15.4 19.5	49/20	100/41				Hard, fresh to slightly weathered, gray, aphanitic to fine grained SCHIST. Primary joints dipping at high to near vertical angles, planar to undulating, smooth, tight to partly open, very close to moderate. Secondary joints dipping at horizontal to low angles. Discoloration on some joint surfaces.
								19.5	-BOTTOM OF EXPLORATION-

NO WELL INSTALLED





# TEST BORING REPORT

Boring No. HA05-18

Project THE WATERMARK Portland, ME  
 Client Riverwalk, LLC.  
 Contractor Maine Test Borings, Inc.

File No. 30322-000  
 Sheet No. 1 of 1  
 Start 4 October 2005  
 Finish 4 October 2005  
 Driller B. Enos

	Casing	Sampler	Barrel	Drilling Equipment and Procedures
Type	NW	SS	NQ	Rig Make & Model: Mobile Drill B-53 Truck
Inside Diameter (in.)	4.0	1 3/8	2.0	Bit Type: Roller Bit
Hammer Weight (lb.)	300	140	-	Drill Mud: None
Hammer Fall (in.)	30	30	-	Casing: Driven
				Hoist/Hammer: Winch/ Safety Hammer

H&A Rep. K. Stone  
 Elevation 16.5 +/-  
 Datum Portland City  
 Location See Plan

Depth (ft.)	SPT <sup>1</sup>	Sample No. & Rec. (in.)	Sample Depth (ft.)	Well Diagram	Elev./Depth (ft.)	USCS Symbol	Visual-Manual Identification and Description (Density/consistency, color, GROUP NAME, max. particle size <sup>2</sup> , structure, odor, moisture, optional descriptions, geologic interpretation)	Gravel		Sand		Field Test					
								% Coarse	% Fine	% Coarse	% Medium	% Fine	% Fines	Dilatancy	Toughness	Plasticity	Strength
0	18 11 10 12	S1 15	0.0 2.0	NO WELL INSTALLED	5.9	SM	Medium dense, dark-brown, silty SAND (SM), mps 0.43 mm., black staining present, no odor, dry.  -FILL-					60	40				
5	9 75(0.4ft)	S2	5.0 5.9			GM	Very dense, dark-brown, silty GRAVEL with sand (GM), mps 1.0 in., no odor, dry.  -FILL-  NOTE: Split spoon refusal at 5.9 ft. Advance roller bit to 6.6 ft. Begin NQ rock core at 6.6 ft. See Core Boring Report HA05-18 for details.	50	10	50	35						

Water Level Data				Sample Identification		Well Diagram		Summary												
Date	Time	Elapsed Time (hr.)	Depth (ft.) to:			O	T	U	S	G	Riser Pipe	Screen	Filter Sand	Cuttings	Grout	Concrete	Bentonite Seal	Overburden (lin. ft.)	Rock Cored (lin. ft.)	Samples
10-4-05	12:55	0.25	Bottom of Casing	Bottom of Hole	Water													6.6	9	2S, 2C

Field Tests: Dilatancy: R-Rapid, S-Slow, N-None Plasticity: N-Nonplastic, L-Low, M-Medium, H-High  
 Toughness: L-Low, M-Medium, H-High Dry Strength: N-None, L-Low, M-Medium, H-High, V-Very High  
<sup>1</sup>SPT = Sampler blows per 6 in. <sup>2</sup>Maximum particle size is determined by direct observation within the limitations of sampler size.  
**Note: Soil identification based on visual-manual methods of the USCS as practiced by Haley & Aldrich, Inc.**

USCS\_TB4 USCSLIB4.GLB USCSSTB-CORE4.GDT G:\PROJECTS\30322\001\30322-000.GPJ 16 May 07



# CORE BORING REPORT

**Boring No. HA05-18**  
 File No. 30322-000  
 Sheet No. 1 of 1

Depth (ft)	Drilling Rate Min./ft	Run No.	Depth (ft)	Recovery/RQD		Weathering	Well Dia-gram	Elev./Depth (ft)	Visual Description and Remarks
				in.	%				
0									SEE TEST BORING REPORT FOR OVERBURDEN DETAILS
5									NOTE: Bedrock encountered at 5.9 ft. Advanced roller bit to 6.6 ft. Begin NQ rock core at 6.6 ft.
		C1	6.6 11.0	48/23	91/47			5.9	Hard, fresh, gray, aphanitic to fine grained SCHIST. Primary joints dipping at moderate to high angles, very close to close, planar, smooth, tight to partly open, occasional calcite veins.
10		C2	11.0 15.6	57/30	100/52				Hard, fresh, gray, aphanitic to fine grained SCHIST. Primary joints dipping at moderate to high angles, close to moderate, planar, smooth, tight to partly open, occasional calcite veins.
15							NO WELL INSTALLED		
								15.6	-BOTTOM OF EXPLORATION-

H:\A\_CORE+WELL\4 USC SLIB4.GLB USCSTB+CORE\GDT G:\PROJECTS\30322\000\30322-000.GPJ 18 May 07



**CORE BORING REPORT**

Depth (ft)	Drilling Rate Min./ft	Run No.	Depth (ft)	Recovery/RQD		Weathering	Well Diagram	Elev./Depth (ft)	Visual Description and Remarks
				in.	%				
									SEE TEST BORING REPORT FOR OVERBURDEN DETAILS (FOR HA05-19A)
5									NOTE: Bedrock encountered at 6.5 ft. Advanced roller bit to 6.9 ft. Begin NQ rock core at 6.9 ft.
		C1	6.9 7.5	6/4.5	85/66			6.9	Hard, fresh, gray, aphanitic to fine grained SCHIST. Joints dipping at low to moderate angles, close to wide, planar to stepped, smooth to rough, partly open, calcite veins present.
		C2	7.5 10.3	33/31	100/94				
10		C3	10.3 14.3	48/40.5	100/84				Hard, fresh, gray, aphanitic to fine grained SCHIST. Joints dipping at low to moderate angles, close to moderate, planar to undulating, smooth to rough, tight to partly open, occasional calcite veins.
15		C4	14.3 18.9	55/40	100/72				Hard, fresh, gray, aphanitic to fine grained SCHIST. Joints dipping at moderate to high angles, close to moderate, planar to undulating, smooth to rough, tight to partly open, occasional calcite veins.
20		C5	18.9 23.9	60/53.5	100/89				Hard, fresh, gray, aphanitic to fine grained SCHIST. Joints dipping at moderate to high angles, close to moderate, planar to undulating, smooth to rough, tight to partly open, occasional calcite veins.
25		C6	23.9 28.9	60/57	100/95				Hard, fresh, gray, aphanitic to fine grained SCHIST. Joints dipping at moderate to high angles, close to moderate, planar to stepped, smooth to rough, tight to partly open. Frequent calcite veins parallel to foliation.

NO WELL INSTALLED

H:\A\_CORE+WELL4 USC\LIB4.GLB USC\STB\CORE4.GDT G:\PROJECTS\30322\000\30322-000.GPJ 18 May 07



# CORE BORING REPORT

Boring No. HA05-19D

File No. 30322-000

Sheet No. 2 of 2

Depth (ft)	Drilling Rate Min./ft	Run No.	Depth (ft)	Recovery/RQD		Weathering	Well Dia-gram	Elev./Depth (ft)	Visual Description and Remarks
				in.	%				
30		C7	28.9	60/46	100/76				Hard, fresh, gray, aphanitic to fine grained SCHIST. Joints dipping at low to high angles, very close to close, planar to undulating, smooth to rough, tight to partly open. Quartz intrusions throughout core stem, occasional calcite stringers.
			33.9						
								33.9	-BOTTOM OF EXPLORATION-

NO WELL INSTALLED



# TEST BORING REPORT

Boring No. HA05-21

Project THE WATERMARK Portland, ME  
Client Riverwalk, LLC.  
Contractor Maine Test Borings, Inc.

File No. 30322-000  
Sheet No. 1 of 1  
Start 30 September 2005  
Finish 30 September 2005  
Driller R. Idano

	Casing	Sampler	Barrel	Drilling Equipment and Procedures
Type	HSA	SS	-	Rig Make & Model: Mobile Drill B-53 Trailer
Inside Diameter (in.)	2.5	1 3/8	-	Bit Type: Cutting Head
Hammer Weight (lb.)	-	140	-	Drill Mud: None
Hammer Fall (in.)	-	30	-	Casing: Spun
				Hoist/Hammer: Winch/ Doughnut Hammer

H&A Rep. K. Stone  
Elevation 16.5+/-  
Datum Portland City  
Location See Plan

Depth (ft.)	SPT <sup>1</sup>	Sample No. & Rec. (in.)	Sample Depth (ft.)	Well Diagram	Elev./Depth (ft.)	USCS Symbol	Visual-Manual Identification and Description (Density/consistency, color, GROUP NAME, max. particle size <sup>2</sup> , structure, odor, moisture, optional descriptions, geologic interpretation)	Gravel					Sand			Field Test							
								% Coarse	% Fine	% Coarse	% Medium	% Fine	% Fines	Dilatancy	Toughness	Plasticity	Strength						
0	7	S1	0.0	NO WELL INSTALLED		SP	Medium dense, brown, poorly graded SAND with gravel (SP), mps 1.0 in., black staining present, no odor, dry.	5	10	5	5	75											
	11	14	2.0				-FILL-																
	14	S2	2.0				SP	Dense, brown, poorly graded SAND with gravel (SP), mps 1.0 in., black staining present, brick fragments present, no odor, dry.	5	10	5	5	75										
	17	13	4.0				-FILL-																
	10	S3	4.0				SP	Medium dense, brown, poorly graded SAND with gravel (SP), mps 1.0 in., black staining from 4.5-4.7ft., no odor, dry.	5	10	5	5	75										
	11	12	6.0				-FILL-																
	11	S4	6.0				SP	Medium dense, brown, poorly graded SAND with gravel (SP), mps 1.0 in., brick fragments present, no odor, dry.	5	10	5	5	75										
	3	12	8.0				-FILL-																
	6	S5	8.0				SP	Medium dense, brown, poorly graded SAND with gravel (SP), mps 1.0 in., some silt and clay from 8.3-8.5 ft., no odor, dry.	5	10	5	5	75										
	10	9	10.0				-FILL-																
10	2	S6	10.0	NO WELL INSTALLED		SC	Medium dense, olive-brown, clayey SAND (SC), mps 0.43 mm., no odor, moist.	50	50			65	35										
	11	10	12.0				10.2	GP	Dense, brown, poorly graded GRAVEL (GP), mps 1.25 in., appears to be weathered rock fragments, no odor, wet.														
	14	S7	12.0				10.4	GP	Dense, brown, poorly graded GRAVEL with sand (GP), mps 1.25 in., no odor, wet.	35	35	10	10	10									
	14	10	14.0				-FILL-																
	17	S8	14.0				13.8		Piece of wood in split spoon, wood fragments.														
	24	6	14.9				-WOOD-																
15	22	S9	15.0				NO WELL INSTALLED		SP	Very dense, gray to black, poorly graded SAND with gravel (SP), mps 1.25 in., no odor, wet.	10	10	15	15	50								
	27	14	17.0							-GLACIAL TILL-													
	27	S10	17.0							17.6	SP	Very dense, gray, poorly graded SAND with gravel (SP). mps 1.0 in., no odor, wet.	10	10	15	15	50						
	44	8	17.6							-GLACIAL TILL-													
							-BOTTOM OF EXPLORATION-																

Water Level Data				Sample Identification		Well Diagram		Summary	
Date	Time	Elapsed Time (hr.)	Depth (ft.) to:	O	T	U	S	G	
			Bottom of Casing	Open End Rod <td>Thin Wall Tube <td>Undisturbed Sample <td>Split Spoon <td>Geoprobe <td></td> </td></td></td></td>	Thin Wall Tube <td>Undisturbed Sample <td>Split Spoon <td>Geoprobe <td></td> </td></td></td>	Undisturbed Sample <td>Split Spoon <td>Geoprobe <td></td> </td></td>	Split Spoon <td>Geoprobe <td></td> </td>	Geoprobe <td></td>	
			Bottom of Hole						
			Water						

Field Tests: Dilatancy: R-Rapid, S-Slow, N-None Plasticity: N-Nonplastic, L-Low, M-Medium, H-High  
 Toughness: L-Low, M-Medium, H-High Dry Strength: N-None, L-Low, M-Medium, H-High, V-Very High  
<sup>1</sup>SPT = Sampler blows per 6 in. <sup>2</sup>Maximum particle size is determined by direct observation within the limitations of sampler size.  
**Note: Soil identification based on visual-manual methods of the USCS as practiced by Haley & Aldrich, Inc.**

USCS\_TB4 USCSLIB4.GLB USCSTB+CORE4.GDT G:\PROJECTS\30322\000\30322-000.GPJ 18 May 07





# TEST BORING REPORT

Boring No. HA05-21A

Project THE WATERMARK Portland, ME  
Client Riverwalk, LLC.  
Contractor Maine Test Borings, Inc.

File No. 30322-000  
Sheet No. 1 of 1  
Start 5 October 2005  
Finish 5 October 2005

	Casing	Sampler	Barrel	Drilling Equipment and Procedures
Type	NW	SS	NQ	Rig Make & Model: Mobile Drill B-53 Truck
Inside Diameter (in.)	3.0	1 3/8	2.0	Bit Type: Roller Bit
Hammer Weight (lb.)	300	140	-	Drill Mud: None
Hammer Fall (in.)	30	30	-	Casing: Driven
				Hoist/Hammer: Winch/ Safety Hammer

Driller B. Enos  
H&A Rep. B. Steinert  
Elevation 16.5 +/-  
Datum Portland City  
Location See Plan

Depth (ft.)	SPT <sup>1</sup>	Sample No. & Rec. (in.)	Sample Depth (ft.)	Well Diagram	Elev./Depth (ft.)	USCS Symbol	Visual-Manual Identification and Description (Density/consistency, color, GROUP NAME, max. particle size <sup>2</sup> , structure, odor, moisture, optional descriptions, geologic interpretation)	Gravel		Sand			Field Test						
								% Coarse	% Fine	% Coarse	% Medium	% Fine	% Fines	Dilatancy	Toughness	Plasticity	Strength		
0							NOTE: See Test Boring Report HA05-21 for overburden details from 0-10 ft.												
10	6 9 9 10	S1 6	10.0 12.0	NO WELL INSTALLED	16.4	SW	Medium dense, brown to olive-brown, well graded SAND with gravel (SW), mps 1.0 in., no odor, wet, brick and porcelain fragments present, rock fragments in tip of spoon. -FILL-	5	15	30	30	10	10						
12	10 12 12	S2 8	12.0 14.0			SW	Medium dense, brown to olive-brown, well graded SAND with gravel (SW), mps 1.0 in., no odor, wet, brick and porcelain fragments present. -FILL-	5	15	30	30	10	10						
15	3 10 12	S3 12	15.2 17.2			SW	Very dense, gray, well graded SAND (SW), mps 1.0 in., no odor, wet, very small brick and porcelain fragments present, wood fibers in top of spoon. -FILL-	5	15	30	30	10	10						
									NOTE: Split spoon refusal at 16.4 ft. Advanced roller bit to 16.7 ft. Begin NQ rock core at 16.7 ft. See Core Boring Report HA05-21A for details.										

Water Level Data				Sample Identification		Well Diagram		Summary	
Date	Time	Elapsed Time (hr.)	Depth (ft.) to:	O	T	U	S	G	
			Bottom of Casing	Open End Rod	Thin Wall Tube	Undisturbed Sample	Split Spoon	Geoprobe	
			Bottom of Hole						
			Water						
									Overburden (lin. ft.) 16.7
									Rock Cored (lin. ft.) 2.9
									Samples 3S, 1C
									<b>Boring No. HA05-21A</b>

Field Tests: Dilatancy: R-Rapid, S-Slow, N-None Plasticity: N-Nonplastic, L-Low, M-Medium, H-High  
Toughness: L-Low, M-Medium, H-High Dry Strength: N-None, L-Low, M-Medium, H-High, V-Very High

<sup>1</sup>SPT = Sampler blows per 6 in.

<sup>2</sup>Maximum particle size is determined by direct observation within the limitations of sampler size.

Note: Soil identification based on visual-manual methods of the USCS as practiced by Haley & Aldrich, Inc.



# CORE BORING REPORT

**Boring No. HA05-21A**  
 File No. 30322-000  
 Sheet No. 1 of 1

Depth (ft)	Drilling Rate Min./ft	Run No.	Depth (ft)	Recovery/RQD		Weathering	Well Dia-gram	Elev./Depth (ft)	Visual Description and Remarks
				in.	%				
									SEE TEST BORING REPORT FOR OVERBURDEN DETAILS
15									
		C1	16.7 19.6	35/31	100/89				16.4 NOTE: Bedrock encountered at 16.4 ft. Advanced roller bit to 16.7 ft. Begin NQ rock core at 16.7 ft. Moderately hard to hard, moderately to slightly weathered, gray to green, aphanitic to fine grained SCHIST. Quartz vein dipping at 20-60 degrees near bottom of run. Primary joint sets dipping at moderate to high angles, close, undulating to rough, discolored, tight to moderately wide.
2									
5									
4									
								19.6	-BOTTOM OF EXPLORATION-
							NO WELL INSTALLED		



# TEST BORING REPORT

Boring No. HA05-22

Project THE WATERMARK Portland, ME  
Client Riverwalk, LLC.  
Contractor Maine Test Borings, Inc.

File No. 30322-000  
Sheet No. 1 of 1  
Start 5 October 2005  
Finish 5 October 2005

	Casing	Sampler	Barrel	Drilling Equipment and Procedures
Type	HSA	SS	-	Rig Make & Model: Mobile Drill B-53 Truck
Inside Diameter (in.)	2.5	1 3/8	-	Bit Type: Roller Bit
Hammer Weight (lb.)	-	140	-	Drill Mud: None
Hammer Fall (in.)	-	30	-	Casing: Driven
				Hoist/Hammer: Winch/ Safety Hammer

Driller B. Enos  
H&A Rep. B. Steinert  
Elevation 15.0 +/-  
Datum Portland City  
Location See Plan

Depth (ft.)	SPT <sup>1</sup>	Sample No. & Rec. (in.)	Sample Depth (ft.)	Well Diagram	Elev./Depth (ft.)	USCS Symbol	Visual-Manual Identification and Description (Density/consistency, color, GROUP NAME, max. particle size <sup>2</sup> , structure, odor, moisture, optional descriptions, geologic interpretation)	Gravel		Sand			Field Test					
								% Coarse	% Fine	% Coarse	% Medium	% Fine	% Fines	Dilatancy	Toughness	Plasticity	Strength	
0				NO WELL INSTALLED	0.4	SM	<b>-BITUMINOUS CONCRETE-</b> Loose, dark-brown to black, silty SAND (SM), mps 0.1 in., no structure, no odor, damp, rust stains present. -FILL- Brick fragments, no odor. -FILL- NOTE: No recovery, brick fragments present at tip of spoon.			10	50	20	20					
6	6	S1	0.4															
4	4	S2	2.4															
5	5	S3	4.4															
3	3	S4	6.4				SM	Medium dense, brown, silty SAND (SM), mps 0.1 in., no structure, no odor, damp. -FILL-			10	35	35	20				
4	4	S5	8.4				SM	Very dense, brown, silty SAND (SM), mps 0.1 in., no odor, damp. -FILL-			10	35	35	20				
5	5																	
7	7																	
16	16																	
13	13																	
50(3 in.)					10.3		<b>-BOTTOM OF EXPLORATION-</b> NOTE: Auger refusal at 10.3 ft. Move hole and advance to confirm bedrock. See HA05-22A for details.											

Water Level Data						Sample Identification		Well Diagram		Summary				
Date	Time	Elapsed Time (hr.)	Depth (ft.) to:			O	T	U	S	G	Overburden (lin. ft.)	Rock Cored (lin. ft.)	Samples	5S
			Bottom of Casing	Bottom of Hole	Water	Open End Rod	Thin Wall Tube	Undisturbed Sample	Split Spoon	Geoprobe				

Field Tests: Dilatancy: R-Rapid, S-Slow, N-None Plasticity: N-Nonplastic, L-Low, M-Medium, H-High  
Toughness: L-Low, M-Medium, H-High Dry Strength: N-None, L-Low, M-Medium, H-High, V-Very High  
<sup>1</sup>SPT = Sampler blows per 6 in. <sup>2</sup>Maximum particle size is determined by direct observation within the limitations of sampler size.  
**Note: Soil identification based on visual-manual methods of the USCS as practiced by Haley & Aldrich, Inc.**

USCS\_TB4 USCSLIBA.GLB USCSSTB+CORE4.GDT G:\PROJECTS\30322\000\30322-000.GPJ 16 May 07



# TEST BORING REPORT

Boring No. HA05-22A

Project THE WATERMARK Portland, ME  
Client Riverwalk, LLC.  
Contractor Maine Test Borings, Inc.

File No. 30322-000  
Sheet No. 1 of 1  
Start 5 October 2005  
Finish 5 October 2005  
Driller B. Enos

	Casing	Sampler	Barrel	Drilling Equipment and Procedures
Type	NW	-	NQ	Rig Make & Model: Mobile Drill B-53 Truck
Inside Diameter (in.)	3.0	-	2.0	Bit Type: Roller Bit
Hammer Weight (lb.)	300	-	-	Drill Mud: None
Hammer Fall (in.)	30	-	-	Casing: Driven
				Hoist/Hammer: Winch/ Safety Hammer

H&A Rep. B. Steinert  
Elevation 15 +/-  
Datum Portland City  
Location See Plan

Depth (ft.)	SPT <sup>1</sup>	Sample No. & Rec. (in.)	Sample Depth (ft.)	Well Diagram	Elev./Depth (ft.)	USCS Symbol	Visual-Manual Identification and Description (Density/consistency, color, GROUP NAME, max. particle size <sup>2</sup> , structure, odor, moisture, optional descriptions, geologic interpretation)	Gravel		Sand			Field Test						
								% Coarse	% Fine	% Coarse	% Medium	% Fine	% Fines	Dilatancy	Toughness	Plasticity	Strength		
0																			
5																			
10				NO WELL INSTALLED	9.7		NOTE: Casing refusal at 9.7 ft. Advanced roller bit to 10.0 ft. Begin NQ rock core at 10.0 ft. See Core Boring Report HA05-22A for details.												

NOTE: No samples taken. See Test Boring Report HA05-22 for overburden details.

NOTE: Casing refusal at 9.7 ft. Advanced roller bit to 10.0 ft. Begin NQ rock core at 10.0 ft. See Core Boring Report HA05-22A for details.

Water Level Data				Sample Identification		Well Diagram		Summary												
Date	Time	Elapsed Time (hr.)	Depth (ft.) to:			O Open End Rod	Riser Pipe	T Thin Wall Tube	U Undisturbed Sample	S Split Spoon	G Geoprobe	Screen	Filter Sand	Cuttings	Grout	Concrete	Bentonite Seal	Overburden (lin. ft.) 10	Rock Cored (lin. ft.) 3.2	Samples -
			Bottom of Casing	Bottom of Hole	Water															

Boring No. HA05-22A

Field Tests: Dilatancy: R-Rapid, S-Slow, N-None Plasticity: N-Nonplastic, L-Low, M-Medium, H-High  
Toughness: L-Low, M-Medium, H-High Dry Strength: N-None, L-Low, M-Medium, H-High, V-Very High

<sup>1</sup>SPT = Sampler blows per 6 in. <sup>2</sup>Maximum particle size is determined by direct observation within the limitations of sampler size.

Note: Soil identification based on visual-manual methods of the USCS as practiced by Haley & Aldrich, Inc.



# CORE BORING REPORT

**Boring No. HA05-22A**  
 File No. 30322-000  
 Sheet No. 1 of 1

Depth (ft)	Drilling Rate Min./ft	Run No.	Depth (ft)	Recovery/RQD		Weathering	Well Dia-gram	Elev./Depth (ft)	Visual Description and Remarks
				in.	%				
5									SEE TEST BORING REPORT FOR OVERBURDEN DETAILS
10	3	C1	10.0 12.0	24/0	100/0				NOTE: Bedrock encountered at 9.7 ft. Advanced roller bit to 10 ft. Begin NQ rock core at 10.0 ft. 9.7 Moderately hard, fresh to slightly weathered, gray to green, aphanitic to fine grained SCHIST. Primary joint set dipping at vertical angles, extremely close to very close, undulating, fresh, open to wide.
	3	C2	12.0 13.2	14/0	100/0				
								13.2	-BOTTOM OF EXPLORATION-

NO WELL INSTALLED



# TEST BORING REPORT

Boring No. HA07-101

Project THE WATERMARK Portland, Maine  
 Client Riverwalk, LLC  
 Contractor Maine Test Borings, Inc.

File No. 30322-000  
 Sheet No. 1 of 2  
 Start 7 March 2007  
 Finish 7 March 2007

	Casing	Sampler	Barrel	Drilling Equipment and Procedures
Type	NW	-	NQ	Rig Make & Model: Mobile Drill B-53 Bombardier
Inside Diameter (in.)	3.0	-	2.0	Bit Type: Roller Bit
Hammer Weight (lb.)	300	-	-	Drill Mud: None
Hammer Fall (in.)	30	-	-	Casing: NW Drive 10.8 ft
				Hoist/Hammer: Winch Safety Hammer

Driller D. McKeen  
 H&A Rep. E. Beirne

Elevation 15.5 +/-  
 Datum Portland City  
 Location See plan

Depth (ft.)	SPT <sup>1</sup>	Sample No. & Rec. (in.)	Sample Depth (ft.)	Well Diagram	Elev./Depth (ft.)	USCS Symbol	Visual-Manual Identification and Description  (Density/consistency, color, GROUP NAME, max. particle size <sup>2</sup> , structure, odor, moisture, optional descriptions, geologic interpretation)	Gravel		Sand		Field Test							
								% Coarse	% Fine	% Coarse	% Medium	% Fine	% Fines	Dilatancy	Toughness	Plasticity	Strength		
0							NOTE: No samples taken.												
5																			
10					10.0		NOTE: Casing refusal on probable bedrock at 10.0 ft. Advance roller bit to 10.8 ft. Begin NQ rock core at 10.8 ft. See Core Boring Report for details.												
15																			
20																			
25																			
30																			

NO WELL INSTALLED

USCS\_TB4 USCSTB-CORE4.GLB USCSTB-CORE4.GDT G:\PROJECTS\30322-000\2007.GPJ 16 May 07

Water Level Data				Sample Identification		Well Diagram		Summary	
Date	Time	Elapsed Time (hr.)	Depth (ft.) to:	O	T	U	S	G	
			Bottom of Casing	Open End Rod	Thin Wall Tube	Undisturbed Sample	Split Spoon	Geoprobe	
			Bottom of Hole						
			Water						
									Overburden (lin. ft.) 10.0
									Rock Cored (lin. ft.) 8.8
									Samples 2C
									<b>Boring No. HA07-101</b>
Field Tests:				Dilatancy: R-Rapid, S-Slow, N-None		Plasticity: N-Nonplastic, L-Low, M-Medium, H-High			
				Toughness: L-Low, M-Medium, H-High		Dry Strength: N-None, L-Low, M-Medium, H-High, V-Very High			
SPT = Sampler blows per 6 in.				Maximum particle size is determined by direct observation within the limitations of sampler size					
Note: Soil identification based on visual-manual methods of the USCS as practiced by Haley & Aldrich, Inc.									



# CORE BORING REPORT

**Boring No. HA07-101**  
 File No. 30322-000  
 Sheet No. 2 of 2

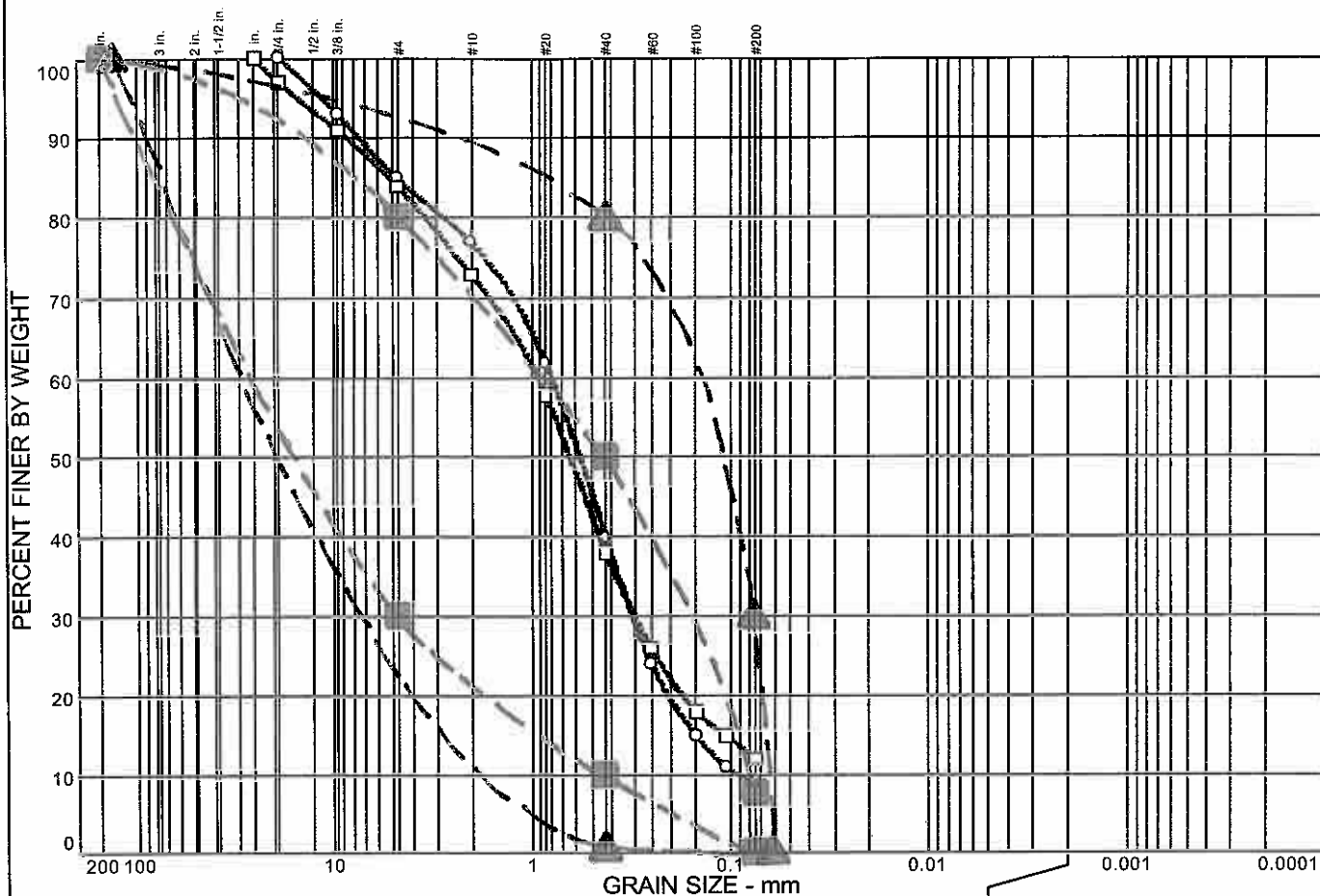
Depth (ft)	Drilling Rate Min./ft	Run No.	Depth (ft)	Recovery/RQD		Weathering	Well Diagram	Elev./Depth (ft)	Visual Description and Remarks
				in.	%				
									SEE TEST BORING REPORT FOR OVERBURDEN DETAILS
10								10.0	Note: Bedrock encountered at 10.0 ft. Advanced roller bit to 10.8 ft. Begin NQ rock core at 10.8 ft.
	3		10.8 14.8	48/44	100/92	Fresh			Hard, fresh, gray, fine grained to aphanitic SCHIST. Joints are low angle to moderately dipping, close to wide, planar, stepped and undulating, smooth to rough, calcite veins present throughout, multiple healed joints.
	3								
	2								
	3								
15								14.8	Hard, fresh, gray, fine grained to aphanitic SCHIST. Joints are low angle to moderately dipping, close to moderately spaced, planar and undulating, smooth to rough, calcite veins present throughout, multiple healed joints.
	2		14.8 18.8	36/48	75/100	Fresh			
	2								
	2								
	3								
							NO WELL INSTALLED	18.8	-BOTTOM OF EXPLORATION-

H:\A\_CORE+WELL4 USCSSLIB4.GLB USCSTB-CORE4.GDT G:\PROJECTS\30322\30322-000\_2007.GPJ 16 May 07



**APPENDIX C**  
HALEY & ALDRICH LABORATORY TEST RESULTS

# U.S. STANDARD SIEVE SIZE



% + 3"	% GRAVEL		% SAND			% FINES	
	CRS.	FINE	CRS.	MEDIUM	FINE	SILT	CLAY
○	0.0	15.0	8.0	37.0	31.0	9.0	
□	0.0	13.0	11.0	35.0	26.0	12.0	

Expl. No.	Sample No.	Depth (ft)	Atterberg Limits %			Water Content (%)	C <sub>u</sub>	C <sub>c</sub>	USCS
			W <sub>L</sub>	W <sub>P</sub>	I <sub>p</sub>				
○	HA05-19	0.5-4.5				6.8	8.59	1.34	SW-SM
□	HA05-21	2.0-6.0				6.5			SP-SM

### Sample Description

- Gray Well-graded sand with silt and gravel
- Gray brown Poorly graded sand with silt and gravel

#### Remarks:

- Composite sample of S01 & S02
- Composite sample of S02 & S03
- maximum and minimum limits for the percentage of soil particles finer than sieve size noted per CGF recommendation
- ▲ maximum and minimum limits for the percentage of soil particles finer than sieve size noted per Common Fill recommendation



UNDERGROUND  
ENGINEERING &  
ENVIRONMENTAL  
SOLUTIONS

The Watermark  
Portland, Maine

### GRAIN SIZE DISTRIBUTION

DATE: 4/11/2007

FILE NO: 30322-000

## SECTION 033000 - CAST-IN-PLACE CONCRETE

### PART 1 - GENERAL

#### 1.1 RELATED DOCUMENTS

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

#### 1.2 SUMMARY

- A. This Section specifies cast-in place concrete, including formwork, reinforcement, concrete materials, mix design, placement procedures, and finishes.
- B. Related Sections include the following:
  - 1. Division 2 Section "Earthwork" for drainage fill under slabs-on-grade.
  - 2. Division 2 Section "Cement Concrete Pavement" for concrete pavement and walks.

#### 1.3 DEFINITIONS

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

#### 1.4 SUBMITTALS

- A. Product Data: For each type of manufactured material and product indicated.
- B. Design Mixes: For each concrete mix. Include alternate mix designs when characteristics of materials, project conditions, weather, test results, or other circumstances warrant adjustments. Each mix design will also indicate where concrete will be used.
  - 1. Indicate amounts of mix water to be withheld for later addition at Project site.
- C. Steel Reinforcement Shop Drawings: Details of fabrication, bending, and placement, prepared according to ACI 315, "Details and Detailing of Concrete Reinforcement." Include material, grade, bar schedules, stirrup spacing, bent bar diagrams, arrangement, and supports of concrete reinforcement. Setting Drawings shall be complete in showing and identifying by mark or otherwise all the bars to be incorporated into the work. Reinforcement of concrete walls shall be shown on wall elevations and reinforcement of beams shall be shown on beam elevations with sections as required. Elevations of walls and beams shall be at least 1/4 inch scale.
- D. Material Test Reports: From a qualified testing agency indicating and interpreting test results for compliance of the following with requirements indicated, based on comprehensive testing of current materials:

- E. Minutes of preinstallation conference.
- F. Anchor Bolt Survey: Stamped Survey Plan of Anchor Bolt As-Built.

#### 1.5 QUALITY ASSURANCE

- A. Installer Qualifications: An experienced installer who has completed concrete Work 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. Manufacturer Qualifications: A firm experienced in manufacturing ready-mixed concrete products complying with ASTM C 94 requirements for production facilities and equipment.
  - 1. Manufacturer must be certified according to the National Ready Mixed Concrete Association's Certification of Ready Mixed Concrete Production Facilities.
- C. Supplier Testing Agency Qualifications: An independent testing agency, acceptable to authorities having jurisdiction, qualified according to ASTM C 1077 and ASTM E 329 to conduct the testing indicated, as documented according to ASTM E 548.
  - 1. Personnel conducting field tests shall be qualified as ACI Concrete Field Testing Technician, Grade 1, according to ACI CP-1 or an equivalent certification program.
- D. Source Limitations: Obtain each type or class of cementitious material of the same brand from the same manufacturer's plant, each aggregate from one source, and each admixture from the same manufacturer.
- E. ACI Publications: Comply with the following, unless more stringent provisions are indicated:
  - 1. ACI 301, "Specification for Structural Concrete."
  - 2. ACI 117, "Specifications for Tolerances for Concrete Construction and Materials."
- F. Preinstallation Conference: Conduct conference at Project site to comply with requirements in Division 1 Section "Project Meetings."
  - 1. Before submitting design mixes, review concrete mix design and examine procedures for ensuring quality of concrete materials. Require representatives of each entity directly concerned with cast-in-place concrete to attend, including the following:
    - a. Contractor's superintendent and project manager.
    - b. Independent testing agency responsible for concrete design mixes.
    - c. Ready-mix concrete producer.
    - d. Concrete subcontractor.
    - e. Structural engineer of record.
    - f. Owner's representative.
    - g. Owner's testing agency.
    - h. Architect

#### 1.6 DELIVERY, STORAGE, AND HANDLING

- A. Deliver, store, and handle steel reinforcement to prevent bending and damage.

## PART 2 - PRODUCTS

### 2.1 FORM-FACING MATERIALS

- A. Smooth-Formed Finished Concrete: Form-facing panels that will provide continuous, true, and smooth concrete surfaces. Furnish in largest practicable sizes to minimize number of joints.
- B. Forms for Cylindrical Columns, Pedestals, and Supports: Metal, glass-fiber-reinforced plastic, paper, or fiber tubes that will produce surfaces with gradual or abrupt irregularities not exceeding specified formwork surface class. Provide units with sufficient wall thickness to resist plastic concrete loads without detrimental deformation.
- C. Chamfer Strips: Wood, metal, PVC, or rubber strips, 3/4 by 3/4 inch (19 by 19 mm), minimum.
- D. Form-Release Agent: Commercially formulated form-release agent that will not bond with, stain, or adversely affect concrete surfaces and will not impair subsequent treatments of concrete surfaces.
- E. Form Ties: Factory-fabricated, removable or snap-off metal or glass-fiber-reinforced plastic form ties designed to resist lateral pressure of fresh concrete on forms and to prevent spalling of concrete on removal.
  - 1. Furnish units that will leave no corrodible metal closer than 1 inch (25 mm) to the plane of the exposed concrete surface.
  - 2. Furnish ties that, when removed, will leave holes not larger than 1 inch (25 mm) in diameter in concrete surface.

### 2.2 STEEL REINFORCEMENT

- A. Reinforcing Bars: ASTM A 615/A 615M, Grade 60 (Grade 420), deformed.
- B. Plain-Steel Wire: ASTM A82
- C. Plain-Steel Welded Wire Fabric: ASTM A 185, fabricated from as-drawn steel wire into flat sheets.
- D. Epoxy Coated Reinforcing Bars: ASTM A 775.

### 2.3 REINFORCEMENT ACCESSORIES

- A. Bar Supports: Bolsters, chairs, spacers, and other devices for spacing, supporting, and fastening reinforcing bars and welded wire fabric in place. Manufacture bar supports according to CRSI's "Manual of Standard Practice" from steel wire, plastic, or precast concrete or fiber-reinforced concrete of greater compressive strength than concrete, and as follows:

1. For concrete surfaces exposed to view where legs of wire bar supports contact forms, use CRSI Class 1 plastic-protected or CRSI Class 2 stainless-steel bar supports.
  2. For chairs supporting reinforcement above soil, provide sand plates to properly support bars.
- B. Slab On Grade Construction Joint Dowel Bars: Plain-steel bars, ASTM A 615/A 615M, Grade 60 (Grade 420). Cut bars true to length with ends square and free of burrs.

## 2.4 CONCRETE MATERIALS

- A. Portland Cement: ASTM 150, Type I/II.
- B. Normal-Weight Aggregate: ASTM C 33, uniformly graded, and as follows:
1. Combined Aggregate Gradation: Well graded from coarsest to finest with not more than 18 percent and not less than 8 percent retained on an individual sieve, except that less than 8 percent may be retained on coarsest sieve and on No. 50 (0.3-mm) sieve, and less than 8 percent may be retained on sieves finer than No. 50 (0.3 mm).
- C. Water: Potable and complying with ASTM C 94.

## 2.5 ADMIXTURES

- A. General: Admixtures certified by manufacturer to contain not more than 0.1 percent water-soluble chloride ions by mass of cementitious material and to be compatible with other admixtures and cementitious materials. Do not use admixtures containing calcium chloride.
- B. Air-Entraining Admixture: ASTM C 260.
- C. Water-Reducing Admixture: ASTM C 494, Type A.
- D. High-Range, Water-Reducing Admixture: ASTM C 494, Type F.
- E. Water-Reducing and Accelerating Admixture: ASTM C 494, Type E.
- F. Water-Reducing and Retarding Admixture: ASTM C 494, Type D.

## 2.6 FIBER REINFORCEMENT

- A. Synthetic Fiber: Fibrillated polypropylene fibers engineered and designed for use in concrete, complying with ASTM C 1116, Type III, 1/2 to 1-1/2 inches (13 to 38 mm) long.
- B. Products: Subject to compliance with requirements, provide one of the following:
1. Fibrillated Fibers:
    - a. Fibrasol F; Axim Concrete Technologies.
    - b. Fibermesh; Fibermesh, Div. of Synthetic Industries.
    - c. Forta; Forta Corporation.

- d. Grace Fibers; W. R. Grace & Co., Construction Products Div.

## 2.7 WATERSTOPS

- A. Flexible PVC Waterstops: CE CRD-C 572, for embedding in concrete to prevent passage of fluids through joints. Factory fabricate corners, intersections, and directional changes.
- B. Self-Expanding Strip Waterstops: Manufactured rectangular or trapezoidal strip, sodium bentonite or other hydrophylic material for adhesive bonding to concrete.

## 2.8 VAPOR RETARDERS

- A. Vapor Retarder
  - 1. Vapor Retarder membrane must have the following qualities
    - a. Water Vapor Transmission Rate    ASTM E 96            0.04 Perms or lower
    - b. Water Vapor Retarder                ASTM E 1745        Meets or Exceeds Class C
    - c. Thickness of Retarder (plastic)    ACI 302.1R-96      Not less than 10 mils
  - B. Granular Fill: Clean mixture of crushed stone or crushed or uncrushed gravel; ASTM D 448, Size 57, with 100 percent passing a 1-1/2-inch (38-mm) sieve and 0 to 5 percent passing a No. 8 (2.36-mm) sieve.

## 2.9 CURING MATERIALS

- A. Moisture-Retaining Cover: ASTM C 171, polyethylene film or white burlap-polyethylene sheet.
- B. Water: Potable.
- C. Clear, Waterborne, Membrane-Forming Curing and Sealing Compound: ASTM C 1315, Type 1, Class A.

## 2.10 RELATED MATERIALS

- A. Joint-Filler Strips: ASTM D 1751, asphalt-saturated cellulosic fiber.
- B. Epoxy Joint Filler: Two-component, semirigid, 100 percent solids, epoxy resin with a Shore A hardness of 80 per ASTM D 2240.
- C. Bonding Agent: ASTM C 1059, Type II, non-redispersible, acrylic emulsion or styrene butadiene.

## 2.11 CONCRETE MIXES

- A. Prepare design mixes for each type and strength of concrete determined by either laboratory trial mix or field test data bases, as follows:
  - 1. Proportion normal-weight concrete according to ACI 211.1 and ACI 301.
- B. Footings and Foundation Walls: Proportion normal-weight concrete mix as follows:
  - 1. Compressive Strength (28 Days): Refer to plans.
  - 2. Maximum Slump for Concrete Containing High-Range Water-Reducing Admixture: 8 inches (200 mm) after admixture is added to concrete with 2- to 4-inch (50- to 100-mm) slump.
- C. Slab-on-Grade: Proportion normal-weight concrete mix as follows:
  - 1. Compressive Strength (28 Days): Refer to plans.
  - 2. Maximum Slump: 4 inches (100 mm) before adding additives.
- D. Cementitious Materials: For concrete exposed to deicers, limit percentage, by weight, of cementitious materials other than portland cement according to ACI 301 requirements.
- E. Cementitious Materials: Limit percentage, by weight, of cementitious materials other than portland cement in concrete as follows:
  - 1. Combined Fly Ash and Pozzolan: 25 percent.
- F. Maximum Water-Cementitious Materials Ratio: 0.45 for concrete exposed to deicers or subject to freezing and thawing while moist.
- G. Air Content: Where required, add air-entraining admixture at manufacturer's prescribed rate to result in concrete at point of placement having an air content as follows within a tolerance of plus 1 or minus 1.5 percent, unless otherwise indicated:
  - 1. Air Content: 6 percent for 3/4-inch- (19-mm-) nominal maximum aggregate size.
- H. Do not air entrain concrete to trowel-finished interior floors and suspended slabs. Do not allow entrapped air content to exceed 2 percent.
- I. Synthetic Fiber: Uniformly disperse in concrete mix at manufacturer's recommended rate, but not less than 1.5 lb/cu. yd. (0.90 kg/cu. m).
- J. Admixtures: Use admixtures according to manufacturer's written instructions.
  - 1. Use water-reducing 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 required to be watertight, and concrete with a water-cementitious materials ratio below 0.50.

## 2.12 FABRICATING REINFORCEMENT



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

## 2.13 CONCRETE MIXING

- A. Ready-Mixed Concrete: Measure, batch, mix, and deliver concrete according to ASTM C 94 and ASTM C 1116, and furnish batch ticket information. Provide amount of water withheld from Design Mix on batch ticket.
  - 1. When air temperature is between 85 and 90 deg F (30 and 32 deg C), reduce mixing and delivery time from 1-1/2 hours to 75 minutes; when air temperature is above 90 deg F (32 deg C), reduce mixing and delivery time to 60 minutes.

## PART 3 - EXECUTION

### 3.1 FORMWORK

- A. Design, erect, shore, brace, and maintain formwork, according to ACI 301, to support vertical, lateral, static, and dynamic loads, and construction loads that might be applied, until concrete structure can support such loads.
- B. Construct formwork so concrete members and structures are of size, shape, alignment, elevation, and position indicated, within tolerance limits of ACI 117.
- C. Limit concrete surface irregularities, designated by ACI 347R as abrupt or gradual, as follows:
  - 1. Class B, 1/4 inch (6 mm).
- D. Construct forms tight enough to prevent loss of concrete mortar.
- E. Chamfer edges of permanently exposed concrete, as indicated on the drawings.
- F. Form openings, chases, offsets, sinkages, keyways, reglets, blocking, screeds, and bulkheads required in the Work. Determine sizes and locations from trades providing such items.
- G. Clean forms and adjacent surfaces to receive concrete. Remove chips, wood, sawdust, dirt, and other debris just before placing concrete.
- H. Retighten forms and bracing before placing concrete, as required, to prevent mortar leaks and maintain proper alignment.
- I. Coat contact surfaces of forms with form-release agent, according to manufacturer's written instructions, before placing reinforcement.

### 3.2 EMBEDDED ITEMS

- A. Place and secure anchorage devices and other embedded items required for adjoining work that is attached to or supported by cast-in-place concrete. Use Setting Drawings, templates, diagrams, instructions, and directions furnished with items to be embedded.

1. Install anchor bolts, accurately located, to elevations required. All anchor bolts shall be dryset (set prior to placement – wetsetting is unacceptable).

### 3.3 REMOVING AND REUSING FORMS

- A. General: Formwork, for sides of beams, walls, columns, and similar parts of the Work, that does not support weight of concrete may be removed after cumulatively curing at not less than 50 deg F (10 deg C) for 24 hours after placing concrete provided concrete is hard enough to not be damaged by form-removal operations and provided curing and protection operations are maintained.
- B. Clean and repair surfaces of forms to be reused in the Work. Split, frayed, delaminated, or otherwise damaged form-facing material will not be acceptable for exposed surfaces. Apply new form-release agent.
- C. When forms are reused, clean surfaces, remove fins and laitance, and tighten to close joints. Align and secure joints to avoid offsets. Do not use patched forms for exposed concrete surfaces unless approved by Architect.

### 3.4 VAPOR RETARDERS

- A. Vapor Retarder: Place, protect, and repair vapor-retarder sheets according to ASTM E 1643 and manufacturer's written instructions.
- B. Granular Fill: Place vapor retarder over 8" of granular fill compacted with mechanical equipment to elevation tolerances of plus 0 inch (0 mm) or minus 3/4 inch (19 mm).

### 3.5 STEEL REINFORCEMENT

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

### 3.6 JOINTS

- A. General: Construct joints true to line with faces perpendicular to surface plane of concrete.
- B. Construction Joints: Install so strength and appearance of concrete are not impaired, at locations indicated or as approved by Architect.
  - 1. Place joints perpendicular to main reinforcement. Continue reinforcement across construction joints, unless otherwise indicated. Do not continue reinforcement through sides of strip placements of floors and slabs.
  - 2. Form from preformed galvanized steel, plastic keyway-section forms, or bulkhead forms with keys, unless otherwise indicated. Embed keys at least 1-1/2 inches (38mm) into concrete.
  - 3. Space vertical joints in walls as indicated. Locate joints beside piers integral with walls, near corners, and in concealed locations where possible.
  - 4. Use neat cement slurry at locations where fresh concrete is placed against hardened or partially hardened concrete surfaces.
- C. Contraction Joints in Slabs-on-Grade: Form weakened-plane contraction joints, sectioning concrete into areas as indicated. Construct contraction joints for a depth equal to at least one-fourth of concrete thickness, as follows:
  - 1. Sawed Joints: Form contraction joints with power saws equipped with shatterproof abrasive or diamond-rimmed blades. Cut 1/8-inch- (3-mm-) wide joints into concrete when cutting action will not tear, abrade, or otherwise damage surface and before concrete develops random contraction cracks.
- D. Slab On Grade Construction Joints: Install dowel sleeves and dowels or dowel bar and support assemblies at joints where indicated. Refer to drawings for details.
  - 1. Construction joints shall be saw cut and filled with joint filler.

### 3.7 WATERSTOPS

- A. Flexible Waterstops: Install in construction joints as indicated to form a continuous diaphragm. Install in longest lengths practicable. Support and protect exposed waterstops during progress of Work. Field-fabricate joints in waterstops according to manufacturer's written instructions.
- B. Self-Expanding Strip Waterstops: Install in construction joints and at other locations indicated, according to manufacturer's written instructions, bonding or mechanically fastening and firmly pressing into place. Install in longest lengths practicable.

### 3.8 CONCRETE PLACEMENT

- A. Before placing concrete, verify that installation of formwork, reinforcement, and embedded items is complete and that required inspections have been performed.
- B. Before placing concrete, water may be added at Project site, subject to limitations of ACI 301.
  - 1. Do not add water to concrete after adding high-range water-reducing admixtures to mix.

- C. Deposit concrete continuously or in layers of such thickness that no new concrete will be placed on concrete that has hardened enough to cause seams or planes of weakness. If a section cannot be placed continuously, provide construction joints as specified. Deposit concrete to avoid segregation.
- D. Deposit concrete in forms in horizontal layers no deeper than 24 inches (600 mm) and in a manner to avoid inclined construction joints. Place each layer while preceding layer is still plastic, to avoid cold joints.
  - 1. Consolidate placed concrete with mechanical vibrating equipment. Use equipment and procedures for consolidating concrete recommended by ACI 309R.
  - 2. Do not use vibrators to transport concrete inside forms. Insert and withdraw vibrators vertically at uniformly spaced locations no farther than the visible effectiveness of the vibrator. Place vibrators to rapidly penetrate placed layer and at least 6 inches (150 mm) into preceding layer. Do not insert vibrators into lower layers of concrete that have begun to lose plasticity. At each insertion, limit duration of vibration to time necessary to consolidate concrete and complete embedment of reinforcement and other embedded items without causing mix constituents to segregate.
- E. Deposit and consolidate concrete for floors and slabs in a continuous operation, within limits of construction joints, until placement of a panel or section is complete.
  - 1. Consolidate concrete during placement operations so concrete is thoroughly worked around reinforcement and other embedded items and into corners.
  - 2. Maintain reinforcement in position on chairs during concrete placement.
  - 3. Screed slab surfaces with a straightedge and strike off to correct elevations.
  - 4. Slope surfaces uniformly to drains where required.
  - 5. Begin initial floating using bull floats or darbies to form a uniform and open-textured surface plane, free of humps or hollows, before excess moisture or bleedwater appears on the surface. Do not further disturb slab surfaces before starting finishing operations.
- F. Cold-Weather Placement: Comply with ACI 306.1 and as follows. Protect concrete work from physical damage or reduced strength that could be caused by frost, freezing actions, or low temperatures.
  - 1. When air temperature has fallen to or is expected to fall below 40 deg F (4.4 deg C), uniformly heat water and aggregates before mixing to obtain a concrete mixture temperature of not less than 50 deg F (10 deg C) and not more than 80 deg F (27 deg C) at point of placement.
  - 2. Do not use frozen materials or materials containing ice or snow. Do not place concrete on frozen subgrade or on subgrade containing frozen materials.
  - 3. Do not use calcium chloride, salt, or other materials containing antifreeze agents or chemical accelerators, unless otherwise specified and approved in mix designs.
- G. Hot-Weather Placement: Place concrete according to recommendations in ACI 305R and as follows, when hot-weather conditions exist:
  - 1. Cool ingredients before mixing to maintain concrete temperature below 90 deg F (32 deg C) at time of placement. Chilled mixing water or chopped ice may be used to control temperature, provided water equivalent of ice is calculated to total amount of mixing water. Using liquid nitrogen to cool concrete is Contractor's option.

2. Cover steel reinforcement with water-soaked burlap so steel temperature will not exceed ambient air temperature immediately before embedding in concrete.
3. Fog-spray forms, steel reinforcement, and subgrade just before placing concrete. Keep subgrade moisture uniform without standing water, soft spots, or dry areas.

### 3.9 FINISHING FORMED SURFACES

- A. Rough-Formed Finish: As-cast concrete texture imparted by form-facing material with tie holes and defective areas repaired and patched. Remove fins and other projections exceeding ACI 347R limits for class of surface specified. Use at areas not exposed to view.
- B. Smooth-Formed Finish: As-cast concrete texture imparted by form-facing material, arranged in an orderly and symmetrical manner with a minimum of seams. Repair and patch tie holes and defective areas. Remove fins and other projections exceeding 1/8 inch (3 mm) in height.
  1. Apply to concrete surfaces exposed to public view or to be covered with a coating or covering material applied directly to concrete, such as waterproofing, dampproofing, veneer plaster, or painting.
  2. Do not apply rubbed finish to smooth-formed finish.
- C. Rubbed Finish: Apply the following to smooth-formed finished concrete, as indicated on plans:
  1. Smooth-Rubbed Finish: Not later than one day after form removal, moisten concrete surfaces and rub with carborundum brick or another abrasive until producing a uniform color and texture. Do not apply cement grout other than that created by the rubbing process.
- D. Related Unformed Surfaces: At tops of walls, horizontal offsets, and similar unformed surfaces adjacent to formed surfaces, strike off smooth and finish with a texture matching adjacent formed surfaces. Continue final surface treatment of formed surfaces uniformly across adjacent unformed surfaces, unless otherwise indicated.

### 3.10 FINISHING FLOORS AND SLABS

- A. General: Comply with recommendations in ACI 302.1R for screeding, restraighening, and finishing operations for concrete surfaces. Do not wet concrete surfaces.
- B. Float Finish: Consolidate surface with power-driven floats or by hand floating if area is small or inaccessible to power driven floats. Restraighten, cut down high spots, and fill low spots. Repeat float passes and restraighening until surface is left with a uniform, smooth, granular texture.
  1. Apply float finish to surfaces indicated, to surfaces to receive trowel finish.
- C. Trowel Finish: After applying float finish, apply first trowel finish and consolidate concrete by hand or power-driven trowel. Continue troweling passes and restraighten until surface is free of trowel marks and uniform in texture and appearance. Grind smooth any surface defects that would telegraph through applied coatings or floor coverings.

1. Apply a trowel finish to surfaces indicated and to floor and slab surfaces exposed to view or to be covered with resilient flooring, carpet, ceramic or quarry tile set over a cleavage membrane, paint, or another thin film-finish coating system
  2. Finish surfaces to the following tolerances, measured within 24 hours according to ASTM E 1155/E 1155M for a randomly trafficked floor surface:
    - a. Specified overall values of flatness, F(F) 25; and levelness, F(L) 20; with minimum local values of flatness, F(F) 17; and levelness, F(L) 15 for slabs-on-grade.
    - b. Specified overall values of flatness, F(F) 25; for elevated slabs on steel beams and metal deck (equivalent to 1/4" gap under 10-foot straightedge). Elevated slab elevations shall be set by lasers taking in consideration that beams and deck shall deflect due to dead load..
- D. Trowel and Fine-Broom Finish: Apply a partial trowel finish, stopping after second troweling, to surfaces indicated and to surfaces where ceramic or quarry tile is to be installed by either thickset or thin-set method. Immediately after second troweling, and when concrete is still plastic, slightly scarify surface with a fine broom.
- E. Broom Finish: Apply a broom finish to exterior concrete platforms, steps, and ramps, and elsewhere as indicated.
1. Immediately after float finishing, slightly roughen trafficked surface by brooming with fiber-bristle broom perpendicular to main traffic route. Coordinate required final finish with Architect before application.

### 3.11 MISCELLANEOUS CONCRETE ITEMS

- A. Filling In: Fill in holes and openings left in concrete structures, unless otherwise indicated, after work of other trades is in place. Mix, place, and cure concrete, as specified, to blend with in-place construction. Provide other miscellaneous concrete filling indicated or required to complete Work.
- B. Equipment Bases and Foundations: Provide machine and equipment bases and foundations as shown on Drawings. Set anchor bolts for machines and equipment at correct elevations, complying with diagrams or templates of manufacturer furnishing machines and equipment.
- C. Steel Pan Stairs: Provide concrete fill for steel pan stair treads, landings, and associated items. Cast-in inserts and accessories as shown on Drawings. Screed, tamp, and trowel-finish concrete surfaces.

### 3.12 CONCRETE PROTECTION AND CURING

- A. General: Protect freshly placed concrete from premature drying and excessive cold or hot temperatures. Comply with ACI 306.1 for cold-weather protection and with recommendations in ACI 305R for hot-weather protection during curing.
- B. Evaporation Retarder: Apply evaporation retarder to unformed concrete surfaces if hot, dry, or windy conditions cause moisture loss approaching 0.2 lb/sq. ft. x h (1 kg/sq. m x h) before and

during finishing operations. Apply according to manufacturer's written instructions after placing, screeding, and bull floating or darbying concrete, but before float finishing.

- C. Unformed Surfaces: Begin curing immediately after finishing concrete. Cure unformed surfaces, including floors and slabs, by one or a combination of the following methods:
  - 1. Moisture Curing: Keep surfaces continuously moist for not less than seven days with the following materials:
    - a. Water.
    - b. Continuous water-fog spray.
    - c. Absorptive cover, water saturated, and kept continuously wet. Cover concrete surfaces and edges with 12-inch (300-mm) lap over adjacent absorptive covers.
  - 2. Moisture-Retaining-Cover Curing: Cover concrete surfaces with moisture-retaining cover for curing concrete, placed in widest practicable width, with sides and ends lapped at least 12 inches (300 mm), and sealed by waterproof tape or adhesive. Cure for not less than seven days. Immediately repair any holes or tears during curing period using cover material and waterproof tape.
    - a. Moisture cure or use moisture-retaining covers to cure concrete surfaces to receive floor coverings.
    - b. Moisture cure or use moisture-retaining covers to cure concrete surfaces to receive penetrating liquid floor treatments or adhesive applied floor finishes.
    - c. Cure concrete surfaces to receive floor coverings with either a moisture-retaining cover or a curing compound that the manufacturer recommends for use with floor coverings.
  - 3. Curing Compound: Apply uniformly in continuous operation by power spray or roller according to manufacturer's written instructions. Recoat areas subjected to heavy rainfall within three hours after initial application. Maintain continuity of coating and repair damage during curing period.
  - 4. Curing and Sealing Compound: Apply uniformly to floors and slabs indicated in a continuous operation by power spray or roller according to manufacturer's written instructions. Recoat areas subjected to heavy rainfall within three hours after initial application. Repeat process 24 hours later and apply a second coat. Maintain continuity of coating and repair damage during curing period.

### 3.13 JOINT FILLING

- A. Prepare, clean, and install joint filler according to manufacturer's written instructions.
  - 1. Defer joint filling until concrete has aged at least six months. Do not fill joints until construction traffic has permanently ceased.
- B. Remove dirt, debris, saw cuttings, curing compounds, and sealers from joints; leave contact faces of joint clean and dry.
- C. Install semirigid epoxy joint filler full depth in saw-cut joints and at least 1.5 inches deep in formed joints. Overfill joint and trim joint filler flush with top of joint after hardening.

### 3.14 CONCRETE SURFACE REPAIRS

- A. Defective Concrete: Repair and patch defective areas when approved by Architect. Remove and replace concrete that cannot be repaired and patched to Architect's approval.
- B. Patching Mortar: Mix dry-pack patching mortar, consisting of one part portland cement to two and one-half parts fine aggregate passing a No. 16 (1.2-mm) sieve, using only enough water for handling and placing.
- C. Repairing Formed Surfaces: Surface defects include color and texture irregularities, cracks, spalls, air bubbles, honeycombs, rock pockets, fins and other projections on the surface, and stains and other discolorations that cannot be removed by cleaning.
  - 1. Immediately after form removal, cut out honeycombs, rock pockets, and voids more than 1/2 inch (13 mm) in any dimension in solid concrete but not less than 1 inch (25 mm) in depth. Make edges of cuts perpendicular to concrete surface. Clean, dampen with water, and brush-coat holes and voids with bonding agent. Fill and compact with patching mortar before bonding agent has dried. Fill form-tie voids with patching mortar or cone plugs secured in place with bonding agent.
  - 2. Repair defects on surfaces exposed to view by blending white portland cement and standard portland cement so that, when dry, patching mortar will match surrounding color. Patch a test area at inconspicuous locations to verify mixture and color match before proceeding with patching. Compact mortar in place and strike off slightly higher than surrounding surface.
  - 3. Repair defects on concealed formed surfaces that affect concrete's durability and structural performance as determined by Architect.
- D. Repairing Unformed Surfaces: Test unformed surfaces, such as floors and slabs, for finish and verify surface tolerances specified for each surface. Correct low and high areas. Test surfaces sloped to drain for trueness of slope and smoothness; use a sloped template.
  - 1. Repair finished surfaces containing defects. Surface defects include spalls, popouts, honeycombs, rock pockets, crazing and cracks in excess of 0.01 inch (0.25 mm) wide or that penetrate to reinforcement or completely through unreinforced sections regardless of width, and other objectionable conditions.
  - 2. After concrete has cured at least 14 days, correct high areas by grinding.
  - 3. Correct localized low areas during or immediately after completing surface finishing operations by cutting out low areas and replacing with patching mortar. Finish repaired areas to blend into adjacent concrete.
  - 4. Correct other low areas scheduled to receive floor coverings with a repair underlayment. Prepare, mix, and apply repair underlayment and primer according to manufacturer's written instructions to produce a smooth, uniform, plane, and level surface. Feather edges to match adjacent floor elevations by removal and replacement.
  - 5. Repair defective areas and low areas, except random cracks and single holes 1 inch (25 mm) or less in diameter, by cutting out and replacing with fresh concrete. Remove defective areas with clean, square cuts and expose steel reinforcement with at least 3/4 inch (19 mm) clearance all around. Dampen concrete surfaces in contact with patching concrete and apply bonding agent. Mix patching concrete of same materials and mix as original concrete except without coarse aggregate. Place, compact, and finish to blend with adjacent finished concrete. Cure in same manner as adjacent concrete.
  - 6. Correct low areas scheduled to remain exposed by removal and replacement.



- E. Perform structural repairs of concrete, subject to Architect's approval, using epoxy adhesive and patching mortar.
- F. Repair materials and installation not specified above may be used, subject to Architect's approval.

### 3.15 FIELD QUALITY CONTROL

- A. Testing Agency: Owner will engage a qualified independent testing and inspecting agency to sample materials, perform tests, and submit test reports during concrete placement. Sampling and testing for quality control may include those specified in this Article.
- B. Testing Services: Testing of composite samples of fresh concrete obtained according to ASTM C 172 shall be performed according to the following requirements:
  - 1. Testing Frequency: Obtain one composite sample for each day's pour of each concrete mix exceeding 5 cu. yd. (4 cu. m), but less than 25 cu. yd. (19 cu. m), plus one set for each additional 50 cu. yd. (38 cu. m) or fraction thereof.
  - 2. Testing Frequency: Obtain at least one composite sample for each 100 cu. yd. (76 cu. m) or fraction thereof of each concrete mix placed each day.
    - a. When frequency of testing will provide fewer than five compressive-strength tests for each concrete mix, testing shall be conducted from at least five randomly selected batches or from each batch if fewer than five are used.
  - 3. Slump: ASTM C 143; one test at point of placement for each composite sample, but not less than one test for each day's pour of each concrete mix. Perform additional tests when concrete consistency appears to change.
  - 4. Air Content: ASTM C 231, pressure method, for normal-weight concrete; ASTM C 173, volumetric method, for structural lightweight concrete; one test for each composite sample, but not less than one test for each day's pour of each concrete mix.
  - 5. Concrete Temperature: ASTM C 1064; one test hourly when air temperature is 40 deg F (4.4 deg C) and below and when 80 deg F (27 deg C) and above, and one test for each composite sample.
  - 6. Unit Weight: ASTM C 567, fresh unit weight of structural lightweight concrete; one test for each composite sample, but not less than one test for each day's pour of each concrete mix.
  - 7. Compression Test Specimens: ASTM C 31/C 31M; cast and laboratory cure one set of four standard cylinder specimens for each composite sample.
    - a. Cast and field cure one set of four standard cylinder specimens for each composite sample.
  - 8. Compressive-Strength Tests: ASTM C 39; test two laboratory-cured specimens at 7 days and two at 28 days.
    - a. Test two field-cured specimens at 7 days and two at 28 days.
    - b. A compressive-strength test shall be the average compressive strength from two specimens obtained from same composite sample and tested at age indicated.

- C. When strength of field-cured cylinders is less than 85 percent of companion laboratory-cured cylinders, Contractor shall evaluate operations and provide corrective procedures for protecting and curing in-place concrete.
- D. Strength of each concrete mix 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 (3.4 MPa).
- E. Test results shall be reported in writing to Architect, the SER, concrete manufacturer, and Contractor within 48 hours of testing. Reports of compressive-strength tests shall contain Project identification name and number, date of concrete placement, name of concrete testing and inspecting agency, location of concrete batch in Work, design compressive strength at 28 days, concrete mix proportions and materials, compressive breaking strength, and type of break for both 7-and 28-day tests.
- F. Nondestructive Testing: Impact hammer, sonoscope, or other nondestructive device may be permitted by Architect but will not be used as sole basis for approval or rejection of concrete.
- G. Additional Tests: Testing and inspecting agency shall make additional tests of concrete when test results indicate that slump, air entrainment, compressive strengths, or other requirements have not been met, as directed by Architect. Testing and inspecting agency may conduct tests to determine adequacy of concrete by cored cylinders complying with ASTM C 42 or by other methods as directed by Architect.

END OF SECTION 03300

SECTION 03 45 00

ARCHITECTURAL PRECAST CONCRETE

PART 1 - GENERAL

1.01 SUMMARY

- A. This section includes precast concrete units.

1.02 PERFORMANCE REQUIREMENTS

- A. Structural Performance: Provide precast concrete units and connections capable of withstanding design loads within limits and under all existing code criteria.

1.03 SUBMITALS

- A. Product Date: For each product indicated.
- B. Design Mixes: For each concrete mix.
- C. Shop Drawings: Detail Fabrication and installation of precast concrete units. Indicate member locations, plans, elevations, dimensions, shapes, cross sections, limits of each finish and types of reinforcement, including special reinforcement.
- D. Samples: For each type of finish – samples will be cast for this job and measure 12"x12"x1" thick or similar. Off the shelf standard samples will not be accepted.

1.04 QUALITY ASSURANCE:

- A. Fabricator Qualifications: A qualified fabricator who assumes responsibility for engineering precast concrete units to comply with performance requirements. This responsibility includes preparation of Shop Drawings

1.05 DELIVERY, STORAGE, AND HANDLING

- A. Store units at Project site to prevent cracking, distorting, warping, staining, or other physical damage, and so markings are visible.
- B. Lift and support units only at designated lifting and supporting points shown on Shop Drawings.

PART 2 - PRODUCTS

2.01 MATERIALS:

A. Steel Reinforcing:

1. Reinforcing Bars: ASTM A 615/A 615M, Grade 69, deformed.
2. Low-Alloy-Steel Reinforcing Bars: ASTM A 706/A 706M, deformed.
3. Plain-Steel Wire: ASTM A 496.
4. Deformed-Steel Wire: ASTM A496.
5. Plain-Steel Welded Wire Fabric: ASTM A 185, fabricated from as-drawn steel wire into flat sheets.
6. Deformed-Steel Welded Wire Fabric: ASTM A 497 flat sheet.
7. Supports: Manufacture's bolsters, chairs, spacers, and other devices for spacing, supporting, and fastening reinforcing bars and welded wire fabric in place according to PCI MNL 117.
8. Prestressing Strand: ASTM A 416/A 416M, Grade 250 or 270, uncoated, 7-wire, low-relaxation strand.

B. Concrete:

1. Portland Cement: ASTM C 150, Type I or Type III, of same type, brand, and source. Color samples to be submitted to Design /Builder for approval. Color to be MCTC.
2. Normal-Weight Aggregates: Except as modified by PCI MNL 117, ASTM C 33, with course aggregates complying with Class 5S.
3. Light-Weight Aggregates: ASTM C 330.
4. Coloring Admixture: ASTM C 979 synthetic mineral-oxide pigments or colored water-reducing admixtures, temperature stable, nonfading, and alkali resistant.
5. Air-Entraining Admixture: ASTM C 260.

6. Fly Ash Admixture: ASTM C 618, Class C or F.
7. Metakaloin Admixture: ASTM C 618, Class N.
8. Silica Fume Admixture: ASTM C 1240.

C. Steel Connections:

1. Carbon-Steel Shapes and Plates: ASTM A 36/A 36M.
2. Carbon-Steel Headed Studs: ASTM A 108, AISI 1018 through AISI 1020, cold finished; AWS D1.1, Type A or B, with arc shields.
3. High-Strength, Low-Alloy Structural Steel: ASTM A 572/A 572M.
4. Carbon-Steel Structural Tubing: ASTM A 500, Grade B.
5. Carbon-Steel Bolts and Studs: ASTM A 307, Grade A; carbon-steel, hex-head bolts and studs; carbon-steel nuts; and flat, unhardened steel washers.
6. Finish: For exterior steel items, steel in exterior walls, and items indicated for galvanizing, apply zinc coated by hot-dip process according to ASTM A 123/A 123M, after fabrication and ASTM A 153/A 153M as applicable.
  - a. Galvanizing Repair Paint: DOD-P-21035A or SSPC-Paint 20.
7. Shop-Primed Finish: Prepare surfaces of non-galvanized steel items, except those surfaces to be embedded in concrete, according to requirements in SSPC-SP 3 and shop-apply lead and chromate-free, rust-inhibitive primer, complying with performance requirements in FS TT-P-664, SSPC-Paint 25, according to SSPC-PA 1.

- D. Sand-Cement Grout: Portland cement, ASTM C 150, Type 1, and clean, natural sand, ASTM C 144. Mix at ratio of 1 part cement to 2 ½ parts sand, by volume, with minimum water required for placement and hydration.

2.02 CONCRETE MIXES:

- A. Light-Weight Concrete Face and Backup Mixes: Proportion mixes by either laboratory trial batch or filed 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.

2. Maximum Water-Cementitious Materials Ratio: 0.40.

- B. Water Absorption: 12 to 14 percent by volume, tested according to PCI MNL 117. Submit test results for abortion along with recipe for intended mix.
- C. 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.

2.03 FABRICATION:

- A. Anchorage Hardware: Fabricate with sufficient anchorage and embedment to comply with design requirements. Accurately position for attachment of loose hardware, and secure in place during pre-casting operations.
- B. Furnish loose steel plates, clip angles, seat angles, anchors, dowels, cramps, hangers, and other hardware shapes for securing pre-cast concrete units to supporting and adjacent construction.
- C. Cast-in reglets, slots, holes, and other accessories in precast concrete units to receive windows, cramps, dowels, reglets, waterstops, flashings, and other similar work as indicated.
- D. Reinforcement: Comply with recommendations in CRSI’s “Manual of Standard Practice” and PCI MNL 117 for fabricating, placing, and supporting reinforcement.
- E. Reinforce precast concrete units to resist handling, transportation, and erection stresses.
- F. Prestress tendons for precast concrete units by either pre-tensioning or post-tensioning methods. Comply with PCI MNL 117.
- G. Mix concrete according to PCI MNL 117 and requirements in the Section. After concrete batching, no additional water may be added.
- H. Place face mix to a minimum thickness after consolidation of the greater of 1 inch or 1.5 times the maximum aggregate size, but not less than the minimum reinforcing cover.
- I. 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.

1. Place backup concrete to ensure bond with face mix concrete.
- J. 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.
- K. Comply with ACI 306.1 procedures for cold-weather concrete placement.
- L. Comply with ACI 305 R recommendations for hot-weather concrete placement.
- M. Identify pickup points of precast concrete units and orientation in structure with permanent markings, complying with markings indicated on Shop Drawings. Imprint or permanently mark casting date on each precast architectural concrete unit on a surface that will not show in finished structure.
- N. 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.
- O. Discard precast concrete units that are warped, cracked, broken, spalled, stained, or otherwise defective unless repairs are approved by Design/Builder.
- P. Fabricate precast concrete units straight and true to size and shape with exposed edges and corners precise and true so each finish panel complies with PCI MNL 117 product tolerances as well as position tolerances for cast-in-items.

2.04 FINISHES:

- A. Finish to be approved by architect.
- B. Finish exposed top and bottom and side surfaces of precast concrete units to match face-surface finish.

PART 3 - EXECUTION

3.01 INSTALLATION

- A. Install precast concrete. Provide temporary supports and bracing as required to maintain position, stability, and alignment as units are being permanently connected.

1. Maintain horizontal and vertical joint alignment and uniform joint width as erection progresses.
- B. Anchor precast concrete units in position by bolting, welding, grouting, or as otherwise indicated.
- C. Welding: Perform welding in compliance with AWS D1.1 and AWS D1.4, with qualified welders.
  1. Repair damaged steel surfaces by cleaning and applying a coat of galvanized repair paint to galvanized and re-priming damaged painted surfaces.
- D. Install pre-cast concrete units level, plumb, square, true, and in alignment without exceeding the non-cumulative erection tolerances of PCI MNL 117, Appendix 1.
- E. Repair exposed exterior surfaces of precast concrete units to match color, texture, and uniformity of surrounding precast concrete if permitted by Design/Builder.
- F. Clean exposed surfaces of precast concrete units after erection to remove weld marks, other markings, dirt and stains.

END OF SECTION



**SECTION 04200**

**UNIT MASONRY**

**1. GENERAL**

**1.1 DESCRIPTION OF WORK**

- A. Drawings and general provisions of Contract, including General Conditions and Division 1 specifications, apply to work in this section.
- B. Extent of Unit Masonry is shown on the drawings.
- C. In addition to work shown on the drawings and specified elsewhere in this Section, build in steel lintels, anchors, inserts and sleeves.

**1.2 QUALITY ASSURANCE**

- A. Standards: Comply with recommendations of Brick Institute of America (BIA), and National Concrete Masonry Assoc. (NCMA).

**1.3 SUBMITTALS**

- A. Issue submittals in accordance with Section 01 31 00, Submittals.
- B. Submit product data and understanding of installation instructions for masonry units, cementitious products for mortar and grout, coloring pigments, throughwall flashing, and masonry accessories.
- C. Submit samples of exposed masonry units and mortar, illustrating full range of colors and textures.
- D. Mockup instructions are indicated in the drawings. The work completed on the mockup will be done to the exact same standards as the contractor expects the building to be done and turned over to the client.

**2 PRODUCTS**

**2.1 FACE BRICK**

- A. Face brick shall be MFG by Belden Ambassador. Two brick colors, beaver blend, 75 Dart-Tex and light range iron spot smooth.

## 20 THAMES STREET – PORTLAND, ME

- B. Face brick shall comply with ASTM C 216, Grade SW, Type FBS. Units shall be size, modular for 3/8 in. mortar joints, nominal dimensions 3-5/8 in. thick, 2-1/4 in. high, 15 5/8 in. long. Norman sizes, lipped and cut brick will be allowed where required and approved by the architect.

### 2.2 CONCRETE MASONRY UNITS

- A. Except as shown on Drawings or specified otherwise, all concrete masonry units shall be as follows:
  - 1. Hollow-type complying with ASTM C 90, Type 1 (moisture-controlled), Grade N.
  - 2. Compressive strength: 2500 psi net, 1250 psi gross (average of three units). Prism strength  $f_m=2500$  psi in Pier A,  $f_m=2000$  elsewhere.
  - 3. Normal-weight, with sand and gravel aggregate complying with ASTM C 33, approximate oven-dry unit weight of 135 lbs. per cu. ft.

### 2.3 MORTAR AND GROUT

- A. Mortar shall comply with ASTM C 270, BIA Technical Notes 8 and 8A, and local Building Code.
- B. Materials shall conform to applicable ASTM specifications including the following:
  - 1. Portland Cement: ASTM 150, Types I, II, or III (do not use Types IA, IIA, or IIIA).
  - 2. Masonry Cement: ASTM C 91.
  - 3. Hydrated Lime: ASTM C 207, Type S only (do not use Type N).
  - 4. Natural or manufactured sand aggregate: ASTM C 144, gradation conforming to Table 1 in BIA Technical Note 8.
  - 5. Masonry cement shall not contain ground limestone.
  - 6. Water: clean, potable, and free of deleterious amounts of acids, alkalies or organic materials.
- C. Mortar Type
  - 1. General:
    - a. All mortar will be mixed proportionally by measured volume. Premixed bag mortar will not be allowed unless a certified recipe is approved by a manufacturer such as

## 20 THAMES STREET – PORTLAND, ME

Spec-Mix or other as approved by the Architect. Reference the drawings for the required mock-up procedures.

- b. Mortar for exterior brick shall be colored as per the drawings and details. submit samples 3" or larger puck with recipe on the back to Architect for approval.
- c. Use 1800 psi minimum Type S mortar for reinforced masonry and where indicated.
- d. Use 750 psi minimum Type N mortar for exterior, above-grade loadbearing and non-loadbearing walls, and for other applications where another type is not indicated.

### D. Grout

1. Grout shall conform to ASTM C 476 and to match existing.
2. Fine and coarse aggregate for grout mixes shall be defined in ASTM C 404.
  - a. Fine grout shall consist of one-part Portland cement, 0 to 1/10 part lime, 2-1/4 to 3 parts fine sand.
  - b. Coarse grout shall consist of the fine grout mix described in "a" above plus 1 to 2 parts coarse aggregate.
  - c. Use coarse grout (pea gravel aggregate) except where minimum horizontal core dimension is under 4 in., in which case use fine grout (sand aggregate). Ordinary concrete (maximum 1 in. aggregate) may be used where minimum core dimension exceeds 6 inches.

- E. Cold-weather construction at exterior walls, will require tenting and blanket warming as per the Brick Institute of America (BIA), and National Concrete Masonry Assoc. (NCMA). Additives and accelerators will not be allowed. Tent heat will be dry heat and not produced by gas heaters that vent into the tented area. All masonry work will be heated and protected until cured and washed.

## 2.4 METAL REINFORCING, TIES, ANCHORS

- A. Acceptable manufacturers: Hohmann & Barnard, Inc., or approved equal.
- B. Brick ties at masonry veneer construction:
  1. HB Thermal 2-Seal adjustable veneer anchors, 14 Ga., stainless steel Type 304, with Pintle Length and Legs fabricated to accommodate 2-inch or other as indicated rigid exterior insulation. Min. 2" into bed joints. Ties to be stainless steel.

## 20 THAMES STREET – PORTLAND, ME

2. Secure anchors as recommended by anchorage manufacturer.
3. Maximum spacing: 24 in. o.c. vertically, 16 in. o.c. horizontally or closer spacing as required at expansion joints, corners, floors, etc., or to secure directly to studs.
4. Material: stainless steel.
5. Masonry Joint Reinforcement: ASTM A 951/A 951M. Either ladder or truss type with single pair of side rods.
6. Uncoated Steel Reinforcing Bars: ASTM A 615/A 615M or ASTM A 996/A 996M, Grade 60

### 2.5 THROUGHWALL FLASHING

- A. Through-wall flashing: Thru wall flashing at base and all window and door heads to be stainless steel with York vent flash as detailed. Flashing to be extended sufficiently beyond jambs and form end dams. Thru wall flashing with H & B # DP stainless steel drip plate as manufactured by Hohmann & Barnard Inc.
- B. Through-wall flashing sealant: Shall be Sandell Trowel Mastic, as manufactured by Sandell Manufacturing Co., Inc. **as approved by the Air Vapor Barrier manufacturer** otherwise other products will be required. In all cases contractor is to provide written documentation from the AVB manufacturer that the product is compatible.

### 2.6 AIR VAPOR BARRIER

- A. 3M Products Vapor Permeable Air Barrier 3015VP – 60” rolls shall be applied per the manufacturer’s instructions and as detailed in the drawings.

### 2.7 MASONRY ACCESSORIES

- A. Weeps: Head joint weeps and vents to be full brick height, medium-density polyethylene, 3/8 in., full depth of outer wythe. Weeps will be set directly on the top of the brick or material below and have no mortar under them. Face of the weep will be set at the same depth as the indicated arris line of mortar and match mortar color.
- B. Chemical cleaning agents for newly-installed masonry: ProSoco Sure-Klean liquid masonry cleaners or equal by Diedrich, as recommended by manufacturer for particular condition. Recommended cleaners include Sure-Klean No. 600 Detergent, No. 101 Lime Solvent, and Vana Trol. Start with a mixture of 14:1 and not to exceed 10:1 in any case. All burned masonry joints will be raked out and repointed to a depth of a min of 2” and repointed. No exceptions. This rework will not affect the schedule cost.

## 20 THAMES STREET – PORTLAND, ME

- C. Apply water proofing – Rub-R-Wall Air/Vapor Barrier, liquid applied, on all block face bearing brick veneer as detailed in the drawings and per the manufacturer’s specifications.

### 3. EXECUTION

#### 3.1 MASONRY WORK IN GENERAL

- A. Erect all masonry work in compliance with the line and level tolerances specified herein. Correct, or replace, as directed by the Architect, non-conforming masonry work at no additional cost to the Contract.
- B. Lay no face brick or concrete masonry unit having chipped edges or face defects where such unit or piece would be exposed to view. Remove any such unit or piece, if installed, replace with new matching material, and bear all costs therefore.
- C. Examine all Drawings as to requirements for the accommodation of work of other trades. Provide all required recesses, chases, slots, cutouts, and set loose lintels. Place anchors, bolts, sleeves and other items occurring in the masonry work. Take every precaution to minimize future cutting and patching. Closely coordinate the location and placement of such items.
- D. Protect all masonry from rain prior to, and during the installation thereof. If the temperature is in excess of 80 degrees F. at time of installation, lightly moisten contact surfaces or masonry units by brushing with water, not dipping in water. Sun shield masonry storage and during installation. The architect will perform inspections during installation including temperature readings.
- E. Lay all masonry in full mortar beds, and completely butter all concealed from view vertical edges with mortar. Completely fill cells of masonry units with mortar where vertical reinforcement is to be installed therein and in other locations specified or indicated on the Drawings. Mason will not allow excess mortar to drop into wall cavity. Mason to leave openings at the base of wall 4'-0" o.c. and at all relieving angles. Mortar droppings will be removed. After approval openings will be closed.
- F. Provide complete protection against breakage and weather damage to all masonry work, including substantial wood boxing around door jambs, over the tops of walls and wherever necessary to protect work at all stages of completion. Protect masonry when not roofed over, at all times when masons are not working on the walls. Apply non-staining tarpaulins or waterproof paper, properly weighted, or nailed, to assure their remaining in place to protect masonry from all possible hazards. Fastener holes in AVB for temporary protection will be patched
- G. Fit masonry into bucks and frames so as not to distort alignment of such items, and fill backs of such items with mortar, except where joints are indicated to receive sealant and have no compressible filler therein, in which case rake joints to a uniform depth of ¼ inch for proper

## 20 THAMES STREET – PORTLAND, ME

installation of sealant material. All sealant joints where no backer rod is installed will have a bond break installed at the back of the joint. All sealant joints in masonry will be sanded.

- H. Use only power saw, equipped with carborundum blade, for cutting exposed masonry, as needed to assure straight, evenly-cut edges. All cuts are to be buried in joints where possible and not exposed to the weather.
- I. Lay out coursing before setting to minimize cutting closures or jumping bond. Reference drawings for layout information. Do not spread any more mortar than can be covered before surface of mortar has begun to dry. Do not endanger bond or mortar by moving masonry when once laid. If necessary to re-adjust any items, remove entirely, clean-off mortar, and reset with fresh mortar. Do not allow mortar to dry on the face of masonry.
- J. Except for cleaning down and pointing, finish all new masonry as the walls and partitions are carried up.
- K. Point and fill all holes and cracks in mortar joints with additional fresh mortar; do not merely spread adjacent mortar over defect or use dead mortar droppings. All cracks will be raked out and repointed to a minimum depth of 2”.

### 3.2 JOB CONDITIONS

- A. Store cement, lime and other cementitious materials under cover in a dry place.
- B. Keep steel reinforcing, ties and anchors free from oil, dirt, rust, and other materials which would destroy bond.
- C. Store masonry above ground on level platforms which allow air circulation under stacked units. Masonry units shall be dry and free from soil and ice before being laid in wall.
- D. Keep installed walls dry and clean at all times. Immediately remove grout or mortar from face of masonry to be left exposed or painted. Protect previously installed elements such as louvers, doors, frames, and windows from mortar droppings and construction damage, using masking elements, dropcloths, etc.
- E. Cover exposed walls at end of working day with well-secured canvas tarpaulins. Protect base of exterior walls from splashing mud and mortar by spreading sand, raw, and sawdust or plastic sheeting 3 to 4 ft. horizontally and up face of wall. Turn scaffold boards near wall on edge at end of day to prevent splashing mortar or dirt.
- F. Securely brace partially completed walls against wind damage. Walls shall have been completed 24 hours minimum before application of distributed loads, 72 hours before concentrated loads.
- G. Comply with cold-weather construction specifications in NCMA-TEK 16 and BIA Technical Note 1A:

## 20 THAMES STREET – PORTLAND, ME

1. Maintain masonry above 32 degrees F. for 48 hours minimum using insulated blankets or heated enclosures. Construct windbreaks at wind velocities over 15 mph. Maintain mortar on board at 40 degrees F. minimum, heating mixing water and sand as required.
2. Do no masonry work at temperatures below 38 degrees F and falling or 35 degrees F and rising, until General Contractor has contacted Architect.

### 3.3 INSTALLATION

- A. Verify that substrate is dry and free from frost, dirt, laitance, loose sand and other material which would prevent satisfactory bond. Lay first course in full mortar bed including face shells and webs of concrete masonry units. Keep cells to be grouted free from mortar.
- B. Dampen masonry units as required to prevent excess suction of mortar. Lay concrete masonry units to form continuous unobstructed vertical spaces within wall. Provide full mortar coverage on horizontal and vertical face shells. Also, bed webs adjacent to reinforced cores to prevent grout leakage, except omit web bedding at fully grouted walls to permit grout to flow laterally. Lay face brick with full vertical and bed joints, except as specified below to provide weep holes. Cut exposed masonry units, where necessary, with a power saw. Avoid the use (by proper layout) of less-than-half-size units.
- C. Install masonry units in the bond pattern indicated and as approved in the mockup.
- D. Step back unfinished work -- toothing is not permitted. Do not adjust installed units -- where necessary, completely remove and reinstall using fresh mortar.
- D. Maximum variation of installed walls from plumb, level, or plan grid shall not exceed 1/8 in. in 10 ft. Wall thickness shall not vary more than 1/4 in. plus or minus from dimension shown on drawings.
- E. Placing Reinforcement: Comply with requirements in ACI 530.1/ASCE 6/TMS 602.
- F. Comply with requirements in ACI 530.1/ASCE 6/TMS 602 for cleanouts and for grout placement, including minimum grout space and maximum pour height.
- F. Mortar:
  1. Measure material volume in calibrated volume containers, or by similar easily-controlled and maintained method. Do not use shovel measurement.

## 20 THAMES STREET – PORTLAND, ME

2. Mix materials in a mechanical mixer for at least three minutes with minimum amount of water necessary to produce a workable consistency. Retemper stiffened mortar as required to restore evaporated water, but do not place mortar any later than 2-1/2 hours after mixing, less time in hot weather.
  3. Exposed-to-view joints shall be approximately 3/8 in. wide, to meet coursing shown, tooled when thumbprint hard with a round bar to produce a dense, flat surface well-bonded to masonry edges.
  4. After tooling, cut off mortar tailings with a trowel and brush off excess. Concealed joints, including those on cavity side of masonry veneer, and joints in masonry to be plastered or stuccoed shall be struck off flush, with no protrusions.
  5. Mortar not tight at time of tooling shall be raked out, pointed with fresh mortar, and retooled. Where sealant is shown, rake out joint 1.25 in., ready for backer rod and sealant specified in Division 7 sealants Section.
- G. Through-wall flashing:
1. Install flashing to the profiles shown on the drawings.
  2. Masonry and concrete surfaces receiving through wall flashings shall be thoroughly dry, free from loose material, and reasonably smooth. There shall be no slopes that will form pockets or prevent free drainage of water to exterior surfaces of wall.
  3. Set flashing in sealant. Hold sealant back 1/4 inch from face of lintel.
  4. At wall openings, extend flashing 6 in. beyond each side of opening and turn up to form pan. Fold all corners, do not cut. Reference drawings and details.
  5. Lap joints between lengths of flashing 6 in. minimum and seal with mastic. Seal penetrations through flashing with mastic or overlapping piece of flashing.
- H. Provide weep vents at 24 inches on center maximum spacing through outer face of masonry at all through-wall flashing. Provide weep vents below relieving angles and precast caps at the top of walls.
- J. Provide openings and chases as required for structural members, ductwork, large pipes, etc. Cut exposed masonry with carborundum saw to ensure straight even edges. Neatly block around and patch penetrations. Provide compressible filler around edges of openings to accommodate vibration and structural deflection. Ensure that joint reinforcement remains uncut or is well-lapped.
- K. Provide control and expansion joints at locations shown, and keep clean of mortar droppings. Install Joint Sealers in accordance with Section 07 92 00.



## 20 THAMES STREET – PORTLAND, ME

- L. Build other work into the masonry work as shown, fitting masonry units around other work, and grouting to secure anchorage.

### 3.4 ALLOWABLE TOLERANCES FOR MASONRY WORK

- A. Maximum variation from true surface level for exposed to view walls and partitions:
  - 1. Unit-to-unit tolerance:  $\frac{1}{8}$  inch.
  - 2. Surface, overall tolerance:  $\frac{1}{4}$  inch in 10 feet in any direction when tested with ten-foot-long straightedge. Where both faces of wall or partition will be exposed to view, request and obtain decision from the Architect as to which face will be required to conform to the specified surface level tolerance.
- B. Maximum variation from true vertical plumb lines:
  - 1. In lines of walls and arises:
    - a.  $\frac{1}{4}$  inch in 10 feet.
    - b.  $\frac{3}{8}$  inch in any story, or up to 20 feet maximum.
    - c.  $\frac{1}{2}$  inch in 40 feet maximum.
  - 2. For external corner lines, control joints, and other conspicuous lines:
    - a.  $\frac{1}{4}$  inch in any story, or up to 20 feet maximum.
- C. Maximum variation from horizontal level or grades for exposed sills, lintel blocks, and other conspicuous lines:
  - 1.  $\frac{1}{4}$  inch in any bay, or up to 20 feet maximum.
  - 2.  $\frac{1}{2}$  inch in 40 feet maximum.
- D. Maximum variation of linear building line from an established position in plan and related portions of walls and partitions:
  - 1.  $\frac{1}{2}$  inch in any bay or up to 20 feet.
  - 2.  $\frac{3}{4}$  inch in 40 feet maximum.

### 3.5 WALL AND PARTITION CONSTRUCTION

- A. General:

## 20 THAMES STREET – PORTLAND, ME

1. Build the masonry walls and partitions in the various combinations and thickness as indicated on the Drawings and as herein specified.
2. Build in anchorage items and loose lintels as the work progresses.
3. Lay first course of masonry on a smooth bed or mortar, after supporting concrete has been cleaned. Fill cells of first course concrete masonry units with mortar in all cases. Completely fill cells of concrete masonry units wherever vertical reinforcing rods are installed therein.
4. For exterior masonry cavity walls, install cavity insulation, through wall membrane flashings, weep wicks, and peastone, as specified herein.
5. Fill pressed metal frames occurring in masonry with mortar, as the masonry is erected.

### 3.6 GROUT

- A. Lay masonry units with core cells vertically aligned and cavities clear of mortar and unobstructed.
- B. Permit mortar to cure three (4) days before placing grout.
- C. Consolidation: Consolidate grout at the time of placement per ACI 530.
- D. ACI 530 Building Code requirements for Masonry Structures and ACI 530 Specifications for Masonry Structures are made part of this specification as are all pertinent sections of the ACI Building Code.

### 3.6 CLEANING MASONRY

- A. Masonry cleaning procedures shall follow recommendations of NCMA-TEK 45 and BIA Technical Note 20 (revised).
- B. Dry brush masonry work at end of each day's work.
- C. After new mortar has cured 14 days minimum, remove large mortar particles with non-metallic scrapers, chisels, or wooden paddles. Wash off dirt and other foreign materials with clean water and light concentration of soap or detergent.
- D. For mortar smears, construction dirt, stains, efflorescence, etc., not removable by above methods, use proprietary cleaners specified under PRODUCTS. Muriatic acid may not be used. Adhere strictly to manufacturer's recommendations.

**20 THAMES STREET – PORTLAND, ME**

- E. Apply and scrub cleaning solutions with non-metallic fibrous brushes. Thoroughly rinse cleaned area before cleaning solution can dry, using water hosed under moderate pressure.

**END OF SECTION**

## SECTION 051200 - STRUCTURAL STEEL FRAMING

### PART 1 - GENERAL

#### 1.1 RELATED DOCUMENTS

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

#### 1.2 SUMMARY

- A. This Section includes structural steel and architecturally exposed structural steel.
- B. Related Sections: The following Sections contain requirements that relate to this Section:
  - 1. Division 1 Section "Quality Control" for independent testing agency procedures and administrative requirements.
  - 2. Division 5 Section "Metal Fabrications" for miscellaneous steel framing.
  - 3. Division 9 Section "Painting" for surface preparation and priming requirements.

#### 1.3 PERFORMANCE REQUIREMENTS

- A. Engineering Responsibility: Engage a fabricator who utilizes a qualified registered professional structural engineer to prepare calculations, Shop Drawings, and other structural data for structural steel connections.

#### 1.4 SUBMITTALS

- A. General: Submit each item in this Article according to the Conditions of the Contract and Division 1 Specification Sections.
- B. Product Data for each type of product specified.
- C. Shop Drawings detailing fabrication of structural steel components.
  - 1. Include details of cuts, connections, splices, camber, holes, and other pertinent data.
  - 2. Indicate welds by standard AWS symbols, distinguishing between shop and field welds, and show size, length, and type of each weld.
  - 3. Indicate type, size and length of bolts, distinguishing between shop and field bolts. Identify high-strength bolted slip-critical, direct-tension, or tensioned shear/bearing connections.
  - 4. Include computations for all connections signed and sealed by the registered structural engineer responsible for their preparation.

- D. Qualification data for firms and persons specified in the "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.
- E. Mill test reports signed by manufacturers certifying that their products, including the following, comply with requirements.
  - 1. Structural steel, including chemical and physical properties.
  - 2. Bolts, nuts, and washers, including mechanical properties and chemical analysis.
  - 3. Direct-tension indicators.
  - 4. Shear stud connectors.

#### 1.5 QUALITY ASSURANCE

- A. Installer Qualifications: Engage an experienced Installer who has completed structural steel work similar in material, design, and extent to that indicated for this Project and with a record of successful in-service performance.
- B. Fabricator Qualifications: Engage a firm experienced in fabricating structural steel similar to that indicated for this Project and with a record of successful in-service performance, as well as sufficient production capacity to fabricate structural steel without delaying the Work.
  - 1. Fabricator must participate in the AISC Quality Certification Program and be designated an AISC-Certified Plant as follows:
    - a. Category: Category I, conventional steel structures.
- C. Comply with applicable provisions of the following specifications and documents:
  - 1. AISC's "Specification for Structural Steel Buildings--Allowable Stress Design and Plastic Design."
  - 2. AISC's "Load and Resistance Factor Design (LFRD) Specification for Structural Steel Buildings."
  - 3. AISC's "Specification for Allowable Stress Design of Single-Angle Members."
  - 4. AISC's "Specification for Load and Resistance Factor Design of Single-Angle Members."
  - 5. AISC's "Seismic Provisions for Structural Steel Buildings."
  - 6. ASTM A 6 (ASTM A 6M) "Specification for General Requirements for Rolled Steel Plates, Shapes, Sheet Piling, and Bars for Structural Use."
  - 7. Research Council on Structural Connections' (RCSC) "Specification for Structural Joints Using ASTM A 325 or A 490 Bolts."
  - 8. Research Council on Structural Connections' (RCSC) "Load and Resistance Factor Design Specification for Structural Joints Using ASTM A 325 or A 490 Bolts."
- D. Professional Engineer Qualifications: A professional engineer who is legally authorized to practice in the 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 projects with structural steel framing that are similar to that indicated for this Project in material, design, and extent.

- E. Welding Standards: Comply with applicable provisions of AWS D1.1 "Structural Welding Code--Steel."
  - 1. Present evidence that each welder has satisfactorily passed AWS qualification tests for welding processes involved and, if pertinent, has undergone recertification.
- F. Preinstallation Conference: Conduct conference at Project site to comply with requirements of Division 1 Section "Project Meetings." The GC, steel fabricator, steel erector, SER, architect and testing lab shall attend the meeting.

## 1.6 DELIVERY, STORAGE, AND HANDLING

- A. Deliver structural steel to Project site in such quantities and at such times to ensure continuity of installation.
- B. Store materials to permit easy access for inspection and identification. Keep steel members off ground by using pallets, platforms, or other supports. Protect steel members and packaged materials from erosion and deterioration.
  - 1. Store fasteners in a protected place. Clean and relubricate bolts and nuts that become dry or rusty before use.
  - 2. Do not store materials on structure in a manner that might cause distortion or damage to members or supporting structures. Repair or replace damaged materials or structures as directed.

## 1.7 SEQUENCING

- A. Supply 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 MATERIALS

- A. Structural Steel Shapes, Plates, and Bars: As follows:
  - 1. Rolled W Shapes & Channels: ASTM A572 Grade 50 or A992.
  - 2. Plates, Bars and Angles: ASTM A36
- B. Cold-Formed Structural Steel Tubing: ASTM A 500, Grade B or C.
- C. Hot-Formed Structural Steel Tubing: ASTM A 501.
- D. Steel Pipe: ASTM A 500, Grade B or C.
- E. Anchor Rods (Bolts), Bolts, Nuts, and Washers: As follows:

1. Anchor Rods (Bolts): ASTM A307, ASTM A 449 refer to plans
  2. Washers: ASTM A 36 (ASTM A 36M).
- F. High-Strength Bolts, Nuts, and Washers: ASTM A 325 (ASTM A 325M), Type 1, heavy hex steel structural bolts, heavy hex carbon-steel nuts, and hardened carbon-steel washers.
- G. High-Strength Bolts, Nuts, and Washers: ASTM A 490 (ASTM A 490M), Type 1, heavy hex steel structural bolts, heavy hex carbon-steel nuts, and hardened carbon-steel washers, uncoated.
- H. Welding Electrodes: Comply with AWS requirements.

## 2.2 PRIMER

- A. Primer: None

## 2.3 GROUT

- A. Nonmetallic, Shrinkage-Resistant Grout: Premixed, nonmetallic, noncorrosive, nonstaining grout containing selected silica sands, portland cement, shrinkage compensating agents, plasticizing and water-reducing agents, complying with ASTM C 1107, of consistency suitable for application, and a 30-minute working time.

## 2.4 FABRICATION

- A. Fabricate and assemble structural steel in shop to greatest extent possible. Fabricate structural steel according to AISC specifications referenced in this Section and in Shop Drawings.
1. Camber structural steel members where indicated.
  2. Identify high-strength structural steel according to ASTM A 6 (ASTM A 6M) and maintain markings until steel has been erected.
  3. Mark and match-mark materials for field assembly.
  4. Fabricate for delivery a sequence that will expedite erection and minimize field handling of structural steel.
  5. Complete structural steel assemblies, including welding of units, before starting shop-priming operations.
  6. Comply with fabrication tolerance limits of AISC's "Code of Standard Practice for Steel Buildings and Bridges" for structural steel.
- B. Fabricate architecturally exposed structural steel with exposed surfaces smooth, square, and free of surface blemishes, including pitting, rust and scale seam marks, roller marks, rolled trade names, and roughness.
1. Remove blemishes by filling, grinding, or by welding and grinding, prior to cleaning, treating, and shop priming.
  2. Comply with fabrication requirements, including tolerance limits, of AISC's "Code of Standard Practice for Steel Buildings and Bridges" for architecturally exposed structural steel.
- C. Thermal Cutting: Perform thermal cutting by machine to greatest extent possible.

1. Plane thermally cut edges to be welded.
- D. Finishing: Accurately mill ends of columns and other members transmitting loads in bearing.
- E. Steel Wall Framing: Select true and straight members for fabricating steel wall framing to be attached to structural steel framing. Straighten as required to provide uniform, square, and true members in completed wall framing.
- F. Holes: Provide holes required for securing other work to structural steel framing and for passage of other work through steel framing members, as shown on Shop Drawings.
1. Cut, drill, or punch holes perpendicular to metal surfaces. Do not flame-cut holes or enlarge holes by burning. Drill holes in bearing plates.
  2. Weld threaded nuts to framing and other specialty items as indicated to receive other work.

## 2.5 SHOP CONNECTIONS

- A. Shop install and tighten nonhigh-strength bolts, except where high-strength bolts are indicated.
- B. Shop install and tighten high-strength bolts according to RCSC's "Specification for Structural Joints Using ASTM A 325 or A 490 Bolts."
- C. Weld Connections: Comply with AWS D1.1 for procedures, appearance and quality of welds, and methods used in correcting welding work.
1. Assemble and weld built-up sections by methods that will maintain true alignment of axes without warp.
  2. Verify that weld sizes, fabrication sequence, and equipment used for architecturally exposed structural steel will limit distortions to allowable tolerances. Prevent surface bleeding of back-side welding on exposed steel surfaces. Grind smooth exposed fillet welds 1/2 inch (13 mm) and larger. Grind flush butt welds. Dress exposed welds.

## 2.6 GALVANIZING

- A. Hot-Dip Galvanized Finish: Apply zinc coating by the hot-dip process to structural steel indicated for galvanizing according to ASTM A 123.

## 2.7 SOURCE QUALITY CONTROL

- A. Owner will engage an independent testing and inspecting agency to perform shop inspections and tests and to prepare test reports.
1. Testing agency will conduct and interpret tests and state in each report whether test specimens comply with or deviate from requirements.
  2. Provide testing agency with access to places where structural steel Work is being fabricated or produced so required inspection and testing can be accomplished.



- B. Correct deficiencies in or remove and replace structural steel that inspections and test reports indicate do not comply with specified requirements.
- C. Additional testing, at Contractor's expense, will be performed to determine compliance of corrected Work with specified requirements.
- D. Shop-bolted connections will be tested and inspected according to RCSC's "Specification for Structural Joints Using ASTM A 325 or A 490 Bolts."
- E. In addition to visual inspection, shop-welded connections will be inspected and tested according to AWS D1.1 and the inspection procedures listed below, at testing agency's option.
  - 1. Liquid Penetrant Inspection: ASTM E 165.
  - 2. Magnetic Particle Inspection: ASTM E 709; performed on root pass and on finished weld. Cracks or zones of incomplete fusion or penetration will not be accepted.
  - 3. Radiographic Inspection: ASTM E 94 and ASTM E 142; minimum quality level "2-2T."
  - 4. Ultrasonic Inspection: ASTM E 164.

### PART 3 - EXECUTION

#### 3.1 EXAMINATION

- A. Before erection proceeds, and with the steel erector present, verify elevations of concrete and masonry bearing surfaces and locations of anchorages for compliance with requirements.
- B. Do not proceed with erection until unsatisfactory conditions have been corrected.

#### 3.2 PREPARATION

- A. Provide temporary shores, guys, braces, and other supports during erection to keep structural steel secure, plumb, and in alignment against temporary construction loads and loads equal in intensity to design loads. Remove temporary supports when permanent structural steel, connections, and bracing are in place, unless otherwise indicated.

#### 3.3 ERECTION

- A. Set structural steel accurately in locations and to elevations indicated and according to AISC specifications referenced in this Section.
- B. Base and Bearing Plates: Clean concrete and masonry bearing surfaces of bond-reducing materials and roughen surfaces prior to setting base and bearing plates. Clean bottom surface of base and bearing plates.
  - 1. Set base and bearing plates for structural members on wedges, shims, or setting nuts as required.
  - 2. Tighten anchor bolts after supported members have been positioned and plumbed. Do not remove wedges or shims but, if protruding, cut off flush with edge of base or bearing plate prior to packing with grout.

3. Pack grout solidly between bearing surfaces and plates so no voids remain. Finish exposed surfaces, protect installed materials, and allow to cure.
  - a. Comply with manufacturer's instructions for proprietary grout materials.
- C. Maintain erection tolerances of structural steel within AISC's "Code of Standard Practice for Steel Buildings and Bridges."
  1. Maintain erection tolerances of architecturally exposed structural steel within AISC's "Code of Standard Practice for Steel Buildings and Bridges."
- D. Align and adjust various members forming part of complete frame or structure before permanently fastening. Before assembly, clean bearing surfaces and other surfaces that will be in permanent contact. Perform necessary adjustments to compensate for discrepancies in elevations and alignment.
  1. Level and plumb individual members of structure.
  2. Establish required leveling and plumbing measurements on mean operating temperature of structure. Make allowances for difference between temperature at time of erection and mean temperature at which structure will be when completed and in service.
- E. Splice members only where indicated.
- F. Remove erection bolts on welded, architecturally exposed structural steel; fill holes with plug welds; and grind smooth at exposed surfaces.
- G. Do not use thermal cutting during erection.
- H. Finish sections thermally cut during erection equal to a sheared appearance.
- I. Do not enlarge unfair holes in members by burning or by using drift pins. Ream holes that must be enlarged to admit bolts.

### 3.4 FIELD CONNECTIONS

- A. Install and tighten nonhigh-strength bolts, except where high-strength bolts are indicated.
- B. Install and tighten high-strength bolts according to RCSC's "Specification for Structural Joints Using ASTM A 325 or A 490 Bolts."
- C. Weld Connections: Comply with AWS D1.1 for procedures, appearance and quality of welds, and methods used in correcting welding work.
  1. Comply with AISC specifications referenced in this Section for bearing, adequacy of temporary connections, alignment, and removal of paint on surfaces adjacent to field welds.
  2. Assemble and weld built-up sections by methods that will maintain true alignment of axes without warp.
  3. Verify that weld sizes, fabrication sequence, and equipment used for architecturally exposed structural steel will limit distortions to allowable tolerances. Prevent surface

bleeding of back-side welding on exposed steel surfaces. Grind smooth exposed fillet welds 1/2 inch (13 mm) and larger. Grind flush butt welds. Dress exposed welds.

### 3.5 REPAIRS AND PROTECTION

- A. Repair damaged galvanized coatings on galvanized items with galvanized repair paint according to ASTM A 780 and manufacturer's written instructions.
- B. Touchup Painting: After installation, promptly clean, prepare, and prime or reprime field connections, rust spots, and abraded surfaces of prime-painted joists and accessories and abutting structural steel.
  - 1. Clean and prepare surfaces by SSPC-SP 2 hand-tool cleaning or SSPC-SP 3 power-tool cleaning.
  - 2. Apply a compatible primer of same type as shop primer used on adjacent surfaces.
- C. Touchup Painting: Cleaning and touchup painting are specified in Division 09 painting Sections.

### 3.6 FIELD QUALITY CONTROL

- A. Owner will engage an independent testing and inspecting agency to perform field inspections and tests and to prepare test reports.
  - 1. Testing agency will conduct and interpret tests and state in each report whether tested Work complies with or deviates from requirements.
- B. Correct deficiencies in or remove and replace structural steel that inspections and test reports indicate do not comply with specified requirements.
- C. Additional testing, at Contractor's expense, will be performed to determine compliance of corrected Work with specified requirements.
- D. Field-bolted connections will be tested and inspected according to RCSC's "Specification for Structural Joints Using ASTM A 325 or A 490 Bolts."
- E. In addition to visual inspection, field-welded connections will be inspected and tested according to AWS D1.1 and the inspection procedures listed below, at testing agency's option.
  - 1. Liquid Penetrant Inspection: ASTM E 165.
  - 2. Magnetic Particle Inspection: ASTM E 709; performed on root pass and on finished weld. Cracks or zones of incomplete fusion or penetration will not be accepted.
  - 3. Radiographic Inspection: ASTM E 94 and ASTM E 142; minimum quality level "2-2T."
  - 4. Ultrasonic Inspection: ASTM E 164.

END OF SECTION 05120

## SECTION 052100 - STEEL JOIST FRAMING

### PART 1 - GENERAL

#### 1.1 RELATED DOCUMENTS

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

#### 1.2 SUMMARY

- A. This Section includes the following:
  - 1. Open-web K-series steel joists.
  - 2. KCS-type, open-web K-series steel joists.
  - 3. Joist girders.
  - 4. Joist accessories.

#### 1.3 DEFINITIONS

- A. Special Joists: Joists requiring modification by the manufacturer to support nonuniform, unequal, or special loading conditions that invalidate SJI's "Standard Specifications Load Tables and Weight Tables for Steel Joists and Joist Girders."

#### 1.4 PERFORMANCE REQUIREMENTS

- A. Structural Performance: Provide special joists and connections capable of withstanding design loads within limits and under conditions indicated.

#### 1.5 SUBMITTALS

- A. Product Data: For each type of joist, accessory, and product indicated.
- B. Shop Drawings: Show layout, mark, number, type, location, and spacings of joists. Include joining and anchorage details, bracing, bridging, accessories; splice and connection locations and details; and attachments to other construction.
- C. Welding Certificates: Copies of certificates for welding procedures and personnel.

#### 1.6 QUALITY ASSURANCE

- A. Manufacturer Qualifications: A firm experienced in manufacturing joists similar to those indicated for this Project and with a record of successful in-service performance.

1. Manufacturer must be certified by SJI to manufacture joists complying with SJI standard specifications and load tables.
  2. Assumes responsibility for engineering special joists to comply with performance requirements. This responsibility includes preparation of Shop Drawings and comprehensive engineering analysis by a qualified professional engineer.
  3. Professional Engineer Qualifications: A professional engineer who is legally authorized 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 joists that are similar to those indicated for this Project in material, design, and extent.
- B. SJI Specifications: Comply with SJI's "Standard Specifications Load Tables and Weight Tables for Steel Joists and Joist Girders" (hereafter, "Specifications"), applicable to types of joists indicated.
- C. Welding: Qualify procedures and personnel according to AWS D1.1, "Structural Welding Code--Steel"; and AWS D1.3 "Structural Welding Code--Sheet Steel."

#### 1.7 DELIVERY, STORAGE, AND HANDLING

- A. Deliver, store, and handle joists as recommended in SJI's "Specifications."
- B. Protect joists from corrosion, deformation, and other damage during delivery, storage, and handling.

### PART 2 - PRODUCTS

#### 2.1 MATERIALS

- A. Steel: Comply with SJI's "Specifications" for chord and web members.
- B. Carbon-Steel Bolts and Threaded Fasteners: ASTM A 307, Grade A (ASTM F 568M, Property Class 4.6), carbon-steel, hex-head bolts and threaded fasteners; carbon-steel nuts; and flat, unhardened steel washers.
- C. High-Strength Bolts and Nuts: ASTM A 325 (ASTM A 325M), Type 1, heavy hex steel structural bolts, heavy hex carbon-steel nuts, and hardened carbon-steel washers.
- D. Welding Electrodes: Comply with AWS standards.
- E. Galvanizing Repair Paint: SSPC-Paint 20 or DOD-P-21035, ASTM A 780.

#### 2.2 PRIMERS

- A. Primer: Fast-curing, lead- and chromate-free, universal modified-alkyd primer with good resistance to normal atmospheric corrosion, complying with performance requirements in FS TT-P-664.

### 2.3 OPEN-WEB K-SERIES STEEL JOISTS

- A. Manufacture steel joists according to "Standard Specifications for Open Web Steel Joists, K-Series," in SJI's "Specifications," with steel-angle top- and bottom-chord members.
- B. Comply with AWS requirements and procedures for shop welding, appearance, quality of welds, and methods used in correcting welding work.
- C. Provide holes in chord members for connecting and securing other construction to joists.
- D. Top-Chord Extensions: Extend top chords of joists with SJI's Type S top-chord extensions where indicated, complying with SJI's "Specifications."
- E. Extended Ends: Extend bearing ends of joists with SJI's Type R extended ends where indicated, complying with SJI's "Specifications."
- F. Camber joists according to SJI's "Specifications."
- G. Equip bearing ends of joists with manufacturer's standard beveled ends or sloped shoes if joist slope exceeds 1/4 inch per 12 inches (1:48).

### 2.4 JOIST ACCESSORIES

- A. Bridging: Provide bridging anchors and number of rows of horizontal or diagonal bridging of material, size, and type required by SJI's "Specifications" for type of joist, chord size, spacing, and span.
- B. Supply ceiling extensions, either extended bottom-chord elements or a separate extension unit of enough strength to support ceiling construction. Extend ends to within 1/2 inch (13 mm) of finished wall surface, unless otherwise indicated.
- C. Supply miscellaneous accessories, including splice plates and bolts required by joist manufacturer to complete joist installation.

### 2.5 CLEANING AND SHOP PAINTING

- A. Apply one shop coat of primer to joists and joist accessories to be primed to provide a continuous, dry paint film not less than 1 mil (0.025 mm) thick.

## PART 3 - EXECUTION

### 3.1 EXAMINATION

- A. Examine supporting substrates, embedded bearing plates, and abutting structural framing, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

### 3.2 INSTALLATION

- A. Do not install joists until supporting construction is in place and secured.
- B. Install joists and accessories plumb, square, and true to line; securely fasten to supporting construction according to SJI's "Specifications," joist manufacturer's written recommendations, and requirements in this Section.
  - 1. Before installation, splice joists delivered to Project site in more than one piece.
  - 2. Space, adjust, and align joists accurately in location before permanently fastening.
  - 3. Install temporary bracing and erection bridging, connections, and anchors to ensure that joists are stabilized during construction.
- C. Field weld joists to supporting steel bearing plates. Coordinate welding sequence and procedure with placement of joists. Comply with AWS requirements and procedures for welding, appearance and quality of welds, and methods used in correcting welding work.
- D. Bolt joists to supporting steel framework using carbon-steel bolts, unless otherwise indicated.
- E. Install and connect bridging concurrently with joist erection, before construction loads are applied. Anchor ends of bridging lines at top and bottom chords if terminating at walls or beams.

### 3.3 FIELD QUALITY CONTROL

- A. Testing Agency: Owner will engage a qualified independent testing and inspecting agency to inspect field welds and high-strength bolted connections.
- B. Field welds will be visually inspected according to AWS D1.1.
- C. In addition to visual inspection, field welds will be tested according to AWS D1.1 and the following procedures, as applicable:
  - 1. Radiographic Testing: ASTM E 94 and ASTM E 142.
  - 2. Magnetic Particle Inspection: ASTM E 709.
  - 3. Ultrasonic Testing: ASTM E 164.
  - 4. Liquid Penetrant Inspection: ASTM E 165.
- D. Bolted connections will be visually inspected.
- E. Correct deficiencies in Work that inspections and test reports have indicated are not in compliance with specified requirements.
- F. Additional testing will be performed to determine compliance of corrected Work with specified requirements.

### 3.4 REPAIRS AND PROTECTION

- A. Provide final protection and maintain conditions, in a manner acceptable to manufacturer and Installer, that ensure joists and accessories are without damage or deterioration at time of Substantial Completion.

20 Thames Street

END OF SECTION 05210



## SECTION 053100 - STEEL DECKING

### PART 1 - GENERAL

#### 1.1 SUMMARY

- A. This Section includes the following:
  - 1. Roof deck.
  - 2. Non-composite form deck.

#### 1.2 SUBMITTALS

- A. Product Data: For each type of deck, accessory, and product indicated.
- B. Shop Drawings: Show layout and types of deck panels, anchorage details, reinforcing channels, pans, cut deck openings, special jointing, accessories, and attachments to other construction.
- C. Product certificates.
- D. Welding certificates.
- E. Field quality-control test and inspection reports.
- F. Research/Evaluation Reports: For steel deck.

#### 1.3 QUALITY ASSURANCE

- A. Welding: Qualify procedures and personnel according to AWS D1.3, "Structural Welding Code - Sheet Steel."
- B. Fire-Test-Response Characteristics: Where indicated, provide steel deck units identical to those tested for fire resistance per ASTM E 119 by a testing and inspecting agency acceptable to authorities having jurisdiction.
  - 1. Fire-Resistance Ratings: Indicated by design designations of applicable testing and inspecting agency.
  - 2. Steel deck units shall be identified with appropriate markings of applicable testing and inspecting agency.
- C. AISI Specifications: Comply with calculated structural characteristics of steel deck according to AISI's "North American Specification for the Design of Cold-Formed Steel Structural Members."

#### 1.4 DELIVERY, STORAGE, AND HANDLING

- A. Protect steel deck from corrosion, deformation, and other damage during delivery, storage, and handling.
- B. Stack steel deck on platforms or pallets and slope to provide drainage. Protect with a waterproof covering and ventilate to avoid condensation.

### PART 2 - PRODUCTS

#### 2.1 MANUFACTURERS

- A. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
- B. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
  - 1. Canam Steel Corp.; The Canam Manac Group.
  - 2. Consolidated Systems, Inc.
  - 3. Epic Metals Corporation.
  - 4. Marlyn Steel Decks, Inc.
  - 5. New Millennium Building Systems, LLC.
  - 6. Nucor Corp.; Vulcraft Division.
  - 7. Roof Deck, Inc.
  - 8. United Steel Deck, Inc.
  - 9. Valley Joist; Division of EBSCO Industries, Inc.
  - 10. Verco Manufacturing Co.

#### 2.2 ROOF DECK

- A. Steel Roof Deck: Fabricate panels, without top-flange stiffening grooves, to comply with "SDI Specifications and Commentary for Steel Roof Deck," in SDI Publication No. 30, and with the following:
  - 1. Galvanized Steel Sheet: ASTM A 653/A 653M, Structural Steel (SS), Grade **33 (230)** zinc coating.
  - 2. Deck Profile: **As indicated.**
  - 3. Profile Depth: **As indicated.**
  - 4. Design Uncoated-Steel Thickness: **As indicated.**
  - 5. Span Condition: **Double span.**

#### 2.3 NONCOMPOSITE FORM DECK

- A. Noncomposite Steel Form Deck: Fabricate ribbed-steel sheet noncomposite form-deck panels to comply with "SDI Specifications and Commentary for Noncomposite Steel Form Deck," in SDI Publication No. 30, with the minimum section properties indicated, and with the following:
  - 1. Uncoated Steel Sheet: Structural Steel (SS), Grade **33 (230)** minimum.

2. Galvanized Steel Sheet: ASTM A 653/A 653M, Structural Steel (SS), Grade **33 (230)** zinc coating.
3. Profile Depth: As indicated.
4. Design Uncoated-Steel Thickness: As indicated.
5. Span Condition: **Double span.**

## 2.4 ACCESSORIES

- A. General: Provide manufacturer's standard accessory materials for deck that comply with requirements indicated.
- B. Mechanical Fasteners: Corrosion-resistant, low-velocity, power-actuated or pneumatically driven carbon-steel fasteners; or self-drilling, self-threading screws.
- C. Side-Lap Fasteners: Corrosion-resistant, hexagonal washer head; self-drilling, carbon-steel screws, **No. 10 (4.8-mm)** minimum diameter.
- D. Flexible Closure Strips: Vulcanized, closed-cell, synthetic rubber.
- E. Miscellaneous Sheet Metal Deck Accessories: Steel sheet, minimum yield strength of **33,000 psi (230 MPa)**, not less than **0.0359-inch (0.91-mm)** design uncoated thickness, of same material and finish as deck; of profile indicated or required for application.
- F. Repair Paint: Manufacturer's standard rust-inhibitive primer of same color as primer.

## PART 3 - EXECUTION

### 3.1 INSTALLATION

- A. Install deck panels and accessories according to applicable specifications and commentary in SDI Publication No. 30, manufacturer's written instructions, requirements in this Section, and as indicated.
- B. Place deck panels on supporting frame and adjust to final position with ends accurately aligned and bearing on supporting frame before being permanently fastened. Do not stretch or contract side-lap interlocks.
- C. Place deck panels flat and square and fasten to supporting frame without warp or deflection.
- D. Cut and neatly fit deck panels and accessories around openings and other work projecting through or adjacent to deck.
- E. Provide additional reinforcement and closure pieces at openings as required for strength, continuity of deck, and support of other work.
- F. Comply with AWS requirements and procedures for manual shielded metal arc welding, appearance and quality of welds, and methods used for correcting welding work.

- G. Mechanical fasteners may be used in lieu of welding to fasten deck. Locate mechanical fasteners and install according to deck manufacturer's written instructions.
- H. End Bearing: Install deck ends over supporting frame with a minimum end bearing of **1-1/2 inches (38 mm)**.
- I. Roof Sump Pans and Sump Plates: Install over openings provided in roof deck and [**weld**] flanges to top of deck. Space **welds** not more than **12 inches (305 mm)** apart with at least one **weld** at each corner.
  - 1. Install reinforcing channels or zees in ribs to span between supports and **weld**.
- J. Miscellaneous Roof-Deck Accessories: Install ridge and valley plates, finish strips, end closures, and reinforcing channels according to deck manufacturer's written instructions. **Weld** to substrate to provide a complete deck installation.
  - 1. Weld cover plates at changes in direction of roof-deck panels, unless otherwise indicated.
- K. Pour Stops and Girder Fillers: Weld steel sheet pour stops and girder fillers to supporting structure according to SDI recommendations, unless otherwise indicated.
- L. Floor-Deck Closures: Weld steel sheet column closures, cell closures, and Z-closures to deck, according to SDI recommendations, to provide tight-fitting closures at open ends of ribs and sides of deck.

### 3.2 FIELD QUALITY CONTROL

- A. Testing Agency: **Owner will engage** a qualified independent testing and inspecting agency to perform field tests and inspections and prepare test reports.
- B. Field welds will be subject to inspection.
- C. Testing agency will report inspection results promptly and in writing to Contractor and Architect.
- D. Remove and replace work that does not comply with specified requirements.
- E. Additional inspecting, at Contractor's expense, will be performed to determine compliance of corrected work with specified requirements.

### 3.3 REPAIRS

- A. Galvanizing Repairs: Prepare and repair damaged galvanized coatings on both surfaces of deck with galvanized repair paint according to ASTM A 780 and manufacturer's written instructions.

END OF SECTION 05310

**SECTION 05 41 00**

**LIGHTGAGE METAL FRAMING**

**PART 1 - GENERAL**

1.01 GENERAL REQUIREMENTS

- A. RELATED DOCUMENTS: Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification sections apply to work of this section.
- B. Examine all other sections of the Specifications for requirements which affect work of this Section whether or not such work is specifically mentioned in this Section.
- C. Coordinate work with that of all trades affecting or affected by work of this Section. Cooperate with such trades to assure the steady progress of all work under the Contract.

1.02 DESCRIPTION OF THE WORK

- A. Work specified within this Section includes, but is not necessarily limited to, the following:
  - 1. Provide and install lightgauge framing for interior and exterior walls, as shown on the Drawings.
  - 2. Provide and install lateral strap bracing, anchors and bridging as required.
  - 3. Provide and install miscellaneous fasteners, hat channels, stiffeners, expansion joints, and accessories necessary to complete the work.

1.03 RELATED WORK SPECIFIED ELSEWHERE

- A. Section 09 21 16 Gypsum Assemblies on Metal Framing
- B. Section 09 29 00 Gypsum Board

1.04 QUALITY ASSURANCE

- A. Materials and installation shall conform to recommendations of the following publications:
  - 1. American Iron and Steel Institute Cold-Formed Steel Design Manual, Parts I & II "Specification for the Design of Cold-Formed Steel Structural Members".
  - 2. AWS D1.1-90 "Structural Welding Code" - Steel.
  - 3. AWS D1.3-89 "Structural Welding Code" - Sheet Steel.

4. ASTM C 954, "Specification for Steel Drill Screws for the Application of Gypsumboard or Metal Plaster Bases to Steel Studs from 0.033 in. to 0.112 in. Thickness."
  5. ASTM C 955, "Specification for Load-Bearing (Transverse and Axial) Steel Studs, Runners (Tracks), and Bracing or Bridging, for Screw Application of Gypsum Board and Metal Plaster Bases.
  6. ASTM C 1007 "Specification for Installation of Load Bearing (Transverse and Axial) Steel Studs and Related Accessories."
  7. ASCE 7-98 "Minimum Design Loads for Building and Other Structures," (formerly ANSI A58.1).
- B. Slip Track Tolerances: Where non-bearing light gage framing abuts the structure, provide a slip joint capable of accommodating the vertical movement of the structure. Slip joint gaps shall allow for 1" Live Load deflection of the supporting member

#### 1.04 SUBMITTALS

- A. The Engineer shall receive all submittals a minimum of two weeks prior to the start of fabrication. The Contractor shall have reviewed and approved all submittals prior to review by the Engineer. All review of submittals by the Contractor, Architect and Engineer shall be completed prior to fabrication and installation of any material or product.

The Engineer's review of shop drawings will consist of a review of the design criteria and loads used for calculations and a review of the type and position of elements and connections to the Primary Structural System. Any errors in calculations, shop drawings and verification of field dimensions shall be the responsibility of the General Contractor.

- B. Product Data: Submit Manufacturer's specifications and installation instructions for the following products. Include laboratory test reports and other data to show compliance with specifications.
1. Steel Studs, tracks, cold rolled channels and hat channels.
  2. Anchors and anchor bolts
  3. Self drilling screws
- C. Shop Drawings:
1. General: Submit shop drawings showing the following:
    - a. Member type, gauge and spacing.
    - b. Sizes, gauges and fastenings for all built-up members including but not limited to roof trusses, headers and jambs.
    - c. Shop Coatings
    - d. Type, size, quantity, locations and spacing of all anchorages and self drilling screws.
    - e. Details of attachment to structure and adjacent work.

- f. Supplemental strapping, bracing, splices, bridging, hat channels and other accessories required for proper installation.
  - g. Critical installation procedures.
- D. Submit (3) reproductions of each shop drawing. Submit (2) copies of design calculations.

## PART 2 - PRODUCTS

### 2.01 FRAMING MEMBERS

#### A. Steel Studs:

1. Acceptable manufacturers:

EB Metal  
Dale/Incor  
Marino  
Dietrich  
Superior  
Ware

2. Provide channel-shaped studs, channel-shaped joists, runners (tracks), blocking, lintels, clip angles, shoes, reinforcements, stiffeners, fasteners, and other accessories recommended by manufacturer for complete framing system.
3. Steel framing materials (all gauges) shall comply with ASTM A 653. Fabricate all components from structural quality sheet steel with the following minimum yield points:

- A. Studs and truss components, 40,000 psi
- B. Bracing, bridging and blocking, 33,000 psi

4. Manufacture of studs, runners (track), and other framing members shall comply with ASTM C 955.
5. Framing components shall be galvanized per ASTM A 525, minimum G-60 coating.

#### B. Screws and other attachment devices:

1. Provide a protective coating equivalent to cadmium or zinc plating and comply with ASTM A 165 type NS.
2. Self-drilling screws shall comply with the Industrial Fastener Institute Standard for steel self-drilling and tapping screws (IFI-113).
3. Penetration through jointed materials shall not be less than three (3) exposed threads.

**PART 3 - EXECUTION**

3.01 INSTALLATION

- A. Product Storage: Store studs, trusses, joists, track etc. on a flat plane. Material damaged (i.e. rusted, dented, bent or twisted) shall be discarded. Protect adhesives and sealants from freezing.
- B. Construction Methods: Wall construction may be either piece-by-piece (stick-built), or by fabrication into panels either on or off site.
- C. Material Fit up: All framing components shall be cut squarely or at an angle to fit squarely against abutting members. Members shall be held firmly in position until properly fastened. Prefabricated panels, if used, shall be square and braced against racking.
- D. Attachment: Components shall be joined by self-drilling screws, so that connection meets or exceeds required design loads. Wire tying of framing components will not be permitted. Field welding will be permitted only where shown on the drawings or approved by the engineer.
- E. Anchorage to Structure: Securely anchor studs and track to floor construction and overhead structure. Provide slip joints where non-bearing vertical studs meet floor or roof structural steel, or as indicated on the drawings.
- F. Welding: Shop and field welds shall conform to applicable AWS and AISI standards, and may be fillet, plug, butt or seam type. Touch-up damage to galvanizing caused by welding with zinc-rich paint.
- G. Openings: Frame openings larger than 2 ft. square with double studs. Provide suitable reinforcements (double studs, headers, jack studs, cripples, bracing, etc.) at control joint intersections, corners, and other special conditions.
- H. Tolerances: Finished installation shall be level and plumb within a tolerance of 1/8 inch 10 feet horizontally and vertically. Maximum deviation from plan or section dimension shall not exceed 1/8 inch. Spacing of studs shall not be more than 1/8 inch from design spacing, providing that cumulative error does not exceed requirements of finishing materials.

**END OF SECTION**



**SECTION 05 50 00**

**METAL FABRICATIONS**

**1. GENERAL**

1.1 REFERENCES

- A. Drawings and general provisions of Contract, including General and Supplementary Conditions and Division 1 specifications, apply to work in this section.
- B. Rough Carpentry: Section 06 10 00
- C. Finish Carpentry: Section 06 20 00
- D. Roofing: Section 07 53 00
- E. Painting: Section 09 90 00
- F. American Society of Testing Materials (ASTM)
- G. Steel Structures Painting Council (SSPC)
- H. National Association of Architectural Metal Manufacturers (NAAMM)

1.2 DESCRIPTION OF WORK

- A. Extent of Metal Fabrications is shown on the drawings and railings, entry canopy and structural deck at entry.
- B. Elevator pit metal ladder.

1.3 QUALITY ASSURANCE

- A. Refer to Section 01 33 10, Products and Substitutions, for general provisions covering product selection, substitutions, material storage, and installation.
- B. Refer to Section 01 45 00, Quality Control Services, for provisions for testing and inspection.

1.4 SUBMITTALS

- A. Issue submittals in accordance with Section 01 33 00, Submittal Procedures.
- B. Submittals under this section include:
  - 1. Shop drawings showing details of fabrication, assembly, and installation showing all connections to other work.

## 20 THAMES STREET – PORTLAND, ME

2. Samples of materials and finished products as may be requested by the Architect.

## 2. PRODUCTS

### 2.1 MATERIALS

1. Railing assembly shall withstand a minimum concentrated load of 200 lbs. applied in any direction at any point on top rail. Intermediate rails, balusters, and panel fillers shall be designed for uniform load of not less than 25 lbs./sq. ft. over gross area of guard. Assembly shall comply with all provisions of the applicable Building Codes.
2. Accurately miter and cope intersections, and weld all around. Form rail-to-end post connections and changes in rail direction with mitered corners or radius bends, as detailed. Form elbow bends and wall returns to uniform radius, free from buckles and twists.
3. **ALUMINUM RAILING SYSTEMS: *EASY RAILINGS ALUMINUM DECK RAILING SYSTEMS – EASY 400 CONTEMPORARY CONTINUOUS TOP RAIL DESIGN*, WITH RAILS, DECK MOUNT POSTS AND FASCIA MOUNT POSTS, HORIZONTAL BARS. REFER TO PRODUCT PAGES: <https://easyrailings.com/easy400.html>**

## 3. EXECUTION

### 3.1 FABRICATION

#### A. GENERAL

1. Use materials of size and thickness shown, or if not shown, of required size, grade, and thickness to produce strength and durability in finished product.
2. Provide materials selected for their surface flatness, smoothness, and freedom from surface blemishes on exposed surfaces.
3. Form metalwork to required shapes and sizes, with true lines, curves and angles. Provide necessary rebates, lugs and brackets for assembly and installation. Use concealed fasteners wherever possible. Mill joints to tight hairline fit; cope or miter corners.
4. Welding:
  - a. Weld corners and seams continuously; grind exposed welds smooth and flush.
  - b. Welding Electrodes and Filler Metal: Type and alloy to match metal to be welded.
5. Anchors and Inserts: Furnish as required for installation in other work. Use copper, cadmium or galvanized anchors and inserts for exterior work.

## 20 THAMES STREET – PORTLAND, ME

6. Fasteners
  - a. Type and alloy to match metal to be fastened; use Phillips flat-head screws for exposed fasteners if not otherwise indicated.
  - b. Provide bolts, nuts, lag bolts, machine screws, wood screws, toggle bolts, masonry anchorage devices, lock washers as required for application indicated and complying with applicable Federal standards. Hot-dip galvanize fasteners for exterior applications to comply with ASTM A 153.
  
7. Shop Finishing
  - a. Comply with NAAMM "Metal Finishes Manual".
  - b. Apply shop primer to surface of metal fabrications except those embedded in concrete or galvanized; comply with SSPC-PA1.
  - c. Surface Preparation: Comply with SSPC-SP6 "Commercial Blast Cleaning" for exterior work, and with SSPC-SP3 "Power Tool Cleaning" for interior work.
  - d. Shop Primer: Fabricator's standard, fast-curing, lead-free, "universal" primer complying with performance requirements of FS TT-P-645.
  - e. Stripe paint edges, corners, crevices, bolts, welds and sharp edges.
  - f. Protect finished metal items.

### 3.2 INSTALLATION

- A. Perform cutting, drilling and fitting required for installation; set work accurately in location, alignment and elevation, measured from established lines and levels.
  
- B. Provide anchorage devices and fasteners where necessary for installation to other work.
  
- C. Repair or replace damaged items as directed by the Architect.
  
- D. Touch-up shop paint after installation. Clean field welds, bolted connections and abraded areas, and apply same type paint as used in shop.
  
- E. Restore damaged protective coverings after installation. Maintain until other work in same areas is completed. Remove protective coverings and clean exposed surfaces prior to final inspection.

**END OF SECTION**

**SECTION 06 16 43  
GYPSUM SHEATHING**

**PART 1 GENERAL**

**1.01 SUMMARY**

- A. Section Includes: Fiberglass-mat faced, moisture and mold resistant gypsum sheathing.
- B. Related Sections:
  - 1. Section 05 41 00 Metal Stud Framing.
  - 2. Section 06 10 00 Rough Carpentry.
  - 3. Section 09 21 16 Gypsum Board Assemblies.

**1.02 REFERENCES**

- A. ASTM International (ASTM):
  - 1. ASTM C473 Standard Test Methods for Physical Testing of Gypsum Panel Products.
  - 2. ASTM C518 Standard Test Method for Steady-State Thermal Transmission Properties by Means of the Heat Flow Meter Apparatus.
  - 3. ASTM C1002 Standard Specification for Steel Self-Piercing Tapping Screws for the Application of Gypsum Panel Products or Metal Plaster Bases to Wood Studs or Steel Studs.
  - 4. ASTM C1177 Standard Specification for Glass Mat Gypsum Substrate for Use as Sheathing.
  - 5. ASTM C1280 Standard Specification for Application of Gypsum Sheathing.
  - 6. ASTM D3273 Standard Test Method for Resistance to Growth of Mold on the Surface of Interior Coatings in an Environmental Chamber.
  - 7. ASTM D6329 Standard Guide for Developing Methodology for Evaluating the Ability of Indoor Materials to Support Microbial Growth Using Static Environmental Chambers.
  - 8. ASTM E72 Standard Test Methods of Conducting Strength Tests of Panels for Building Construction.
  - 9. ASTM E96 Standard Test Methods for Water Vapor Transmission of Materials.
  - 10. ASTM C1396 Standard Specification for Gypsum Board
  - 11. ASTM E 136 Standard Test Method for Behavior of Materials in a Vertical Tube Furnace at 750°C
  - 12. ASTM E 84 Standard Test Method for Surface Burning Characteristics of Building Materials
- B. Gypsum Association (GA): GA-253 Application of Gypsum Sheathing.

**1.03 SUBMITTALS**

- A. Product Data: Manufacturer's specifications and installation instructions for each product specified.

**1.04 WARRANTY**

- A. Provide products that offer twelve months of coverage against in-place exposure damage (delamination, deterioration and decay) commencing with the date of installation of the product in such structure.

## 20 THAMES STREET – PORTLAND, ME

- B. Manufacturer's Warranty:
  - 1. Five years against manufacturing defects from the date of purchase of the product for installation
  - 2. 12 years against manufacturing defects when used as a substrate in architecturally specified EIFS.

### PART 2 PRODUCTS

#### 2.01 MANUFACTURERS

- A. Georgia-Pacific Gypsum LLC:
  - 1. Fiberglass-Mat Faced Gypsum Sheathing: DensGlass Sheathing.
  - 2. Fiberglass-Mat Faced Gypsum Sheathing, Type X for Fire Rated Designs: DensGlass Fireguard Sheathing.

#### 2.02 MATERIALS

- A. Fiberglass-Mat Faced Gypsum Sheathing: ASTM C1177:
  - 1. Thickness: 1/2 inch.
  - 2. Width: 4 feet.
  - 3. Length: [8 feet] [9 feet] [10 feet].
  - 4. Weight: 1.9 lb/sq. ft.
  - 5. Edges: Square.
  - 6. Surfacing: Fiberglass mat on face, back, and long edges.
  - 7. Racking Strength (Ultimate, not design value) (ASTM E72): Not less than 540 pounds per square foot, dry.
  - 8. Flexural Strength, Parallel (ASTM C473): 80 lbf, parallel.
  - 9. Humidified Deflection (ASTM C1177): Not more than 2/8 inch.
  - 10. Permeance (ASTM E96): Not less than 23 perms.
  - 11. R-Value (ASTM C518): 0.56.
  - 12. Mold Resistance (ASTM D3273): 10, in a test as manufactured.
  - 13. Microbial Resistance (ASTM D6329, UL Environmental GREENGUARD 3-week protocol): Will not support microbial growth.
  - 14. Acceptable Products:
    - a. 1/2 inch DensGlass Sheathing, Georgia-Pacific Gypsum LLC.
- B. Fire-Rated Fiberglass-Mat Faced Gypsum Sheathing: ASTM C1177, Type X:
  - 1. Thickness: 5/8 inch.
  - 2. Width: 4 feet.
  - 3. Length: [8 feet] [9 feet] [10 feet].
  - 4. Weight: 2.5 lb/sq. ft.
  - 5. Edges: Square.
  - 6. Surfacing: Fiberglass mat on face, back, and long edges.
  - 7. Racking Strength (Ultimate, not design value) (ASTM E72): Not less than 654 pounds per square foot, dry.
  - 8. Flexural Strength, Parallel (ASTM C1177): 100 lbf, parallel.
  - 9. Humidified Deflection (ASTM C1177): Not more than 1/8 inch.

## **20 THAMES STREET – PORTLAND, ME**

10. Permeance (ASTM E96): Not less than 17 perms.
11. R-Value (ASTM C518): 0.67.
12. Mold Resistance (ASTM D3273): 10, in a test as manufactured.
13. Microbial Resistance (ASTM D6329, UL Environmental GREENGUARD 3-week protocol): Will not support microbial growth.
14. Acceptable Products:
  - a. 5/8 inch DensGlass Fireguard Sheathing, Georgia-Pacific Gypsum LLC.

### **2.03 ACCESSORIES**

- A. Screws: ASTM C1002, corrosion resistant treated.

## **PART 3 EXECUTION**

### **3.01 EXAMINATION**

- A. Verification of Conditions:
  1. Inspection: Verify that project conditions and substrates are acceptable, to the installer, to begin installation of work of this section.

### **3.02 INSTALLATION**

- A. General: In accordance with GA-253, ASTM C1280 and the manufacturer's recommendations.
  1. Manufacturer's Recommendations:
    - a. Current "Product Catalog", Georgia-Pacific Gypsum.

### **3.03 PROTECTION**

- A. Protect gypsum board installations from damage and deterioration until date of Substantial Completion.

**END OF SECTION**

SECTION 06200

FINISH CARPENTRY AND ARCHITECTURAL MILLWORK

**PART 1 GENERAL**

1.01 SUMMARY

A. Section Includes, Special Fabricated:

1. Wood Millwork
  - a. Interior Standing and Running Trim
  - b. Exterior Standing and Running Trim
2. Wood Shelving
3. Wood Casework
4. Exterior trim, frames and millwork
5. Interior trim, jambs and millwork
6. Interior stairwork
7. Interior architectural wall surfacing [Solid Wood, Veneered Paneling, Laminated Plastic, Solid Surface]
8. Wood or Plastic Laminated casework
9. Solid Surface or Wood countertops
10. Factory finishing
11. Hardware, typically furnished by the woodwork manufacturer

B. Related Sections:

1. Section 06 10 00 - Rough Carpentry
2. Section 09 26 00 - Gypsum Board Assemblies
3. Section 09 90 00 - Painting

1.02 REFERENCES

- A. DOC PS 1 "Construction and Industrial Plywood"
- B. DOC PS 20 "American Softwood Lumber Standard"
- C. ANSI/AF&PA NDS-2005: "National Design Specification (NDS) for Wood Construction".
- D. ANSI/HPVA HP-1: "American National Standard for Hardwood and Decorative Plywood"
- E. AWI Quality Standards

1.03 SUBMITTALS

- A. Submit "Letter of Conformance" in accordance with Section 01 33 00 with the following supporting data:

## 20 THAMES STREET – PORTLAND, ME

1. Submit Product Data and Shop Drawings indicating component profiles and fastening and joining details.
2. Samples for initial selection of the following in the form of manufacturer's color charts consisting of actual units or sections of units showing the full range of colors, textures, and patterns available for each type of material indicated.
3. Samples for verification of the following:
  - a. Lumber products with factory-applied finish, 50 sq. in. for lumber for each finish system and color.

### 1.04 QUALITY ASSURANCE

- A. Factory-mark each piece of lumber and plywood with type, grade, mill, and grading agency identification; except omit marking from surfaces to receive transparent finish, and submit mill certificate that material has been inspected and graded in accordance with requirements if it cannot be marked on a concealed surface.
- B. Perform finish carpentry work in accordance with AWI Quality Standards, Custom Grade.
- C. Lumber Siding Installer Qualifications: Engage an experienced Installer who has completed siding similar in material, design, and extent to that indicated for this Project and with a record of successful in-service performance.

### 1.05 DELIVERY, STORAGE, AND HANDLING

- A. Protect finish carpentry materials during transit, delivery, storage, and handling to prevent damage, soiling, and deterioration.
- B. Do not deliver finish carpentry materials, until painting, wet work, grinding, and similar operations which could damage, soil, or deteriorate woodwork have been completed in installation areas. If, due to unforeseen circumstances, finish carpentry materials must be stored in other than installation areas, store only in areas meeting requirements specified for installation areas.

### 1.06 PROJECT CONDITIONS

- A. Conditioning: Installer shall advise Contractor of temperature and humidity requirements for finish carpentry installation areas.
- B. Environmental Limitations: Do not deliver or install interior finish carpentry until building is enclosed and weatherproof, wet-work in space is completed and nominally dry, and HVAC system is operating and will maintain temperature and relative humidity at occupancy levels throughout the remainder of construction period.
  1. Maintain temperature and humidity in installation area as required to maintain moisture content of installed finish carpentry within a 1.0 percent tolerance of optimum moisture content, from date of installation through remainder of construction period. The fabricator of woodwork shall determine optimum moisture content and required temperature and humidity.
- C. Weather Limitations: Proceed with installing exterior finish carpentry only when existing and forecasted weather conditions will permit work to be performed according to manufacturer's recommendations and warranty requirements and at least one coat of specified finish to be applied without exposure to rain, snow, or dampness.



**PART 2 PRODUCTS**

2.01 MATERIALS, GENERAL

- A. This specification is based upon a custom cabinet installation. Please see alternative prefab cabinets 06 20 00-9.
- B. Lumber standards: Comply with DOC PS 20, "American Softwood Lumber Standard," for lumber and with applicable grading rules of inspection agencies certified by American Lumber Standards Committee Board of Review.
- C. Inspection Agencies: Inspection agencies, and the abbreviations used to reference them, include the following:
  - 1. NeLMA - Northeastern Lumber Manufacturers Association
  - 2. NLGA - National Lumber Grades Authority
  - 3. WCLIB - West Coast Lumber Inspection Bureau
  - 4. WWPA - Western Wood Products Association
- D. Grade Stamps: Provide lumber with each piece factory marked with grade stamp of inspection agency evidencing compliance with grading rule requirements and identifying grading agency, grade, species, moisture content at time of surfacing, and mill.
  - 1. For exposed lumber, furnish pieces with grade stamps applied to ends or back of each piece, or omit grade stamps entirely and provide certificates of grade compliance issued by inspection agency.
- E. Softwood Plywood: Comply with DOC PS 1, "U.S. Product Standard for Construction and Industrial Plywood."
- F. Hardwood Plywood: Comply with ANSI/HPVA HP-1, "Interim Voluntary Standard for Hardwood and Decorative Plywood."

2.02 INTERIOR STANDING AND RUNNING TRIM

- A. Hardwood Lumber: PS 58; Premium Grade in accordance with AWI; maximum moisture content of 15 percent.
  - 1. Stained Interior Wood Trim and Millwork: Species as shown below, solid lumber stock, sizes and shapes shown on Interior Design Drawings, of grain type sufficient to receive stained finish, smooth surfaced.
  - 2. Painted Interior Wood Trim and Millwork: Species as shown below, solid lumber stock, sizes and shapes shown on Drawings, of grain type sufficient to receive painted finish, smooth surfaced.
- B. Nominal sizes are indicated, except as shown by detailed dimensions. Provide dressed or worked and dressed lumber, as applicable, manufactured to the actual sizes as required by PS 20 or to actual sizes and patterns as shown, unless otherwise indicated.

## 20 THAMES STREET – PORTLAND, ME

### 2.03 FINISH CARPENTRY FABRICATION

- A. Wood Moisture Content: Comply with requirements of specified inspection agencies and manufacturer's recommendations for moisture content of finish carpentry on relative humidity conditions existing during time of fabrication and in installation areas.
- B. Fabricate finish carpentry to dimensions, profiles, and details indicated.
  - 1. Back out or kerf backs of the following members, except members with ends exposed in finished work:
    - a. Interior standing and running trim, except shoe mold and crown mold.
  - 2. Ease edges of lumber less than 1 inch in nominal thickness to 1/16 inch radius.

### 2.04 PLATFORM ACCESS DOOR HARDWARE

- 1. Top Knobs M580 Indent Knob ¾" Polished Chrome Finish
- 2. Self-Closing Concealed Hinges
- 3. Magnetic Catch

## PART 3 EXECUTION

### 3.01 EXAMINATION

- A. Examine substrates, with Installer present, for compliance with requirements for installation tolerance and other conditions affecting installation and performance of finish carpentry. Do not proceed with installation until unsatisfactory conditions have been corrected.

### 3.02 PREPARATION

- A. Clean substrates of projections and substances detrimental to application.
- B. Condition finish carpentry to average prevailing humidity conditions in installation areas before installation, for a minimum of 24 hours unless longer conditioning is recommended by manufacturer.
- C. Prime and backprime lumber for painted finish exposed on the exterior not indicated as factory prefinished. Comply with requirements for surface preparation and application in Division 09 Section "Painting."

### 3.03 INSTALLATION - GENERAL

- A. Discard units of material which are unsound, warped, bowed, twisted improperly treated, not adequately seasoned or too small to fabricate work with minimum of joints or optimum jointing arrangements. Do not use manufactured units with defective surfaces, sizes, or patterns.
- B. Install the work plumb, level, true, and straight with no distortions. Shim as required using concealed shims. Install to a tolerance of 1/8" in 8'-0" for plumb and level countertops; and with 1/16" maximum offset in flush adjoining 1/8" maximum offsets in revealed adjoining surfaces.
- C. Scribe and cut work to fit adjoining work, and refinish cut surfaces or repair damaged finish at cuts.

## 20 THAMES STREET – PORTLAND, ME

- D. Countersink nails, fill surface flush, and sand where face nailing is unavoidable.
- E. Install to tolerance of 1/8 inch in 96 inches for plumb and level. Install adjoining finish carpentry with 1/32 inch maximum offset for flush installation and 1/16 inch maximum offset for reveal installation.
- F. Coordinate finish carpentry with materials and systems in or adjacent to standing and running trim and rails. Provide cutouts for mechanical and electrical items that penetrate exposed surfaces of trim and rails.
- G. Finish according to specified requirements.
- H. Anchor finish carpentry work to anchorage devices or blocking built-in or directly attached to substrates. Secure to grounds, stripping and blocking with countersunk, concealed fasteners and blind nailing as required for a complete installation. Except where prefinished matching fastener heads are required, use fine finishing nails for exposed nailings, countersunk and filled flush with finished surface, and matching final finish where transparent is indicated.

### 3.04 WOOD STANDING AND RUNNING TRIM INSTALLATION

- A. Install with minimum number of joints practical, using full-length pieces from maximum lengths of lumber available. Do not use pieces less than 24 inches long, except where necessary. Stagger joints in adjacent and related standing and running trim. Cope at returns and miter at corners to produce tight-fitting joints with full-surface contact throughout length of joint. Use scarf joints for end-to-end joints. Plane backs of casings to provide uniform thickness across joints, if required.
  - 1. Match color and grain pattern across joints.
  - 2. Install trim after gypsum board joint finishing operations are completed.
  - 3. Drill pilot holes in hardwood before fastening to prevent spitting. Fasten to prevent movement or warping. Countersink fastener heads on exposed carpentry work and fill holes.
  - 4. Fit exterior joints to exclude water. Apply flat grain lumber with bark side exposed to weather.

### 3.05 ADJUSTMENT, CLEANING, FINISHING, AND PROTECTION

- A. Repair damaged and defective finish carpentry work wherever possible to eliminate defects functionally and visually; where not possible to repair properly, replace woodwork. Adjust joinery for uniform appearance.
- B. Clean finish carpentry work on exposed and semi-exposed surfaces. Touch-up factory-applied finishes to restore damaged or soiled areas.
- C. Preparation for Finishing: Sand work smooth and set all nails and screws. Apply wood filler in exposed nail and screw indentations.
- D. Cleaning: Keep premises in a neat, safe, and orderly condition at all times during execution of this portion of the work, free from the accumulation of sawdust, cut-ends, and debris.
- E. Refer to Division 09 sections for final finishing of installed finish carpentry work.

## 20 THAMES STREET – PORTLAND, ME

- F. Protection: Installer of finish carpentry work shall advise Contractor of final protection and maintained conditions necessary to ensure that work will be without damage or deterioration at time of acceptance.

### 3.06 GENERAL NOTES – CASEWORK AND MILLWORK:

#### A. GENERAL

1. Material and workmanship shall meet the requirements of “Premium Grade” quality standards of the Architectural Woodwork Institute, which is hereby made part of the specification.
2. All parts of cabinets shall be mortised and tenoned together, glued and nailed. Provide blocking as shown or required for rigidity.
3. Cabinetwork shall be constructed with plywood and hard wood as shown on the drawings.
4. Work shall be assembled and finished at the shop insofar as is practical and delivered ready for erection. When necessary to cut and fit on the job, the materials shall be made up with ample allowance for cutting.
5. Joints shall be made in an approved manner to conceal shrinkage.
6. Work shall be scribed and fitted to sheetrock or other finished surfaces in a careful manner.
7. Hardware for casework shall be provided and installed by the cabinetmaker and shall be as specified on the drawings and/or required for a complete installation. Submit catalogue cuts of all hardware for Architect’s approval prior to ordering.
8. All miscellaneous metal work and glass shown on the drawings shall be included in this contract. Contractor shall make all required submittals to the Architect for approval.
9. Finished goods and all components used in fabrication must meet all Industry Standards, Federal, State & Local regulations plus Ownership’s, Purchaser’s and Architect’s standards for quality, performance, and Life Safety. Purchaser to oversee the adherence to all standards.
10. Purchasing Agent to verify quantities prior to ordering.

#### B. SUBMITTALS

1. Manufacturer must provide the following for Architect’s review and approval prior to production:
  - a. Full shop drawings spelling out all details of construction and showing all points of design, construction and reinforcement
  - b. Samples of all finishes and materials used in construction
  - c. One Mock up & Full size sample required prior to production of quantity

#### C. MATERIALS/PRODUCTS

1. Finish wood, wood trim and plywood shall be the best of their respective grades, free from warp that cannot be corrected in the process of nailing, and all defects and imperfections affecting strength and durability. Moisture content shall not exceed 5%.

**20 THAMES STREET – PORTLAND, ME**

2. Premium Grade Hardwood
3. Premium Grade Veneer
4. All interior hardware (hinges, screws, bolts, etc.) shall be stainless steel.
5. Particle board shall be medium density conforming to C.S.236-66 (Type 1-B-2) in fire retardant grade where required, conforming to New York City Building Code Section C26-502.6.
6. Polyester resin shall be as manufactured by Titaine Co. Submit samples to Architect for review and approval.
7. Stainless steel shall be mirror polished 18 gauge or custom milled ¼" plate as shown on drawings.

**D. POLYESTER RESIN, PAINT AND TRANSPARENT FINISHES**

1. Finish interior woodwork shall be back painted in the field before installation.
2. Polyester resin finish shall be applied to dense particle board (fire retardant) as follows:
  - a. Apply two or three undercoats of high solids lacquer primer, and sand between coats.
  - b. Apply two or three coats of color lacquer. Note that color must be corrected to compensate for amber tint of polyester.
  - c. Scuff and sand lacquer. Apply one coat of polyester resin. Allow to cure 24 hours. Sand with orbital sander. Take care not to cut through polyester. Apply second coat of polyester, sand. Apply third coat of polyester; then cure at 125 degrees for 12 hours.
  - d. Sand successively with 400 grit-500-600 silicone carbide no-load paper. Polish to high luster using dry and liquid compounds.

***The above is for establishing a minimum quality standard, and the contractor should adhere to manufacturer's recommendations where they differ from or exceed the above. Polyester resin shall be as manufactured by Titaine Co.***

**E. PREPARATION**

1. Custom furniture Contractor must perform a thorough survey and is responsible for verifying all dimensions on site prior to quoting and fabrication, and advise Architect of any irregularities affecting the design intent.

**END OF SECTION**

**SECTION 07 11 13  
BITUMINOUS DAMPPROOFING**

**PART 1 - GENERAL**

**1.1 SUMMARY**

- A. Section Includes:
  - 1. Bituminous dampproofing on concrete foundation walls.

**1.2 RELATED REQUIREMENTS**

- A. Concrete: Section 03 00 00, CAST-IN-PLACE CONCRETE.

**1.3 APPLICABLE PUBLICATIONS**

- A. Comply with references to extent specified in this section.
- B. ASTM International (ASTM):
  - 1. C578-15 - Rigid, Cellular Polystyrene Thermal insulation.
  - 2. D226/D226M-09 - Asphalt-Saturated Organic Felt Used in Roofing and Waterproofing.
  - 3. D449/D449M-03(2014)e1 - Asphalt Used in Dampproofing and Waterproofing.
  - 4. D1227-13 - Emulsified Asphalt Used as a Protective Coating for Roofing.
  - 5. D6380/D6380M-03(2013)e1 - Asphalt Roll Roofing (Organic Felt).
  - 6. D6506-01(2009) - Asphalt Based Protection Board for Below-Grade Waterproofing.

**1.4 SUBMITTALS**

- A. Submittal Procedures: Section 01 33 23, SHOP DRAWINGS, PRODUCT DATA, AND SAMPLES.
- B. Manufacturer's Literature and Data:
  - 1. Description of each product.
  - 2. Application instructions.

**1.5 DELIVERY**

- A. Deliver products in manufacturer's original sealed packaging.
- B. Mark packaging, legibly. Indicate manufacturer's name or brand, type, color, production run number, and manufacture date.
- C. Before installation, return or dispose of products within distorted, damaged, or opened packaging.

**1.6 STORAGE AND HANDLING**

- A. Store products indoors in dry, weathertight // conditioned // facility.

- B. Protect products from damage during handling and construction operations.

**1.7 WARRANTY**

- A. Construction Warranty: FAR clause 52.246-21, "Warranty of Construction."

**PART 2 - PRODUCTS**

**2.1 SYSTEM PERFORMANCE**

- A. Control moisture migration through concrete or masonry exterior walls where no hydrostatic head occurs or is anticipated.

**2.2 PRODUCTS - GENERAL**

- A. Provide each product from one manufacturer and from one production run.
- B. Hot Applied Bituminous Dampproofing:
  - 1. Asphalt: ASTM D449/D449M, Type I.
- C. Cold Applied Bituminous Dampproofing:
  - 1. Asphalt: ASTM D1227, Type III (spray grade).

**2.3 ACCESSORIES**

- A. Asphalt Saturated Felt: ASTM D226/D226M, Type I, 7 kg (15 pound).
- B. Protection Course: // ASTM D6506, 3 mm (1/8 inch) thick, semirigid sheets of fiberglass or mineral-reinforced-asphaltic core, pressure laminated between two asphalt-saturated fibrous liners. // Smooth-surfaced roll roofing complying with ASTM D6380/D6380M, Class S, Type III. // Extruded-polystyrene board insulation, unfaced, ASTM C 578, Type X, 13 mm (1/2 inch) thick. //

**PART 3 - EXECUTION**

**3.1 PREPARATION**

- A. Examine and verify substrate suitability for product installation.
- B. Protect existing construction and completed work from damage.
- C. Clean substrates. Remove contaminants capable of affecting subsequently installed product's performance.
- D. Remove free water; surfaces may remain damp.

**3.2 INSTALLATION - GENERAL**

- A. Install products according to manufacturer's instructions // and approved submittal drawings //.

1. When manufacturer's instructions deviate from specifications, submit proposed resolution for Contracting Officer's Representative consideration.

**3.3 DAMPPROOFING INSTALLATION**

- A. Applications:
  1. Apply to surfaces where indicated on drawings.
- B. Apply dampproofing at 1 L/sq. m (2-1/2 gal. per 100 sq. ft.), minimum, each coat.
  1. Allow 24 hours drying time between coats.
- C. Adhere protection course to conceal // foundation // dampproofing before backfilling.

**3.4 PROTECTION**

- A. Protect dampproofing and protection course from construction operations.
- B. Repair damage.

- - E N D - -



SECTION 07 16 13

POLYMER MODIFIED CEMENT WATERPROOFING

PART 1 - GENERAL

1.1 SECTION INCLUDES

- A. *To be used at elevator pit.***

1.2 REFERENCES

- A. ASTM C 109 - Standard Test Method for Compressive Strength of Hydraulic Cement Mortars.
- B. ASTM C 348 - Standard Test Method for Flexural Strength of Hydraulic Cement Mortars.
- C. ASTM C 321 - Standard Test Method for Bond Strength of Chemical-Resistant Mortars.
- D. ASTM E 96 - Standard Test Method for Water Vapor Transmission of Materials.

1.3 SUBMITTALS

- A. General:  
Submit manufacturer's certification that proposed materials, details and systems as indicated and specified fully comply with manufacturer's details and specifications. If any portion of Contract Documents do not conform to manufacturer's standard recommendations, submit notification of portions of design that are at variance with manufacturer's specifications.
- B. Product Data:
  - 1. Submit manufacturer's descriptive literature and product specifications for each product.
  - 2. Submit laboratory tests or data that validate product compliance with the performance criteria specified.

1.4 QUALITY ASSURANCE

- A. Manufacturer Qualifications:
  - 1. Company specializing in manufacturing Products specified in this Section with minimum 10 years documented experience.
- B. Installer Qualifications:
  - 1. Acceptable to manufacturer with documented experience on at least 2 projects of similar nature in past 2 years and/or training provided by the product manufacturer.

**1.5 DELIVERY, STORAGE AND HANDLING**

- A. Deliver, store off the ground and covered, handle and protect products from moisture in accordance with manufacturer's instructions.
- B. Deliver materials in manufacturer's unopened containers, fully identified with brand, type, grade, class and all other qualifying information. Provide Material Safety Data Sheets for each product.
- C. Take necessary precautions to keep products clean, dry and free of damage.

**1.6 WARRANTY**

- A. Comply with provisions of Section 01 77 00.

**1.7 SYSTEM REQUIREMENTS**

- A. Coordinate waterproofing work with work of other trades.
- B. Provide materials and accessories in timely manner so as not to delay the Work.

**1.8 PROJECT CONDITIONS**

- A. Maintain surfaces to be waterproofed/lined and surrounding air temperature at not less than 40°F (5°C) for at least 48 hours before, during and after application of waterproofing.
- B. Do not apply materials to frozen or frost-filled surfaces.
- C. Exercise caution when temperatures exceed 86°F (30°C). It may be necessary to apply waterproofing/lining during times when the sun is not at its strongest (i.e. early morning, evening or night).

**PART 2 - PRODUCTS**

**2.1 MANUFACTURERS**

- A. Provide products of AQUAFIN, Inc. 505 Blue Ball Road, #160. Elkton, MD, 21921. Phone (800) 394-1410, or (410) 392-2300, Fax (410) 392-2324; e-mail [info@aquafin.net](mailto:info@aquafin.net) or equal.

**2.2 MATERIALS**

## 20 THAMES STREET – PORTLAND, ME

- A. Cementitious, 1-component, polymer enhanced, ready-mixed, efflorescence-free surface waterproofer/ liner with hydrophobic properties, that requires just the addition of water, resistant to water and moisture.
1. Product: AQUAFIN-1K
  2. Color: Gray
  3. Aggregate: Powder
  4. Compressive Strength:(ASTM C-109) 5000 psi (35 MPa) @ 28 days (gray)
  5. Flexural Strength: (ASTM C-348) 725 psi (5 MPa) @ 28 days (gray)
  6. Bond/Adhesion: (ASTM C-321) 220 psi (1.5 MPa)
  7. Vapor Permeability: (ASTM E-96) 17 US perms
  8. Microbiological growth: Not supported
  9. Potable water: (ANSI/NSF 61) Certification for potable water as per NSF 61
  10. Permeability (CRD C-48-73) Withstands 100 psi = 234 ft. 7 bar = 70 m) hydrostatic pressure at 1/10" (2.5 mm) thickness
- B. Water: Clean, clear, non alkaline and free of salts and other harmful elements; potable.

### 2.3 ACCESSORY MATERIALS

- A. Patching Compound: Pre-blended, cementitious repair mortar recommended or approved by waterproofing manufacturer for patching, honeycombs, seal strips (coves, reglets), etc.
1. Product: AQUAFIN MORTAR-LN
  2. Color: Gray
  3. Aggregate: Powder
  4. Compressive Strength: (ASTM C-109) 6000 psi (41.3 MPa) @ 28 days
  5. Flexural Strength: (ASTM C-348) 1160 psi (8.0 MPa) @ 28 days

## PART 3 - EXECUTION

### 3.1 EXAMINATION

- A. Examine substrates and adjoining construction, and conditions under which Work is to be installed. Do not proceed with Work until unsatisfactory conditions are corrected.
- B. Verify the following substrate conditions before application of waterproof lining:
1. That substrate condition is satisfactory and in accordance with manufacturer's instructions.
  2. That concrete surfaces have open pores and wood float finish on horizontal surfaces.
  3. That concrete surfaces are free of voids, spalled areas, loose aggregate and sharp protrusions, and with no coarse aggregate visible.
  4. That curing compounds or surface hardeners incompatible with waterproof lining have not been used on concrete.

### 3.2 PREPARATION

- A. Protect adjacent surfaces not designated to receive waterproof lining.
- B. Substrate preparation:
  - 1. Remove remaining concrete fins and projections, and general surface dirt.
  - 2. Remove grease, oil and other contaminants. Use high-pressure water blasting, wet or dry sand blasting, or other methods recommended by waterproofing manufacturer to produce surfaces suitable for application of waterproofing.
  - 3. Follow manufacturer's instructions to clean and prepare surfaces.
  - 4. Repair cracks, honeycombs, unsound concrete and weak mortar joints.
  - 5. Roughen form tie holes.
- C. Rinse surfaces to be lined/waterproofed several times so that the concrete is thoroughly saturated. Surfaces shall be moist but not wet when waterproofing system is applied. Remove any surface water on horizontal surfaces.

### 3.3 INSTALLATION

- A. Mix waterproof lining material in proportions recommended by manufacturer.
- B. Apply waterproof lining material in quantities as per manufacturer's specifications and recommendations.
- C. Cavity Fill:
  - 1. At cleaned and prepared faulty construction joints, cracks, form tie, nail and bug holes, fill voids with patching compound in mortar consistency flush to surface. Leave rough surface finish for subsequent waterproofing material to bond.
- D. Floor/wall and corner joints:
  - 1. Install (rounded) coves 2" x 2" (5 cm x 5 cm) with patching compound in mortar consistency. Leave rough surface finish for subsequent waterproof lining material to bond.
- E. Horizontal and vertical surfaces – Waterproofing (subject to hydrostatic pressure):
  - 1. Apply 1st coat of waterproof lining material at 50 mils (1.25 mm) thickness (120 SF/50 lb (11.2 m<sup>2</sup>/22.7 kg) bag). Apply by steel trowel or appropriate compressed-air spray equipment. Back-trowel application to uniform thickness if applied with spray equipment.
  - 2. Apply 2nd coat of waterproof lining material at 50 mils (1.25 mm) thickness (120 SF/50 lb (11.2 m<sup>2</sup>/22.7 kg) bag) after 1st coat has sufficiently hardened (approximately 2 to 4 hrs) to total 100 mils = 1/10" (2.5 mm) wet film thickness. Apply by steel trowel or appropriate air spray equipment. Surface finish shall be

troweled smooth, or dense, glazed appearance if sprayed, showing little indentations from air pressure (orange skin).

**3.4 CURING**

- A. Protect exposed waterproofed/lined surfaces from premature drying out with polyethylene sheeting. Do not use burlap as this may stain the white surface.
- B. Moisture cure exposed waterproofed/lined surfaces as per manufacturer's instructions.

**3.5 ACCEPTANCE**

- A. Remove left over materials and any foreign material resulting from the work from the site.
- B. Clean adjacent surfaces and materials.

**END OF SECTION**

SECTION 07 21 16

THERMAL AND ACOUSTIC INSULATION

**1 GENERAL**

- 1.1 GENERAL PROVISIONS: Drawings and general provisions of Contract, including General Conditions and Division 1 specifications, apply to work in this section.
- 1.2 DESCRIPTION OF WORK: The extent of work shall be as shown on Drawings and called for in these Specifications. Performance shall meet the requirements of the Specifications. The work covered by this section of Specifications consists of the following:
1. Installation of rigid insulation on inside foundation wall and sill sealer, where shown on Drawings.
  2. Installation of rigid insulation, fiberglass batts, and blown insulation and sound insulation in exterior walls, interior walls, ceilings and floors where shown on Drawings.
  3. Vapor barriers to be installed as shown.

**2 PRODUCTS**

- 2.1 SLAB AND FOUNDATION WALL INSULATION: sizes as shown on Drawings. Styrofoam square edge insulation by Dow Chemical, or approved equal.
- 2.2 SPRAY APPLIED INSULATION: Closed cell spray foam by Corbond or equal. *Refer to Spec Section 07 21 19.*
- 2.3 BATT INSULATION TYPE: Fiberglass by Owens-Corning- Fiberglass, or approved equal, 6" or 4" to suit wall thickness.
- 2.4 BLOWN INSULATION TYPE: Cellulose Blowing Insulation by National Fiber or equal. *Refer to Spec Section 07 21 26.*
- 2.5 MOISTURE PROTECTION: 8 mil. Polyester & vinyl composite Fiberwes 100, Clark/Hammerbean 781-461-1946
- 2.6 SEALANTS: *Refer to Spec Section 07 92 00.*
- 2.7 AIR INFILTRATION BARRIER: *Refer to Spec. Section 07 27 29*
- 2.8 RIGID BOARD INSULATION: sizes and locations as shown on Drawings. Styrofoam square edge insulation by Dow Chemical, or approved equal.

**3 EXECUTION**

- 3.1 RIGID INSULATION on foundation walls must extend to top of footing.

## **20 THAMES STREET – PORTLAND, ME**

3.2 RIGID INSULATION: At entry doors. Provide 4" rigid insulation under concrete slab, plan dimension's shown on drawings, at entry doors.

### **3.3 FIBERGLASS INSULATION**

A. Fiberglass batts in walls between floors shall be fluffed to full nominal depth. Secure wall batts at top of cavity with wire or nails into side of studs. Provide foam insulation in 3/4" or less gaps between frame and R.O. of openings. Insure that insulation is tight and full.

3.4 MOISTURE PROTECTION: A continuous 8-mil. polyethylene vapor barrier shall be installed on all exterior walls and ceilings stapled to hold fiberglass batts in place, as part of the work of this Section. Vapor barrier on walls shall be 8' wide to minimize horizontal joints. All joints in vapor barrier shall be taped, and all vapor barrier free edges shall be taped to substrate. Minimum lap at joints to be 8" including lap at wall/ceiling (cap 8" each surface).

### **3.5 AIR INFILTRATION BARRIER:**

A. Apply to outside face of wall sheathing according to manufacturer's procedures, with imprint facing outward. Staple at 30" + and maintain overlap of six inches (6") at all joints.

B. If material is degraded by sunlight (verify with manufacturer), do not store outside. Cover with siding as soon as possible and within manufacturer's recommended time period.

**END OF SECTION**

SECTION 07 21 19

MOISTURE AND THERMAL PROTECTION  
SPRAY FOAM INSULATION

CORBOND® III *Performance Insulation System*®

All spray applied insulation as shown on drawings or Specified herein shall be the **CORBOND** Performance Insulation System® as manufactured by Corbond Corporation of Bozeman, Montana OR EQUAL.

**CORBOND** shall be installed by technicians in accordance with manufacturer's instructions.

**I. GENERAL**

**A. Related documents:** The general provisions of the contract and all codes and standards referenced.

**B. Description of the Work:**

1. The extent of **CORBOND** insulation is shown on the drawings.
2. The applications of **CORBOND** include the following:
  - a. Rigid spray-in-place perimeter floor header (box sill, rim joist) insulation. Provide minimum R-Value of 21 at all exterior wall applications. (Thermal barrier requirement exception at floor header for class 1, 1.5 – 2.0 lb. spray foam when applied at 3.25 thickness or less per IBC/IRC).
3. **Related Work:**
  - a. Gypsum Drywall System: Division 9 (09 29 00).
4. **Quality assurance:**
  - a. Thermal Conductivity:  $K = .15$  (ASTM-C-518).
  - b. R-Factor = 6.6 per inch.
  - c. Density = 2.0 lbs/cu ft. in-place (ASTM D-1622).
  - d. Permeance = .90 at 2.5 inch thickness (ASTM-E-96).
  - e. Surface Burning Characteristics: Class I (ASTM-E-84-91a) \*\*Flame Spread <25, Smoke Density <450. (1.5 inch, 4inch, 6inch)
  - f. Recognizable lavender trademark color.
5. **Product handling:**
  - a. Do not store containers in direct sunlight. Keep drums covered. Empty container disposal by technicians in accordance with current law and industry standard practice.
  - b. Store raw materials at 60° F to 70° F.
  - c. Fire hazard class of raw material stored on site: Combustible liquid, Class 3B.
  - d. Transportation Class 55, NOIBN, Non-Hazardous
  - e. WARNING: Breathing hazard during application of insulation materials. Do not enter without proper respiratory protection. No smoking or open flame.
  - f. Process materials in accordance with **CORBOND** published Technical Data.



**6. Job Conditions:**

- a. Examination of substrate: Technicians will examine the substrate and conditions under which the spray insulation work is to be performed, and notify the contractor in writing of any unsatisfactory conditions, such as: 1. Excessive dirt or oil on substrate. 2. Excessive moisture present as dampness, dew, frost or water. 3. Substrate temperatures outside applicable limits.
- b. Cover tools and work of other trades as required to prevent damage from overspray.
- c. Do not weld or torch near **CORBOND**. Cover as soon as possible with subsequent work.

**II. PRODUCTS**

**A. Materials:**

1. Wall insulation: **CORBOND** Performance Insulation System® installed to thickness required to provide R-Value of 21.

**III. EXECUTION**

**A. Installation:**

Installation of the **CORBOND** Performance Insulation System® is performed by technicians familiar with the processing of two component polyurethane foams and in complete accord with application instructions provided by the manufacturer. These technicians employ equipment with preset component ratio and electronically controlled heat input to assure in-place consistency of finished product and performance. Contact **CORBOND** Corporation, Bozeman, Montana, (888) 949-9089 or direct at (406) 586-4585.

**IV. PROTECTION**

All plastic insulation (including but not limited to polyurethane spray foam) shall be separated from the interior of the building by an approved thermal barrier of 1/2 -inch gypsum wallboard or equivalent thermal barrier material as approved by Maine State Fire Marshall.

**END OF SECTION**

SECTION 07 21 26

CELLULOSE INSULATION

1. General

- I. This specification provides information regarding the pneumatic application of Cel-Pak cellulose insulation in floors, walls, ceilings and attics. Cel-Pak cellulose insulation provides superior R-Value (resistance to heat flow) for thermal applications, sound control for acoustical treatments, and fire control in floors, walls, ceilings and attics of residential and commercial construction.

2. Materials

- I. **Cellulose Insulation.** Cel-Pak cellulose insulation is manufactured from recycled paper. Each pound of Cel-Pak insulation contains at least 83% paper fiber content. The fibers are treated with boric acid to create permanent flame resistance. The additives are mold-resistant, non-toxic, non-corrosive, will not irritate skin, will not outgas harmful chemicals, will not attract vermin or insects and will not adversely affect other building materials.
- II. **Thermal Performance.** Cel-Pak cellulose insulation resists the flow of heat. Conductive heat transfer is limited as indicated by its R-Value of 3.8 per inch. Air infiltration through the material is limited because of the density of the material and methods used to install it.
- III. **Sound Control.** These same characteristics, particularly the density of the material when installed in walls and floors, also provide significant airborne noise reduction in walls and between floors.
- IV. **Fire Resistance.** Cel-Pak cellulose insulation adds fire resistance to building assemblies, is a code approved ignition barrier over spray foam, and a code recognized fire block.
- V. **Standards.** Cel-Pak conforms to the CPSC standard 16 CFR Parts 1209 and 1404. In addition, Cel-Pak cellulose insulation meets all of the testing requirements of ASTM C-739, E-84 and E-119, and UL-723.
- VI. **Material Characteristics.** The following properties were tested by Underwriters Laboratories (R-8078):
- VII. **Settled Density.** The maximum density after long-term settling in a loose filled, dry attic application: 1.6 lbs/cuft.
- VIII. **Thermal Resistance.** The average thermal resistance per inch: 3.8 (R-Value/in).
- IX. **Flammability Characteristics.** Critical Radiant Flux: greater than or equal to 0.12 watts/cm<sup>2</sup>. Smoldering Combustion: less than or equal to 15%.
- X. **Moisture Vapor Sorption.** This requirement assures that normal variations in relative humidity will not adversely affect thermal resistance. Cel-Pak cellulose insulation meets the requirements of less than 15% for maximum weight gain under the specified test conditions.
- XI. **Environmental Characteristics.** When in contact with steel, copper, aluminum, or galvanized materials, Cel-Pak cellulose insulation is non-corrosive. Cel-Pak cellulose insulation passes all required tests demonstrating that it does not support fungal growth.
- XII. **Surface Burning Characteristics.** Cel-Pak insulation was tested by Underwriters Laboratories (R-13173) for the following properties:
- XIII. Flame Spread: 20

- XIV. Smoke Developed: 0
- XV. **Sound Transmission Classification.** Numerous wood and steel stud wall assemblies insulated with Cel-Pak insulation, including firewall assemblies, have been tested according to ASTM E-90 and E-413 by Riverbank Acoustical Laboratories for STC ratings. Results are available upon request.
- XVI. **Building Codes.** Properly installed Cel-Pak cellulose insulation meets the requirements for thermal insulating materials set forth in the IBC, CABO, BOCA, ICBO, SBCCI and the Model Energy Code.

### 3. Execution

- I. **Installation.** Cel-Pak Insulation is pneumatically blown, dry, into attic, wall and floor assemblies after all mechanical, plumbing and electrical and other utility installations have been completed. Coverage charts are available upon request.
- II. For loose fill cellulose applications, air seal all penetrations through the ceiling including plumbing, wiring, seams between top plate and drywall and all other gaps or holes, with the appropriate air sealing materials. Chimney and flue penetrations shall be air sealed with metal flashing and high temperature silicone sealants and a non-combustible insulation dam installed of sufficient distance and height to meet the code clearance to combustibles requirements. Install loose fill cellulose insulation in accordance with the manufacturer's instructions to settled thickness, or settled R-value, as indicated on the drawings.
- III. In open cavity applications that will later be covered with drywall (wall / roof / floor / ceiling), Insulweb is stapled to the face of the interior framing prior to cellulose installation. Install cellulose insulation using the tube insertion or 'dense pack' method in accordance with the manufacturer's instructions to provide a minimum installed density of 3.5 pcf (lbs/cuft). After cellulose injection, the Insulweb is rolled flat to allow for drywall application. For durability, drywall shall be installed as soon as possible over the Insulweb in any inhabited areas or where the possibility for damage exists from poking or tearing. In overhead areas, Insulweb should always be covered with drywall as soon as possible, to prevent the fabric from stretching over time.
- IV. **Certification and Equipment:** Installations will be made only by National Fiber Cel-Pak certified contractors using approved application methods and equipment capable of blower pressures of 3.5 psi or greater at the outlet of the blowing machine, with the agitator running. If you have any questions, please contact our Technical Manager, Bill Hulstrunk at [technical@nationalfiber.com](mailto:technical@nationalfiber.com).

END OF SECTION

**SECTION 07 24 00**  
**OUTSULATION® PLUS MD SYSTEM**  
**EXTERIOR INSULATION AND FINISH SYSTEM CLASS PB**

**PART I GENERAL**

**1.01 SUMMARY**

- A. This document is to be used in preparing specifications for projects utilizing the Dryvit Outsulation Plus MD System. For complete product description and usage refer to:
1. Dryvit Outsulation Plus MD System Data Sheet, DS445.
  2. Dryvit Outsulation Plus MD System Application Instructions, DS218.
  3. Dryvit Outsulation Plus MD System Installation Details, DS110.
- B. Related Sections
1. Unit Masonry – Section 04200
  2. Concrete – Sections 03300 and 03400
  3. Light Gauge Cold Formed Steel Framing – Section 05400
  4. Wood Framing – Section 06100
  5. Sealant – Section 07900
  6. Flashing – Section 07600

**1.02 REFERENCES**

- A. Section Includes
1. ASTM B 117 (Federal Test Standard 141A Method 6061) Standard Practice for Operating Salt Spray (Fog) Apparatus
  2. ASTM C 150 Standard Specification for Portland Cement
  3. ASTM C 297 Standard Test Method for Flatwise Tensile Strength of Sandwich Constructions
  4. ASTM C 1177 Standard Specification for Glass Mat Gypsum Substrate for Use as Sheathing
  5. ASTM C 1396 (formerly C 79) Standard Specification for Gypsum Board
  6. ASTM D 968 (Federal Test Standard 141A Method 6191) Standard Test Methods for Abrasion Resistance of Organic Coatings by Falling Abrasive
  7. ASTM D 2247 (Federal Test Standard 141A Method 6201) Standard Practice for Testing Water Resistance of Coatings in 100% Relative Humidity
  8. ASTM D 2898 Standard Test Method for Accelerated Weathering of Fire-Retardant-Treated Wood for Fire Testing
  9. ASTM D 3273 Standard Test Method for Resistance to Growth of Mold on the Surface of Interior Coatings in an Environmental Chamber
  10. ASTM D 4060 Standard Test Method for Abrasion Resistance of Organic Coatings by the Taber Abraser
  11. ASTM E 84 Standard Test Method for Surface Burning Characteristics of Building Materials
  12. ASTM E 96 Standard Test Methods for Water Vapor Transmission of Materials
  13. ASTM E 119 Standard Method for Fire Tests of Building Construction and Materials
  14. ASTM E 283 Standard Test Method for Determining Rate of Air Leakage Through Exterior Windows, Curtain Walls and Doors Under Specified Pressure Differences Across the Specimen
  15. ASTM E 330 Test Method for Structural Performance of Exterior Windows, Doors and Curtain Walls by Uniform Static Air Pressure Difference
  16. ASTM E 331 Test Method for Water Penetration of Exterior Windows, Skylights, Doors and Curtain Walls by Uniform Static Air Pressure Difference
  17. ASTM E 2098 Test Method for Determining the Tensile Breaking Strength of Glass Fiber Reinforcing Mesh for use in Class PB Exterior Insulation and Finish Systems (EIFS), after Exposure to Sodium Hydroxide Solution
  18. ASTM E 2134 Test Method for Evaluating the Tensile-Adhesion Performance of Exterior Insulation and Finish Systems (EIFS)
  19. ASTM E 2178 Standard Test Method for Air Permeance of Building Materials
  20. ASTM E 2273 Test Method for Determining the Drainage Efficiency of Exterior Insulation and Finish Systems (EIFS) Clad Wall Assemblies
  21. ASTM E 2357 Standard Test Method for Determining Air Leakage of Air Barrier Assemblies
  22. ASTM E 2430 Standard Specification for Expanded Polystyrene (EPS) Thermal Insulation Boards for use in Exterior Insulation and Finish Systems (EIFS)
  23. ASTM E 2485 (formerly EIMA Std. 101.01) Standard Test Method for Freeze-Thaw Resistance of Exterior Insulation and Finish Systems (EIFS) and Water-Resistive Barrier Coatings

## 20 THAMES STREET – PORTLAND, ME

24. ASTM E 2486 (formerly EIMA Std. 101.86) Standard Test Method for Impact Resistance of Class PB and PI Exterior Insulation and Finish Systems (EIFS)
25. ASTM G 155 (Federal Test Standard 141A Method 6151) Standard Practice for Operating-Xenon Arc Light Apparatus for Exposure of Nonmetallic Materials
26. DS131, Dryvit Expanded Polystyrene Insulation Board Specification
27. DS151, Custom Brick™ Polymer System Specifications for Use On Vertical Walls
28. DS152, Dryvit Cleaning and Recoating
29. DS153, Dryvit Expansion Joints and Sealants
30. DS159, Dryvit Water Vapor Transmission
31. DS456, Rapidry DM™ 35-50 or DS457, Rapidry DM™ 50-75 Data Sheets
32. DS494, Dryvit AquaFlash® System
33. DS704, Backstop® DMS
34. DS705, Reflectit™
35. DS706, Mojave E™ Finish
36. Mil Std E5272 Environmental Testing
37. Mil Std 810B Environmental Test Methods
38. NFPA 268 Standard Test Method for Determining Ignitibility of Exterior Wall Assemblies Using a Radiant Heat Energy Source.
39. NFPA 285 Standard Method of Test for the Evaluation of Flammability Characteristics of Exterior Non-Load-Bearing Wall Assemblies Containing Combustible Components Using the Intermediate-Scale, Multistory Test Apparatus
40. ANSI FM 4880 Evaluating Insulated Wall or Wall and Roof/Ceiling Assemblies; Plastic Interior Finish Materials; Plastic Exterior Building Panels; Wall/Ceiling Coating Systems; Interior or Exterior Finish Systems

### 1.03 DEFINITIONS

- A. Base Coat: Material used to encapsulate one or more layers of reinforcing mesh fully embedded that is applied to the outside surface of the EPS.
- B. Building Expansion Joint: A joint through the entire building structure designed to accommodate structural movement.
- C. Contractor: The contractor that installs the Outsulation Plus MD System to the substrate.
- D. Dryvit: Dryvit Systems, Inc., the manufacturer of the Outsulation Plus MD System, a Rhode Island corporation.
- E. Expansion Joint: A structural discontinuity in the Outsulation Plus MD System.
- F. Finish: An acrylic-based coating, available in a variety of textures and colors that is applied over the base coat.
- G. Insulation Board: Expanded polystyrene (EPS) insulation board, which is affixed to the substrate.
- H. Panel Erector: The contractor who installs the panelized Outsulation Plus MD System.
- I. Panel Fabricator: The contractor who fabricates the panelized Outsulation Plus MD System.
- J. Reinforcing Mesh: Glass fiber mesh(es) used to reinforce the base coat and to provide impact resistance.
- K. Sheathing: A substrate in sheet form.
- L. Substrate: The material to which the Outsulation Plus MD System is affixed.
- M. Substrate System: The total wall assembly including the attached substrate to which the Outsulation Plus MD System is affixed.

### 1.04 SYSTEM DESCRIPTION

- A. General: The Dryvit Outsulation Plus MD System is an Exterior Insulation and Finish System (EIFS), Class PB, consisting of a water-resistive barrier coating (air/water-resistive barrier), an adhesive, expanded polystyrene insulation board, base coat, reinforcing mesh(es) and finish.
- B. Methods of Installation:
  1. Field Applied: The Outsulation Plus MD System is applied to the substrate system in place.
  2. Panelized: The Outsulation Plus MD System is shop-applied to the prefabricated wall panels.
- C. Design Requirements:
  1. Acceptable substrates for the Outsulation Plus MD System shall be:
    - a. Exterior grade gypsum sheathing meeting ASTM C 1396 (formerly C 79) requirements for water resistant core or Type X core at the time of application of the Outsulation Plus MD System.
    - b. Exterior sheathing having a water-resistant core with fiberglass mat facers meeting ASTM C 1177.
    - c. Exterior fiber reinforced cement or calcium silicate boards.

**20 THAMES STREET – PORTLAND, ME**

- d. APA Exterior or Exposure 1 Rated Plywood, Grade C-D or better, nominal 12.7 mm (1/2 in) minimum 4-ply.
- e. Exterior grade fire retardant treated (FRT) plywood.
- f. APA Exposure 1 Rated Oriented Strand Board (OSB) nominal 11.1 mm (7/16 in) minimum
- g. Unglazed brick, cement plaster, concrete or masonry.
- 2. Deflection of the substrate systems shall not exceed 1/240 times the span.
- 3. The substrate shall be flat within 6.4 mm (1/4 in) in a 1.2 m (4 ft) radius.
- 4. The slope of inclined surfaces shall not be less than 6:12, and the length shall not exceed 305 mm (12 in).
- 5. All areas requiring an impact resistance classification higher than "standard", as defined by ASTM E 2486 (formerly EIMA Standard 101.86), shall be as detailed in the drawings and described in the contract documents. Refer to Section 1.04.D.1.d of this specification.
- 6. Expansion Joints:
  - a. Design and location of expansion joints in the Outsulation Plus MD System is the responsibility of the project designer and shall be noted on the project drawings. As a minimum, expansion joints shall be placed at the following locations:
    - 1) Where expansion joints occur in the substrate system.
    - 2) Where building expansion joints occur.
    - 3) At floor lines in wood frame construction.
    - 4) At floor lines of non-wood framed buildings where significant movement is expected.
    - 5) Where the Outsulation Plus MD System abuts dissimilar materials.
    - 6) Where the substrate type changes.
    - 7) Where prefabricated panels abut one another.
    - 8) In continuous elevations at intervals not exceeding 23 m (75 ft).
    - 9) Where significant structural movement occurs, such as changes in roof line, building shape or structural system.
- 7. Terminations:
  - a. Prior to applying the Dryvit Outsulation Plus MD System, wall openings shall be treated with Dryvit AquaFlash System or Flashing Tape. Refer to Dryvit Outsulation Plus MD Installation Details (DS110).
  - b. The Outsulation Plus MD System shall be held back from adjoining materials around openings and penetrations such as windows, doors, and mechanical equipment a minimum of 19 mm (3/4 in) for sealant application. See Dryvit's Outsulation Plus MD System Installation Details, DS110.
  - c. The system shall be terminated a minimum of 203 mm (8 in) above finished grade.
  - d. Sealants
    - 1) Shall be manufactured and supplied by others.
    - 2) Shall be compatible with the Outsulation Plus MD System materials. Refer to current Dryvit Publication DS153 for listing of sealants tested by sealant manufacturer for compatibility.
    - 3) The sealant backer rod shall be closed cell.
- 8. Vapor Retarders: The use and location of vapor retarders within a wall assembly is the responsibility of the project designer and shall comply with local building code requirements. The type and location shall be noted on the project drawings and specifications. Vapor retarders may be inappropriate in certain climates and can result in condensation within the wall assembly. Refer to Dryvit Publication DS159 for additional information.
- 9. Dark Colors: The use of dark colors must be considered in relation to wall surface temperature as a function of local climatic conditions. Use of dark colors in high temperature climates can affect the performance of the system.
- 10. Flashing: Shall be provided at all roof-wall intersections, windows, doors, chimneys, decks, balconies and other areas as necessary to prevent water from entering behind the Outsulation Plus MD System.

**D. Performance Requirements:**

- 1. The Outsulation Plus MD System shall have been tested as follows:
  - a. Air/Water-Resistive Barrier Coating

TEST	TEST METHOD	CRITERIA	
<b>Tensile Bond</b>	ASTM C 297/E 2134 ICC ES (AC 212)*	Minimum 104 kPa (15 psi)	07 24 00-3
Exterior Insulation and Finish			

20 THAMES STREET – PORTLAND, ME

	ASTM E 2485/ICC-ES Proc. ICC ES (AC 212)*	No deleterious effects after 10 cycles	
	ASTM D 2247 ICC ES (AC 212)*	No deleterious effects after 14 days exposure <sup>1</sup>	
	ASTM E 96 Proc. B ICC ES (AC 212)*	Vapor Permeable	
	ASTM E 283	No ICC or ANSI/EIMA Criteria	
	ASTM E 2178	No ICC or ANSI/EIMA Criteria	
	ASTM E 2357	No ICC or ANSI/EIMA Criteria	
	ASTM E 1233 Proc. A ICC ES (AC 212)*	Minimum 10 positive cycles at 1/240 deflection; No cracking in field, at joints or interface with flashing	
	ASTM E 72 ICC ES (AC 212)*	No cracking in field, at joints or interface with flashing at net deflection of 3.2 mm (1/8 inch)	
	ICC-ES Procedure ICC ES (AC 212)*	5 cycles; No cracking in field, at joints or interface with flashing	
	ASTM E331 ICC ES (AC 212)*	No water penetration beyond the inner-most plane of the wall after 15 minutes at 137 Pa (2.86 psf)	
<b>Hydrostatic Pressure Test</b>	ICC ES Proc. ICC ES (AC212)*	210 hours of exposure	Passed
	ICC ES Proc. ICC ES (AC212)*	25 cycles of wetting and drying	
	AATCC 127 ICC ES (AC212)*	ICC: 549 mm (21.6 in) water column for 5 hours	
<b>Surface Burning Characteristics</b>	ASTM E 84	Flame Spread < 25 Smoke Developed < 450	Passed
<p>* (AC212 – Acceptance Criteria for Water-Resistive Coatings Used as Water-Resistive Barriers over Exterior Sheathing, also referred to as ASTM E 2570</p> <p>1. No cracking, checking, rusting, crazing, erosion, blistering, peeling, or delamination when viewed under 5x magnification</p> <p>2. Defined as a Class III vapor retarder per the 2009 IBC and IRC</p>			

20 THAMES STREET – PORTLAND, ME

b. Durability

TEST	TEST METHOD	CRITERIA	
<b>Abrasion Resistance</b>	ASTM D 968	No deleterious effects after 500 liters (528 quarts)	
<b>Accelerated Weathering</b>	ASTM G 155 Cycle 1	No deleterious effects after 2000 hours	
	ASTM G 154 Cycle 1 (QUV)		
<b>Freeze-Thaw</b>	ASTM E 2485 (formerly EIMA 101.01)	No deleterious effects after 60 cycles	
	ASTM C 67 modified	No deleterious effects after 60 cycles	
	ASTM E 2485/ICC-ES Proc. ICC ES (AC235)***	No deleterious effects after 10 cycles	
<b>Mildew Resistance</b>	ASTM D 3273	No growth during 28 day exposure period	
<b>Water Resistance</b>	ASTM D 2247	No deleterious effects after 14 days exposure	
<b>Taber Abrasion</b>	ASTM D 4060	N/A	
<b>Salt Spray Resistance</b>	ASTM B 117	No deleterious effects after 300 hours exposure	
<b>Water Penetration</b>	ASTM E 331 ICC ES (AC 235)***	No water penetration beyond the inner-most plane of the wall after 15 minutes at 137 Pa (2.86 psf)	
<b>Water Vapor Transmission</b>	ASTM E 96 Procedure B	Vapor permeable	40 Perms
<b>Drainage Efficiency</b>	ASTM E 2273 ICC ES (AC 235)***	Minimum Drainage Efficiency of 90%	

\* Base Coat perm value based on Dryvit Genesis®  
 \*\* Finish perm value based on Dryvit Quarzputz  
 \*\*\* AC 235 – Acceptance Criteria for EIFS Clad Drainage Wall Assemblies

c. Structural

TEST	TEST METHOD	CRITERIA	
<b>Tensile Bond</b>	ASTM C 297/E 2134	Minimum 104 kPa (15 psi) – substrate or insulation failure	
<b>Transverse Wind Load</b>	ASTM E 330	Withstand positive and negative wind loads as specified by the building code	

\* All Dryvit components remain intact – for higher wind loads contact Dryvit Systems, Inc.

d. Impact Resistance: In accordance with ASTM E 2486 (formerly EIMA Standard 101.86):

Reinforcing Mesh <sup>1</sup> /Weight g/m <sup>2</sup> (oz/yd <sup>2</sup> )	Minimum Tensile Strengths	EIMA Impact Classification	EIMA Impact Range Joules (in-lbs)		Impact Test Results Joules (in-lbs)	
Standard - 146 (4.3)	27 g/cm (150 lbs/in)	Standard	3-6	(25-49)	4	(36)
Standard Plus™ - 203 (6)	36 g/cm (200 lbs/in).	Medium	6-10	(50-89)	6	(56)
Intermediate® - 407 (12)	54 g/cm (300 lbs/in).	High	10-17	(90-150)	12	(108)
Panzer® 15* - 509 (15)	71 g/cm (400 lbs/in).	Ultra High	>17	(>150)	18	(162)
Panzer 20* - 695 (20.5)	98 g/cm (550 lbs/in).	Ultra High	>17	(>150)	40	(352)
Detail® Short Rolls - 146 (4.3)	27 g/cm (150 lbs/in).	n/a	n/a	n/a	n/a	n/a
Corner Mesh™ - 244 (7.2)	49 g/cm (274 lbs/in).	n/a	n/a	n/a	n/a	n/a



**20 THAMES STREET – PORTLAND, ME**

\*Shall be used in conjunction with Standard Mesh (recommended for areas exposed to high traffic).

1. It shall be colored blue for product identification bearing the Dryvit logo.

e. Fire performance

TEST	TEST METHOD	CRITERIA	RESULTS
<b>Fire Resistance</b>	ASTM E 119	No effect on the fire resistance of a rated wall assembly	Passed 1 hour
<b>Ignitability</b>	NFPA 268	No ignition at 12.5 kw/m <sup>2</sup> at 20 minutes	Passed
<b>Intermediate Multi-Story Fire Test</b>	NFPA 285 (UBC 26-9)	1. Resist flame propagation over the exterior surface 2. Resist vertical spread of flame within combustible core/component of panel from one story to the next 3. Resist vertical spread of flame over the interior surface from one story to the next 4. Resist lateral spread of flame from the compartment of fire origin to adjacent spaces	Passed
<b>Full Scale Multi-Story* (corner test)</b>	ANSI FM 4880	Resist flame propagation over the exterior surface	Passed; No height restrictions*

\* Dryvit FM Products must be specified

2. The Outsulation Plus MD components shall be tested for:

a. Fire

TEST	TEST METHOD	CRITERIA	RESULTS
<b>Surface Burning Characteristics</b>	ASTM E 84	All components shall have a: Flame Spread ≤ 25 Smoke Developed ≤ 450	Passed

b. Durability

TEST	TEST METHOD	CRITERIA	RESULTS
<b>Reinforcing Mesh Alkali Resistance of Reinforcing Mesh</b>	ASTM E 2098 (formerly EIMA 105.01)	> 21dN/cm (120 pli) retained tensile strength after exposure	Passed
<b>EPS (Physical Properties) Density</b>	ASTM C 303, D 1622	15.2-20.0 kg/m <sup>3</sup> (0.95-1.25 lb/ft <sup>3</sup> )	Pass
<b>Thermal Resistance</b>	ASTM C 177, C 518	4.0 @ 4.4 °C (40 °F) 3.6 @ 23.9 °C (75 °F)	Pass Pass
<b>Water Absorption</b>	ASTM C 272	2.5 % max. by volume	Pass
<b>Oxygen Index</b>	ASTM D 2863	24% min. by volume	Pass
<b>Compressive Strength</b>	ASTM D 1621 Proc. A	69 kPa (10 psi) min.	Pass
<b>Flexural Strength</b>	ASTM C 203	172 kPa (25 psi) min.	Pass
<b>Flame Spread</b>	ASTM E 84	25 max.	Pass
<b>Smoke Developed</b>	ASTM E 84	450 max.	Pass

**1.05 SUBMITTALS**

A. Product Data: The contractor shall submit to the owner/architect the manufacturer's product data sheets describing products, which will be used on this project.

B. Shop Drawings for Panelized Construction: The panel fabricator shall prepare and submit to the owner/architect complete drawings showing: wall layout, connections, details, expansion joints, and installation sequence.

C. Samples: The contractor shall submit to the owner/architect two (2) samples of the Outsulation Plus MD System for each finish, texture and color to be used on the project. The same tools and techniques proposed for the actual installation shall be used. Samples shall be of sufficient size to accurately represent each color

## 20 THAMES STREET – PORTLAND, ME

and texture being utilized on the project.

- D. Test Reports: When requested, the contractor shall submit to the owner/architect copies of selected test reports verifying the performance of the Outsulation Plus MD System.

### 1.06 QUALITY ASSURANCE

#### A. Qualifications

1. System Manufacturer: Shall be Dryvit Systems, Inc. All materials shall be manufactured or sold by Dryvit and shall be purchased from Dryvit or its authorized distributors.
  - a. Materials shall be manufactured at a facility covered by a current ISO 9001:2008 and ISO 14000:2004 certification. Certification of the facility shall be done by a registrar accredited by the American National Standards Institute, Registrar Accreditation Board (ANSI-RAB).
2. Contractor: Shall be knowledgeable in the proper installation of the Dryvit Outsulation Plus MD System and shall be experienced and competent in the installation of Exterior Insulation and Finish Systems. Additionally, the contractor shall possess a current Outsulation Plus MD System Trained Contractor Certificate\* issued by Dryvit Systems, Inc.
3. Insulation Board Manufacturer: Shall be listed by Dryvit Systems, Inc., shall be capable of producing the Expanded Polystyrene (EPS) in accordance with the current Dryvit Specification for Insulation Board, DS131, and shall subscribe to the Dryvit Third Party Certification and Quality Assurance Program.
4. Panel Fabricator: Shall be a contractor experienced and competent in the fabrication of architectural wall panels and shall possess a current Outsulation Plus MD System Trained Contractor Certificate\* issued by Dryvit Systems, Inc.
5. Panel Erector: Shall be experienced and competent in the installation of architectural wall panel systems and shall be:
  - a. The panel fabricator or
  - b. An erector approved by the panel fabricator or
  - c. An erector under the direct supervision of the panel fabricator

#### B. Regulatory Requirements:

1. The EPS shall be separated from the interior of the building by a minimum 15-minute thermal barrier.
2. The use and maximum thickness of EPS shall be in accordance with the applicable building code(s).

#### C. Certification

1. The Outsulation Plus MD System shall be recognized for the intended use by the applicable building code(s).

#### D. Mock-Up

1. The contractor shall, before the project commences, provide the owner/architect with a mock-up for approval.
2. The mock-up shall be of suitable size as required to accurately represent the products being installed, as well as each color and texture to be utilized on the project.
3. The mock-up shall be prepared with the same products, tools, equipment and techniques required for the actual applications. The finish used shall be from the same batch that is being used on the project.
4. The approved mock-up shall be available and maintained at the jobsite.
5. For panelized construction, the mock-up shall be available and maintained at the panel fabrication location.

### 1.07 DELIVERY, STORAGE AND HANDLING

A. All Dryvit materials shall be delivered to the job site in the original, unopened packages with labels intact.

B. Upon arrival, materials shall be inspected for physical damage, freezing or overheating. Questionable materials shall not be used.

1. Materials shall be stored at the jobsite in a cool, dry location, out of direct sunlight, protected from weather and other sources of damage. Minimum storage temperature shall be as follows:
  - a. Demandit®, Revyvit®, Reflectit: 7 °C (45 °F)
  - b. Ameristone™, TerraNeo® and Lymestone™: 10 °C (50 °F)
  - c. DPR, PMR™ and E™ Finishes, Color Prime™, Primus®, Genesis and NCB™: 4 °C (40 °F)
  - d. Custom Brick™ Finish: refer to Custom Brick Polymer Specification, DS151.
  - e. For other products, refer to specific product data sheets.
2. Maximum storage temperature shall not exceed 38 °C (100 °F). **NOTE: Minimize exposure of materials to temperatures over 32 °C (90 °F). Finishes exposed to temperatures over 43 °C (110 °F) for even short periods may exhibit skinning, increased viscosity and should be inspected prior to use.**

C. Protect all products from inclement weather and direct sunlight.

### 1.08 PROJECT CONDITIONS

#### A. Environmental Requirements

1. Application of wet materials shall not take place during inclement weather unless appropriate protection is provided. Protect materials from inclement weather until they are completely dry.
  2. At the time of application, the minimum air and wall surface temperatures shall be as follows:
    - a. Demandit, Revyvit, Reflectit: 7 °C (45 °F)
    - b. Ameristone, TerraNeo and Limestone: 10 °C (50 °F)
    - c. DPR, PMR and **E** Finishes, Color Prime, Primus Genesis and NCB: 4 °C (40 °F)
    - d. Custom Brick Finish: refer to Custom Brick Polymer Specification, DS151.
    - e. For other products, refer to specific product data sheets.
  3. These temperatures shall be maintained with adequate air ventilation and circulation for a minimum of 24 hours (48 hours for Ameristone, TerraNeo and Limestone) thereafter, or until the products are completely dry. Refer to published product data sheets for more specific information.
- B. Existing Conditions: The contractor shall have access to electric power, clean water and a clean work area at the location where the Dryvit materials are to be applied.

### 1.09 SEQUENCING AND SCHEDULING

- A. Installation of the Outsulation Plus MD System shall be coordinated with other construction trades.
- B. Sufficient manpower and equipment shall be employed to ensure a continuous operation, free of cold joints, scaffold lines, texture variations, etc.

### 1.10 WARRANTY

- A. Dryvit Systems, Inc. shall provide a written moisture drainage and limited materials warranty against defective material upon written request. Dryvit shall make no other warranties, expressed or implied. Dryvit does not warrant workmanship. Full details are available from Dryvit Systems, Inc.
- B. The applicator shall warrant workmanship separately. Dryvit shall not be responsible for workmanship associated with installation of the Outsulation Plus MD System.

### 1.11 DESIGN RESPONSIBILITY

- A. It is the responsibility of both the specifier and the purchaser to determine if a product is suitable for its intended use. The designer selected by the purchaser shall be responsible for all decisions pertaining to design, detail, structural capability, attachment details, shop drawings and the like. Dryvit has prepared guidelines in the form of specifications, installation details, and product sheets to facilitate the design process only. Dryvit is not liable for any errors or omissions in design, detail, structural capability, attachment details, shop drawings, or the like, whether based upon the information prepared by Dryvit or otherwise, or for any changes which purchasers, specifiers, designers, or their appointed representatives may make to Dryvit's published comments.

### 1.12 MAINTENANCE

- A. Maintenance and repair shall follow the procedures noted in the Dryvit Outsulation Plus MD System Application Instructions, DS218.
- B. All Dryvit products are designed to require minimal maintenance. However, as with all building products, depending on location, some cleaning may be required. See Dryvit publication DS152 on Cleaning and Recoating.
- C. Sealants and Flashings shall be inspected on a regular basis and repairs made as necessary.

## PART II PRODUCTS

### 2.01 MANUFACTURER

- A. All components of the Outsulation Plus MD System shall be supplied or obtained from Dryvit or its authorized distributors. Substitutions or additions of materials other than specified will void the warranty.

### 2.02 MATERIALS

- A. Portland Cement: Shall be Type I or II, meeting ASTM C 150, white or gray in color, fresh and free of lumps.
- B. Water: Shall be clean and free of foreign matter.

### 2.03 COMPONENTS

- A. Air/Water-Resistive Barrier Components:

## 20 THAMES STREET – PORTLAND, ME

1. Dryvit Backstop® NT: A flexible, polymer-based noncementitious water-resistive coating and air barrier available in Texture and Smooth.
2. Dryvit Grid Tape™: An open weave fiberglass mesh tape with pressure sensitive adhesive available in rolls 102 mm (4 in) wide by 91 m (100 yds) long.
3. Dryvit Backstop DMS: A sprayable single step water-resistive membrane/air barrier and adhesive.

**NOTE: Backstop DMS is not approved for use over wood based substrates.**

### B. Flashing Materials: Used to protect substrate edges at terminations.

1. Liquid Applied: An extremely flexible water-based polymer material, ready for use.
  - a. Shall be AquaFlash and AquaFlash Mesh
2. Sheet Type:
  - a. Shall be Flashing Tape and Surface Conditioner
    - 1) Dryvit Flashing Tape™: A high density polyethylene film backed with a rubberized asphalt adhesive available in rolls 102 mm (4 in), 152 mm (6 in) and 229 mm (9 in) wide by 23 m (75 ft) long.
    - 2) Dryvit Flashing Tape Surface Conditioner™: A water-based surface conditioner and adhesion promoter for the Dryvit Flashing Tape.

### C. Dryvit AP Adhesive™: A moisture cure, urethane-based adhesive used to adhere the Dryvit Drainage Strip and Drainage Track.

### D. Drainage Track: UV treated PVC "J" channel perforated with weep holes, complying with ASTM D 1784 and ASTM C 1063. Drainage track usage is limited to the base of the system at finished grade level. All other horizontal terminations shall utilize the Dryvit Drainage Strip as shown in Outsulation Plus MD Installation Details, DS110. Shall be one of the following:

1. Starter Trac STWP – without drip edge by Plastic Components, Inc.
2. Starter Trac STDE – with drip edge by Plastic Components, Inc.
3. Universal Starter Track by Wind-lock Corporation
4. Sloped Starter Strip with Drip by Vinyl Corp.

### E. Dryvit Drainage Strip™: A corrugated plastic sheet material, which provides drainage.

### F. Adhesives: Used to adhere the EPS to the air/water-resistive barrier, shall be compatible with the water-resistive barrier and the EPS.

1. Cementitious: A liquid polymer-based material, which is field mixed with Portland cement.
  - a. Shall be Primus, Genesis or Genesis® FM
2. Ready mixed: A dry blend cementitious, copolymer-based product, field mixed with water.
  - a. Shall be Primus® DM, Genesis® DM, Genesis® DMS, Rapidry DM 35-50 or Rapidry DM 50-75

### G. Insulation Board: Expanded Polystyrene meeting Dryvit Specification for Insulation Board, DS131.

1. Thickness of insulation board shall be minimum 25 mm (1 in).
2. The insulation board shall be manufactured by a board supplier listed by Dryvit Systems, Inc.

### H. Base Coat: Shall be compatible with the EPS insulation board and reinforcing mesh(es).

1. Cementitious: A liquid polymer-based material, which is field mixed with Portland cement.
  - a. Shall be Primus, Genesis or Genesis FM
2. Noncementitious: A factory-mixed, fully formulated, water-based product.
  - a. Shall be NCB
3. Ready mixed: A dry blend cementitious, copolymer-based product, field mixed with water.
  - a. Shall be Primus DM, Genesis DM, Genesis DMS, Rapidry DM 35-50 or Rapidry DM 50-75.

### I. Reinforcing Mesh: A balanced, open weave, glass fiber fabric treated for compatibility with other system materials. **NOTE: Reinforcing meshes are classified by impact resistance and specified by weight and tensile strength as listed in Section 1.04.D.1.d.**

1. Shall be Standard, Standard Plus, Intermediate, Panzer 15, Panzer 20, Detail and Corner Mesh
2. Shall be colored blue for product identification bearing the Dryvit logo.

### J. Finish: Shall be the type, color and texture as selected by the architect/owner and shall be one or more of the following:

1. Standard DPR (Dirt Pickup Resistance): Water-based, acrylic coating with integral color and texture and formulated with DPR chemistry:
  - a. Quarzputz® DPR: Open-texture
  - b. Sandblast® DPR: Medium texture
  - c. Freestyle® DPR: Fine texture
  - d. Sandpebble® DPR: Pebble texture
  - e. Sandpebble® Fine DPR: Fine pebble texture
2. **E**: Water-based, lightweight acrylic coating with integral color and texture and formulated with DPR chemistry:

## 20 THAMES STREET – PORTLAND, ME

- a. Quarzputz® **E**
- b. Sandpebble® **E**
- c. Sandpebble® Fine **E**
3. Finish with recycled content:
  - a. Mojave **E**: Water based, 100% acrylic finish containing 20% post consumer recycled content and formulated with DPR chemistry.

FM: Water-based, acrylic coating with integral color and texture, formulated with PMR chemistry:

- a. Sandpebble® FM
- b. Sandpebble® Fine FM
5. Specialty: Factory mixed, water-based acrylic:
  - a. Ameristone: Multi-colored quartz aggregate with a flamed granite appearance.
  - b. Stone Mist®: Ceramically colored quartz aggregate.
  - c. Custom Brick: Acrylic polymer-based finish used in conjunction with a proprietary template system to create the look of stone, brick, slate or tile.
  - d. TerraNeo: 100% acrylic-based finish with large mica chips and multi-colored quartz aggregates.
  - e. Limestone: A premixed, 100% acrylic-based finish designed to replicate the appearance of limestone blocks.
  - f. Reflectit: 100% acrylic coating providing a pearlescent appearance.
6. Elastomeric DPR (Dirt Pickup Resistance): Water- based, elastomeric acrylic coating with integral color and texture and formulated with DPR chemistry:
  - a. Weatherlastic® Quarzputz
  - b. Weatherlastic® Sandpebble
  - c. Weatherlastic® Sandpebble Fine
  - d. Weatherlastic® Adobe
7. Medallion Series PMR™ (Proven Mildew Resistance): Water-based, acrylic coating with integral color and texture and formulated with PMR chemistry:
  - a. Quarzputz® PMR
  - b. Sandblast® PMR
  - c. Freestyle® PMR
  - d. Sandpebble® PMR
  - e. Sandpebble® Fine PMR
8. Coatings, Primers and Sealers:
  - a. Demandit
  - b. Weatherlastic® Smooth
  - c. Tuscan Glaze™
  - d. Revyvit
  - e. Color Prime
  - f. Prymit®
  - g. SealClear™

## PART III EXECUTION

### 3.01 EXAMINATION

- A. Prior to installation of the Outsulation Plus MD System, the contractor shall verify that the substrate:
  1. Is of a type listed in Section 1.04.C.1.
  2. Is flat within 6.4 mm (1/4 in) in a 1.2 m (4 ft) radius.
  3. Is sound, dry, connections are tight; has no surface voids, projections, or other conditions that may interfere with the Outsulation Plus MD System installation or performance.
- B. Prior to installation of the Outsulation Plus MD System, the architect or general contractor shall insure that all needed flashings and other waterproofing details have been completed, if such completion is required prior to the Outsulation Plus MD application. Additionally the Contractor shall ensure that:
  1. Metal roof flashing has been installed in accordance with Asphalt Roofing Manufacturers Association (ARMA) Standards.
  2. Openings are flashed in accordance with the Outsulation Plus MD System Installation Details, DS110, or as otherwise necessary to prevent water penetration.
  3. Chimneys, Balconies and Decks have been properly flashed.

## **20 THAMES STREET – PORTLAND, ME**

4. Windows, Doors, etc. are installed and flashed per manufacturer's requirements and the Outsulation Plus MD System Installation Details, DS110.
- C. Prior to the installation of the Outsulation Plus MD System, the contractor shall notify the general contractor, and/or architect, and/or owner of all discrepancies.

### **3.02 PREPARATION**

- A. The Outsulation Plus MD materials shall be protected by permanent or temporary means from inclement weather and other sources of damage prior to, during, and following application until completely dry.
- B. Protect adjoining work and property during Outsulation Plus MD installation.
- C. The substrate shall be prepared as to be free of foreign materials, such as oil, dust, dirt, form-release agents, efflorescence, paint, wax, water repellants, moisture, frost, and any other condition that may inhibit adhesion.

### **3.03 INSTALLATION**

- A. The system shall be installed in accordance with the Dryvit Outsulation Plus MD System Application Instructions, DS218.
- B. The overall minimum base coat thickness shall be sufficient to fully embed the mesh. The recommended method is to apply the base coat in two (2) passes.
- C. Sealant shall not be applied directly to textured finishes or base coat surfaces. Dryvit Outsulation Plus MD System surfaces in contact with sealant shall be coated with Demandit or Color Prime.
- D. High impact meshes shall be installed as specified at ground level, high traffic areas and other areas exposed to or susceptible to impact damage.

### **3.04 FIELD QUALITY CONTROL**

- A. The contractor shall be responsible for the proper application of the Outsulation Plus MD materials.
- B. Dryvit assumes no responsibility for on-site inspections or application of its products.
- C. If required, the contractor shall certify in writing the quality of work performed relative to the substrate system, details, installation procedures, workmanship and as to the specific products used.
- D. If required, the EPS supplier shall certify in writing that the EPS meets Dryvit's specifications.
- E. If required, the sealant contractor shall certify in writing that the sealant application is in accordance with the sealant manufacturer's and Dryvit's recommendations.

### **3.05 CLEANING**

- A. All excess Outsulation Plus MD System materials shall be removed from the job site by the contractor in accordance with contract provisions and as required by applicable law.
- B. All surrounding areas, where the Dryvit Outsulation Plus MD System has been applied, shall be left free of debris and foreign substances resulting from the contractor's work.

### **3.06 PROTECTION**

- A. The Outsulation Plus MD System shall be protected from inclement weather and other sources of damage until dry and permanent protection in the form of flashings, sealants, etc. are installed.

END OF SECTION

**SECTION 07 26 16  
UNDER-SLAB VAPOR BARRIER**

**PART 1 – GENERAL**

1.1 SUMMARY

- A. Products supplied under this section:
  - 1. Vapor barrier, seam tape, and mastic for installation under concrete slabs.
- B. Related sections:
  - 1. Section 03 30 00 Cast-in-Place Concrete
  - 2. Section 07 26 00 Vapor Retarders

1.2 REFERENCES

- A. American Society for Testing and Materials (ASTM):
  - 1. ASTM E 1745-09 Standard Specification for Plastic Water Vapor Retarders Used in Contact with Soil or Granular Fill Under Concrete Slabs.
  - 2. ASTM E 154-99 (2005) Standard Test Methods for Water Vapor Retarders Used in Contact with Earth Under Concrete Slabs, on Walls, or as Ground Cover.
  - 3. ASTM E 96-05 Standard Test Methods for Water Vapor Transmission of Materials.
  - 4. ASTM F 1249-06 Standard Test Method for Water Vapor Transmission Rate Through Plastic Film and Sheeting Using a Modulated Infrared Sensor.
  - 5. ASTM E 1643-09 Selection, Design, Installation, and Inspection of Water Vapor Retarders Used in Contact with Earth or Granular Fill Under Concrete Slabs.
- B. American Concrete Institute (ACI):
  - 1. ACI 302.2R-06 Guide for Concrete Slabs that Receive Moisture-Sensitive Flooring Materials.

1.3 SUBMITTALS

- A. Quality control/assurance:
  - 1. Summary of test results as per paragraph 8.3 of ASTM E 1745.
  - 2. Manufacturer's samples, literature.
  - 3. Manufacturer's installation instructions for placement, seaming and penetration repair instructions.

**PART 2 – PRODUCTS**

2.1 MATERIALS

- A. Vapor barrier must have all of the following qualities:
  - 1. Permeance of less than 0.01 Perms [grains/(ft<sup>2</sup> · hr · inHg)] as tested in accordance with ASTM E 1745 Section 7.
  - 2. Other performance criteria:

- a. Strength: ASTM E 1745 Class A.
  - b. Thickness: 15 mils minimum
- B. Vapor barrier products:
- 1. Basis of Design: Stego Wrap Vapor Barrier (15-mil) by Stego Industries LLC, (877) 464-7834 [www.stegoindustries.com](http://www.stegoindustries.com).

## 2.2 ACCESSORIES

- A. Seam tape:
- 1. Stego Tape by Stego Industries LLC, (877) 464-7834 [www.stegoindustries.com](http://www.stegoindustries.com).
- B. Vapor-proofing mastic:
- 1. Stego Mastic by Stego Industries LLC, (877) 464-7834 [www.stegoindustries.com](http://www.stegoindustries.com).

## PART 3 – EXECUTION

### 3.1 PREPARATION

- A. Ensure that base material is approved by Architect or Geotechnical Engineer.
- 1. Level and compact base material.

### 3.2 INSTALLATION

- A. Install vapor barrier in accordance with manufacturer's instructions and ASTM E 1643.
- 1. Unroll vapor barrier with the longest dimension parallel with the direction of the concrete placement.
  - 2. Lap vapor barrier over footings and/or seal to foundation walls.
  - 3. Overlap joints 6 inches and seal with manufacturer's tape.
  - 4. Seal all penetrations (including pipes) per manufacturer's instructions.
  - 5. No penetration of the vapor barrier is allowed except for reinforcing steel and permanent utilities.
  - 6. Repair damaged areas by cutting patches of vapor barrier, overlapping damaged area 6 inches and taping all sides with tape.

**END OF SECTION**



Section 07 27 31

Spray Applied Waterproofing

**1 General**

1.1 SECTION INCLUDES

- .1 Materials and installation methods for a spray applied air/vapour barrier located in the non-accessible part of the wall.
- .2 Materials and installation to bridge and seal openings and penetrations of window frames, door frames, masonry ties and similar leakage paths in the wall.

1.2 SUBMITTALS

- .1 Product Data: Provide data on material characteristics, performance characteristics, limitations and independent air leakage, sustained wind load and gust wind test data.

1.3 QUALIFICATIONS

- .1 Applicator: Company specializing in performing work of this section approved by air/vapour membrane material manufacturer.

1.4 MOCK-UP

- .1 Provide mock-up of air/vapour barrier materials under provisions of the drawings.
- .2 Construct typical exterior wall sample panel, 3' long by 6' wide, incorporating window and door frame and sill, insulation, and junction with roof membrane, illustrating materials interface and seals where applicable.
- .3 Mock-up may remain as part of the work.
- .4 Allow 48 h for inspection of mock-up by Architect before proceeding with air/vapor barrier work.

1.5 PRE-INSTALLATION CONFERENCE

- .1 Meet prior to commencing work of this section with the design – construction team.

1.6 ENVIRONMENTAL REQUIREMENTS

- .1 Ensure application temperature and humidity recommended by material manufacturer is maintained before, during and after installation.

1.7 SEQUENCING

- .1 Sequence work under the provisions of Master Construction Schedule
- .2 Sequence work to permit installation of materials in conjunction with related materials and seals.

1.8 CO-ORDINATION

- .1 Co-ordinate work of this section with all affected trades.

**2 Products**

- 2.1 Air/Vapour Barrier Membrane: Rub-R-Wall Air/Vapour Barrier, liquid applied 100% rubber copolymer membrane having an air leakage rate of 0.00220 L/s.m<sup>2</sup> when tested to ASTM E283, nominal total thickness of 1 mm (40 mils) manufactured by Advanced Coatings Inc. in accordance with physical properties as stated in manufacturer's literature.

- 2.2 Transition Strip: Rub-R-Wall SA, composite sheet composed of rubberized asphalt integrally bonded to a film of high density cross laminated polyethylene, nominal 1.0 mm (40 mils) thickness, width as required, manufactured by Advanced Coatings Inc.
- 2.3 Transition Strip Primer: Rub-R-Wall SA primer manufactured by Advanced Coatings Inc.
- 2.4 Substrate Filler: Rub-R-Wall Airtight Mastic manufactured by Advanced Coatings Inc.

### **3 Execution**

#### **3.1 EXAMINATION**

- .1 Verify that surfaces and conditions are suitable prior to commencing work of this section.
- .2 Ensure that:
  - .1 surfaces are sound, dry, even, and free of oil, grease, dirt, excess mortar or other contaminants .
  - .2 concrete surfaces are cured and dry, smooth without large voids, spalled areas or sharp protrusions.
  - .3 Masonry joints are flush and completely filled with mortar, and all excess mortar sitting on masonry ties has been removed.

#### **3.2 PREPARATION**

- .1 Remove loose or foreign matter which might impair adhesion of materials.
- .2 Fill any voids with mastic substrate filler.
- .3 Clean and prime substrate joint/connection surfaces to receive transition strip in accordance with manufacturer's instructions.

#### **3.3 APPLICATION**

- .1 Install materials in accordance with manufacturer's instructions.
- .2 Lap to sheet applied air vapor barrier and sill flashings in a counter flashing – shingle sequence.
- .3 Transition joints: Seal with transition strip at beams, columns, changes in substrate material, and similar joints or connections to provide continuity of air/vapour barrier assembly. Generally, apply transition strip so that a minimum of 75 mm (3") coverage is achieved over both substrates. Position strip over firm bearing.
- .4 Window frame perimeter, and door frames: Lap transition strip from wall substrate with 75 mm (3") of full contact over firm bearing to window or door frame with 25 mm (1") of full contact.
- .5 Apply air/vapour barrier membrane within recommended application temperature ranges. Consult manufacturer when membrane cannot be applied within these temperature ranges.
- .6 Using airless spray equipment having a minimum pressure of 20 684 kPa (3000 psi), apply first coat of air/vapour barrier membrane over [outer surface of inner wythe masonry] [over outer surface of inner metal stud wall assembly].
- .7 Use alternating horizontal and vertical passes to ensure complete coverage of substrate and transition strips. Seal masonry anchors or other penetrations air tight.
- .8 Check surfaces again and if necessary, fill any remaining gaps with mastic substrate filler prior to covering with membrane.
- .9 Complete application of membrane at coverage rate of 2.6 to 3 m<sup>2</sup>/4.5 L (28 to 32 sq. ft./gal.) to provide seamless, monolithic surface to a thickness of 1 mm (40 mils).
- .10 Adhere insulation to air/vapour barrier membrane after initial set time of approximately 1 to 2 hours, and while membrane is still tacky, to prevent convection currents occurring behind the insulation.

#### **3.4 PROTECTION OF FINISHED WORK**

- .1 Protect finished work under provisions in all cases].
- .2 Do not permit adjacent work to damage work of this section.

End of Section

**SECTION 07 50 00**  
**MEMBRANE ROOFING**

**PART 1: GENERAL**

**1.01 SUMMARY**

- A. Project Name: 20 Thames Street
- B. Furnish and install a fully adhered .060 EPDM single ply elastomeric sheet membrane roofing system to the defined areas of the project, including:
  - 1. Roofing manufacturer's requirements for the specified warranty
  - 2. Wood nailers for roofing attachment
  - 3. Insulation
  - 4. Cover boards
  - 5. Elastomeric membrane roofing
  - 6. Metal roof edgings, copings, gutters, and downspouts
  - 7. Flashings, terminations, and counter flashings
  - 8. Walkway pads
  - 9. Other roofing-related items to provide a complete weatherproof roofing system.
- C. Testing of Roofing for Hazardous Materials and disposal of demolition debris and construction waste is the responsibility of Contractor. Perform in manner complying with all applicable federal, state, and local regulations.
- D. Comply with the published recommendations and instructions of the roofing membrane manufacturer, at <http://manual.fsbp.com>.
- E. Notify Architect of any discrepancies between specified roofing system and existing observable conditions that may prohibit implementation of specifications.
- E. Commencement of work by the Contractor shall constitute acknowledgement by the Contractor that this specification can be satisfactorily executed, under the project conditions and with all necessary prerequisites for warranty acceptance by roofing membrane manufacturer.

**1.02 REFERENCES**

- A. Referenced Standards: These standards form part of this specification only to the extent they are referenced as specification requirements.
- B. ASTM C-1289 - Standard Specification for Faced Rigid Cellular Polyisocyanurate Thermal Insulation Board; 2004.
- C. ASTM D-1079 - Standard Terminology Relating to Roofing, Waterproofing, and Bituminous Materials; 2005a.
- D. ASTM D-4637 - Standard Specification for EPDM Sheet used in Single-Ply Roof Membrane.
- E. ASTM D-4811 - Standard Specification for Non-vulcanized (Uncured) Rubber Sheet Used as Roof Flashing; 2004.
- F. ASTM E-84 - Standard Test Method for Surface Burning Characteristics of Building Materials; 2005.
- G. CAN-ULC-S770 - Standard Test Method Determination of L-Term Thermal Resistance of Closed-Cell Thermal Insulating Foams

## 20 THAMES STREET – PORTLAND, ME

- H. PS-1 : Construction and Industrial Plywood
- I. PS- 20: American Softwood Lumber Standard

### 1.03 DEFINITIONS

- A. Roofing Terminology: Refer to ASTM D-1079 for definition of terms related to roofing work not otherwise defined in the section.
- B. LTTR: Long Term Thermal Resistance, as defined by CAN-ULC S770.

### 1.03 PERFORMANCE REEQUIREMENTS

- A. General: Install sheet membrane roofing and flashings that are watertight and will withstand the wind loads, thermally induced movement, and exposure to weather without failure.
- B. Compatibility: Provide materials that are compatible with one another under application and service conditions required.
- C. Fire Resistance: The complete roof covering assembly shall meet ASTM E-108, Class A or UL 790, Class A.
- D. Uplift Resistance: Provide membrane roofing system that is identical to systems that have been successfully tested by a qualified testing agency to resist uplift pressure (lbf/ sq. ft.) calculated according to ASCE/ SEI-7. A Safety Factor of 2 has been added:

Field Uplift Pressure = Reference structural drawings

Perimeter Uplift Pressure = Reference structural drawings

Corner Uplift Pressure = Reference structural drawings

### 1.04 SUBMITTALS

- A. Product Data:
  - 1. Provide membrane manufacturer's printed data sufficient to show that all components of roofing system, including insulation and fasteners, comply with the specified requirements and with the membrane manufacturer's requirements and recommendations for the system type specified; include data for each product used in conjunction with roofing membrane.
  - 2. Provide a printed statement of VOC content for adhesives, primers, and sealants indicating compliance with VOC limits of authorities having jurisdiction.
- B. Samples: Submit samples of membrane, insulation, cover board, edge metal color charts and fasteners along with a letter approving the application for the requested warranty from the manufacturer. Submit sample warranties and product literature along with drawings for tapered insulation layout.
- D. Installer Qualifications: Letter from manufacturer attesting that the roofing installer meets the specified qualifications and has installed warranted systems of this nature.

### 1.05 QUALITY ASSURANCE

- A. Applicator Qualifications: Roofing installer shall have the following:
  - 1. Current Firestone Red Shield Licensed Contractor status.
  - 2. Current approval, license, or authorization as applicator by the manufacturer.
  - 3. Fully staffed office within 100 miles of the job site.
  - 4. At least 10 years verifiable experience in installing specified system.
  - 5. Capability to provide payment and performance bond to building owner.

- B. Pre-Installation Conference: Before start of roofing work, Contractor shall hold a meeting to discuss the proper installation of materials and requirements to achieve the warranty.
1. Require attendance with all parties directly influencing the quality of roofing work or affected by the performance of roofing work.
  2. Notify building owner's representative well in advance of meeting.

#### **1.06 DELIVERY, STORAGE AND HANDLING**

- A. Deliver products in manufacturer's original containers, dry and undamaged, with seals and labels intact and legible.
- B. Store materials clear of ground and moisture with weather protective covering.
- C. Keep combustible materials away from ignition sources.

#### **1.07 SYSTEM DESCRIPTION**

##### **Main Roof Area: Fully Adhered EPDM**

- Complete Tear off to Wood Deck
- Firestone V-Force Vapor Barrier adhered to the DensDeck substrate (V-Force Primer is required). Seal at all wood deck penetrations.
- Firestone ISO 95+ GL (Flat or Tapered) adhered to the vapor barrier with Firestone Twin Pack Insulation Adhesive at a rate of 12"/ 6"/ 6" o.c. For the field, perimeter, and corner areas respectively. Max. 4'x4' boards.
- New Firestone .060 LS-FR RubberGard EPDM fully adhered with Single Ply LVOC Bonding Adhesive

#### **1.08 WARRANTY**

- A. Comply with all warranty procedures required by manufacturer, including notifications, scheduling, and inspections.
- B. Warranty: Firestone **25** year Medallion Limited Warranty covering membrane, roof insulation, membrane accessories and metal edges.
1. Limit of Liability: No dollar limitation.
  2. Scope of Coverage: Repair leaks in the roofing system caused by:
    - a. Ordinary wear and tear of the elements.
    - b. Unintentional damage due to normal rooftop inspections, maintenance, or service.
    - c. Manufacturing defect in Firestone brand materials.
    - d. Defective workmanship used to install these materials.
    - e. Damage due to winds up to 55 mph (88 km/h).

### **PART 2 PRODUCTS**

#### **2.01 MANUFACTURERS**

- A. Acceptable Manufacturer - Roofing System Basis of Design: Firestone Building Products Co., Carmel, IN. [www.firestonebpco.com](http://www.firestonebpco.com).
1. Roofing systems manufactured by others are acceptable provided the roofing system is completely equivalent in materials and warranty conditions and the manufacturer meets the following qualifications:
    - a. Specializing in manufacturing the roofing system to be provided.
    - b. Minimum ten years of experience manufacturing the roofing system to be provided.

## 20 THAMES STREET – PORTLAND, ME

- c. Able to provide a no dollar limit, single source roof system warranty that is backed by corporate assets in excess of one billion dollars.
  - d. ISO 9002 certified.
  - e. Able to provide isocyanurate insulation and cover boards that are produced in own facilities.
- B. Manufacturer of Insulation and Cover Boards: Same manufacturer as roof membrane.
- C. Manufacturer of Metal Roof Edging: Same manufacturer as roof membrane.
- 1. Metal roof edging products by other manufacturers are not acceptable.
  - 2. Shop-fabricated metal roof edgings are acceptable.

### 2.02 ROOFING SYSTEM DESCRIPTION

- A. Roofing System:
- 1. Membrane: Ethylene propylene diene monomer (EPDM)
  - 2. Thickness: .060" thick
  - 3. Membrane Attachment: Fully adhered
  - 4. Comply with applicable local building code requirements.
- B. Insulation: Polyisocyanurate; nominal 20 psi; thickness as noted elsewhere
- C. Tapered polyisocyanurate insulation; 1/4" slope; as indicated on drawing. Provide tapered polyisocyanurate drain sumps and crickets as noted.

### 2.03 EPDM MEMBRANE MATERIALS

- A. Roofing and Flashing Membrane: Black cured synthetic single-ply membrane composed of ethylene propylene diene terpolymer (EPDM) with the following properties:
- 1. Membrane complying with ASTM D 4637, Type I, Class U (unreinforced).
  - 2. Thickness, nominal: 0.060 inch (and .090" for front canopy roof areas).
  - 3. Sheet Width: Provide the widest available sheets to minimize field seaming.
  - 4. Acceptable Product: RubberGard Non-Reinforced Low Slope Fire Retardant (LS-FR) EPDM Membrane by Firestone.
- B. Self-Adhesive Flashing Membrane: Semi-cured 45 mil EPDM membrane laminated to 35 mil (0.9 mm) EPDM tape adhesive; QuickSeam Flashing by Firestone.
- C. Self-Adhesive Lap Splice Tape: 35 mil (0.9 mm) EPDM-based, formulated for compatibility with EPDM membrane and high-solids primer; QuickSeam 6" Splice Tape by Firestone.
- D. Bonding Adhesive: Neoprene-based, formulated for compatibility with EPDM membrane and wide variety of substrate materials, including masonry, wood, and insulation facings; LVOC Bonding Adhesive by Firestone.
- E. Insulation Adhesive: Manufacturer's two-part low rise urethane insulation adhesive specifically formulated and approved for the application meeting VOC regulations currently in effect.
- F. Roof Walkway Pads: EPDM, 0.30 inch (7.6 mm) thick by 30 by 30 inches (760 by 760 mm) with EPDM tape adhesive strips laminated to the bottom; QuickSeam Walkway Pads by Firestone.

### 2.04 ROOF INSULATION AND COVER BOARDS

- A. Polyisocyanurate Board Insulation: Closed cell polyisocyanurate foam with black glass reinforced mat laminated to faces complying with ASTM C-1289, Type II, Class 1, with the following additional characteristics:
- 1. Thickness:
    - a. As specified in the drawings and details min 4" prior to taper to drains.

## 20 THAMES STREET – PORTLAND, ME

2. Compressive Strength:
    - a. Insulation: 20 psi (138 kPa) when tested in accordance with ASTM C-1289.
    - b. Cover Board: 120 psi when tested in accordance with ASTM C 1289 for cover board.
  3. Ozone Depletion Potential: Zero; made without CFC or HCFC blowing agents.
  4. Recycled Content: 19 percent post-consumer and 15 percent post-industrial, average.
  5. Acceptable Insulation Product: ISO 95+ GL Polyisocyanurate Insulation by Firestone.
  6. Acceptable Cover Board Product: IsoGard HD by Firestone.
- B. Insulation Fasteners: Fully adhered and screw/plate fastened as show in the drawings.

### 2.05 METAL ACCESSORIES

- A. Metal Roof Edging and Fascia: Continuous break metal coping serving as termination of roof membrane and retainer for metal fascia; watertight with no exposed fasteners; mounted to parapet nailer with continuous cleat as shown in the details.
1. Fascia Face Height: as shown in the drawings.
  2. Fascia Material and Finish: Color TBD by architect as shown in the details.
  3. Continuous Cleat: as shown in the details
- B. Metal Counterflashings: Provide metal counterflashings as required to properly terminate membrane roofing system at all roof curbs and penetrations at interior of roof.

### 2.06 ACCESSORY MATERIALS

- A. Wood Nailers: PS 20 dimension lumber, Structural Grade No. 2 or better Southern Pine, Douglas Fir; or PS 1, APA Exterior Grade plywood; pressure preservative treated.

All wood in contact with masonry or concrete to be Pressure Treated and installed with stainless steel fasteners.

1. Width: As indicated in the drawings.
2. Thickness: As indicated in the drawings.

## PART 3 INSTALLATION

### 3.01 GENERAL

- A. Install roofing, insulation, flashings, and accessories in accordance with roofing manufacturer's published instructions and recommendations for the specified roofing system. Where manufacturer provides no instructions or recommendations, follow good roofing practices and industry standards. Comply with federal, state, and local regulations.
- B. Obtain all relevant instructions and maintain copies at project site for duration of installation.
- C. Do not start work until Pre-Installation Notice has been submitted to manufacturer as notification that this project requires a manufacturer's warranty.
- D. Perform work using competent and properly equipped personnel.
- E. Temporary closures, which ensure that moisture does not damage any completed section of the new roofing system, are the responsibility of the applicator. Completion of flashings, terminations, and temporary closures shall be completed as required to provide a watertight condition.
- F. Install roofing membrane only when surfaces are clean, dry, smooth and free of snow or ice; do not apply roofing membrane during inclement weather or when ambient conditions will not allow proper application; consult manufacturer for recommended procedures during cold weather. **Do not work with sealants and adhesives when material temperature is outside the range of 60 to 80 degrees F (15 to 25 degrees C).**

## 20 THAMES STREET – PORTLAND, ME

- G. Protect adjacent construction, property, vehicles, and persons from damage related to roofing work; repair or restore damage caused by roofing work.
  - 1. Protect from spills and overspray from bitumen, adhesives, sealants and coatings.
  - 2. Particularly protect metal, glass, plastic, and painted surfaces from bitumen, adhesives, and sealants within the range of wind-borne overspray.
  - 3. Protect finished areas of the roofing system from roofing related work traffic and traffic by other trades.
- H. Until ready for use, keep materials in their original containers as labeled by the manufacturer.
- I. Consult membrane manufacturer's instructions, container labels, and Material Safety Data Sheets (MSDS) for specific safety instructions. Keep all adhesives, sealants, primers and cleaning materials away from all sources of ignition.

### 3.02 EXAMINATION

- A. Examine roof deck to determine that it is sufficiently rigid to support installers and their mechanical equipment and that deflection will not strain or rupture roof components or deform deck.
- B. Verify that surfaces and site conditions are ready to receive work. Correct defects in the substrate before commencing with roofing work.
- C. Examine roof substrate to verify that it is properly sloped to drains.
- D. Verify that the specifications and drawing details are workable and not in conflict with the roofing manufacturer's recommendations and instructions; start of work constitutes acceptable of project conditions and requirements.

### 3.03 PREPARATION

- A. Take appropriate measures to ensure that fumes from adhesive solvents are not drawn into the building through air intakes. Coordinate construction with owner.
- B. Prior to proceeding, prepare roof surface so that it is clean, dry, and smooth, and free of sharp edges, fins, roughened surfaces, loose or foreign materials, oil, grease and other materials that may damage the membrane.
- C. Fill all surface voids in the immediate substrate that are greater than 1/4 inch (6 mm) wide with fill material acceptable insulation to membrane manufacturer.
- D. Wood Nailers: Provide new wood nailers at all perimeters and other locations as required to match the height of the new roofing assembly; reuse existing wood mailers to the greatest extent possible. Attach new wood nailers in accordance with manufacturer's instructions.
  - 1. Install with 1/8 inch gap between each length and at each change of direction.
  - 2. Mechanically fasten to deck to resist force of 200 lbf per linear foot (35 kN/m).

### 3.04 INSULATION INSTALLATION

- A. Evenly apply Firestone V-Force Primer in accordance with manufacturer's recommended coverage rates and application guidelines.
- B. Install Firestone V-Force vapor barrier to the primed substrate allowing for 3" side laps and 6" end laps. Remove the release paper and roll the V-Force Vapor Barrier using a 75 lb. lawn/ carpet roller to ensure adequate adhesion to the substrate. Contractor to note that V-Force VB is under curbing and sealed to wall Air Vapor Barrier.
- D. Install insulation in configuration and with attachment method(s) specified in PART 2, under



## 20 THAMES STREET – PORTLAND, ME

### Roofing System.

- B. Install only as much insulation as can be covered with the completed roofing system before the end of the day's work or before the onset of inclement weather. Daily night tie-ins are required and shall consist of a sealed, watertight connection every night, regardless of weather.
- C. Neatly and tightly fit insulation to all penetrations, projections, and nailers, with gaps not greater than 1/4 inch (6 mm). Fill gaps greater than 1/4 inch (6 mm) with acceptable insulation. Do not leave the roofing membrane unsupported over a space greater than 1/4 inch (6 mm).

### 3.05 SINGLE-PLY MEMBRANE INSTALLATION

- A. Beginning at low point of roof, place membrane without stretching over substrate and allow to relax at least 30 minutes before attachment or splicing; in colder weather allow for longer relax time.
- B. Lay out the membrane pieces so that field and flashing splices are installed to shed water.
- C. Install membrane without wrinkles and without gaps or fishmouths in seams; bond and test seams and laps in accordance with membrane manufacturer's instructions and details.
- D. Install membrane adhered to the substrate, with edge securement as specified.
- E. Adhered Membrane: Bond membrane sheet to substrate using membrane manufacturer's recommended bonding material, application rate, and procedures.
- F. Install all field seams using 6" Quickseam Tape (3" seam tape is not acceptable for this project).
- G. Secure membrane at all locations where membrane terminates or goes through an angle change greater than 2 in 12 inches (1:6 ) using mechanically fastened reinforced perimeter fastening strips, plates, or metal edging as indicated or as recommended by roofing manufacturer.

### 3.06 FLASHING AND ACCESSORIES INSTALLATION

- A. Install flashings, including laps, splices, joints, bonding, adhesion, and attachment, as required by membrane manufacturer's recommendations and details.
- B. Metal Accessories: Install metal edgings, gravel stops, and copings with horizontal leg of edge member over membrane and flashing over metal onto membrane.
  - 1. Follow roofing manufacturer's instructions.
  - 2. Remove protective plastic surface film immediately before installation.
  - 3. Adhere primary roofing membrane over roof edge nailers to cover the vertical face of the nailers entirely.
  - 4. Install continuous cleat fastened in accordance with manufacturer's details and specifications.
  - 5. Install new copper coping to match existing fascia heights (adding for new cover board thickness) and attach in accordance with manufacturer's details and specifications.
- C. Roofing Expansion Joints: Install acceptable expansion joint detail at all expansion joint locations in accordance with roofing manufacturer's details and specifications.
- D. Flashing at Walls, Curbs, and Other Vertical and Sloped Surfaces: Install weathertight flashing at all walls, curbs, parapets, curbs, skylights, and other vertical and sloped surfaces that the roofing membrane abuts to; raise curbs as required to extend flashing at least 8 inches high above membrane surface.
  - 1. Use the longest practical flashing pieces.

## **20 THAMES STREET – PORTLAND, ME**

2. Evaluate the substrate and overlay and adjust installation procedure in accordance with membrane manufacturer's recommendations.
  3. Provide termination directly to the vertical substrate.
  4. Provide new metal counterflashings at units, walls, and other areas as required to properly terminate roofing system.
- E. Roof Drains: Provide new drains as specified. Use specified pre-manufactured tapered insulation with facer or suitable bonding surface to achieve slope; slope not to exceed manufacturer's recommendations.
- F. Flashing at Penetrations: Flash all penetrations passing through the membrane; make flashing seals directly to the penetration.

### **3.07 FINISHING AND WALKWAY INSTALLATION**

- A. Install walkway pads around mechanical equipment.
- B. Walkway Pads: Adhere to the roofing membrane, spacing each pad at minimum of 1.0 inch (25 mm) and maximum of 3.0 inches (75 mm) from each other to allow for drainage.
1. Do not install walkway pads over any seams.

### **3.08 FIELD QUALITY CONTROL**

- A. Inspection by Manufacturer: Provide final inspection of the roofing system by a Technical Representative employed by roofing system manufacturer specifically to inspect installation for warranty purposes.
- B. Perform all corrections necessary for issuance of warranty.

### **3.09 CLEANING**

- A. Clean all contaminants generated by roofing work from building and surrounding areas, including bitumen, adhesives, sealants, and coatings.
- B. Repair or replace building components and finished surfaces damaged or defaced due to the work of this section; comply with recommendations of manufacturers of components and surfaces.
- C. Remove leftover materials, trash, debris, equipment from project site and surrounding areas.

### **3.10 PROTECTION**

- A. Where construction traffic must continue over finished roof membrane, provide durable protection and replace or repair damaged roofing to original condition.

**END OF SECTION**

SECTION 07 65 10

**FLEXIBLE FLASHING DRAINAGE PLANE SYSTEM**  
**Universally Compatible Type 304 Stainless Steel Flashing Drainage System**  
**Engineered specifically for use with all Air Barrier Systems**

**PART 1 - GENERAL**

1.01 SUMMARY

- A. Section includes combination flashing, mortar deflection, and weep as complete one step system. Using this system deletes requirement for mortar deflection devices.
- B. Alternates: This Section replaces the multiple component technology and multiple trade involvement of older technologies; providing a single source/single trade engineered & warranted system.

1.02 REFERENCES

- A. Standards of the following as referenced:
  - 1. ASTM.
  - 2. Brick Industry Association (BIA).
- B. Industry standards:
  - 1. BIA *Technical Notes on Brick Construction No. 7, Water Penetration Resistance- Design and Detailing*, August 2005.
  - 2. BIA *Technical Notes on Brick Construction No. 28B, Brick Veneer/Steel Stud Walls*, August 2005.

1.03 DEFINITIONS

- A. Terms:
  - 1. Cavity wall flashing: Same as flexible flashing.
  - 2. Foundation sill flashing: Same as flexible flashing.
  - 3. Flexible flashing: Water-proof material typically used in cavity wall construction to contain and assist in the proper water drainage that may penetrate wall system veneer. Other materials may be required to constitute the system.
  - 4. Head and sill flashing: Same as flexible flashing.
  - 5. Through-wall flashing:
    - a. Generally considered the same as flexible flashing.
    - b. Rare definition referred to full width cap flashing under copings or wall caps.

1.04 SUBMITTALS

- A. Product data: Indicate material type, composition, thickness, and installation procedures.
- B. Samples: 3" by 5" flashing material.
- C. **Product Quality & Environmental submittals:**
  - 1. **Certificates:**
    - a. Indicate materials supplied or installed are asbestos free.
    - b. Indicate recycled content: a minimum of 60% total recycled material; based on 60% Post Industrial Recycled Content.
  - 2. **Critical Performance Attributes:**
    - a. Tensile Strength, stainless steel 100,000 psi average
    - b. Puncture Resistant, stainless steel 2,500 psi average
    - c. When tested as manufactured, product resists growth of mold pursuant to test method

## 20 THAMES STREET – PORTLAND, ME

ASTM D 3273.

- d. Fire Rating: flame spread and smoke generation
  1. Rated Class A, ASTM E84
- e. Certify the use of domestic manufactured stainless steel for flashing.
- f. Certify products contain no silica or asbestos.

### 1.05 QUALITY ASSURANCE

#### A. Qualifications:

1. Manufacturer: Provide flashing materials by single manufacturer with not less than twenty five years of experience in manufacturing flexible flashing products.
2. If product is used with spray polyurethane foam, then flashing materials must be able to withstand 300 ° F temperatures without changing the long term performance of the flashing.

### 1.06 WARRANTY

#### A. Special warranty:

1. Manufacturer: **Warrant flexible flashing/drainage system material for life of the wall.**
2. Begin warranty at Date of Substantial Completion.

## PART 2 - PRODUCTS

### 2.01 MANUFACTURED UNITS

#### A. Stainless steel core flexible flashing with drainage fabric:

1. Product standard of quality: York Manufacturing, Inc.; York Flash-Vent SS,
2. Accepted products:
  - a. York Manufacturing, Inc.; York Flash-Vent SS, ([www.yorkmfg.com](http://www.yorkmfg.com))
  - b. STS Coatings, Inc.; Wall Guardian TWF Stainless Steel ([www.stscoatings.com](http://www.stscoatings.com))
  - c. Building Materials West Company, Inc.; Evacu-Flash SS ([www.evacu-flash.com](http://www.evacu-flash.com))
  - d. Other flashings that meet the requirements in section 1.04.C
3. Characteristics:
  - a. Type: Engineered system, with high resistant to damage, composite with a stainless steel with non-asphalt adhesive polymer fabric laminated to one stainless steel and non-woven drainage fabric laminated to opposing face with non-asphalt adhesive.
  - b. Stainless steel: type 304, ASTM A240. Domestically sourced per DFARS 252.225-7008 and/or DFARS 252.225-7009.
  - c. Fabrics:
    - 1) Polymer fabric; laminated back face to stainless steel core
    - 2) Non-woven drainage fabric: Fabric laminated to front face stainless steel core.
  - d. Recycled content: stainless steel is 60% recycled
  - e. Size: Manufacturer's standard width rolls.

### 2.2 ACCESSORIES

- A. Mastic/sealant: Product standard of quality is York Manufacturing, Inc.; UniverSeal US100.
  1. Characteristics:
    - a. Type: One part 100% solids, solvent-free formulated silyl-terminated polyether (STPE), ASTM C920-11, Type S, Grade NS, Class 50.
- B. Outside corner and inside corner material; manufacturer's standard available units using:
  1. Stainless steel: 26 gauge stainless steel.
- C. End dam: Product may be folded in line with the flashing material or utilize preformed end dams by manufacturer using:
  1. Stainless steel: 26 gauge stainless steel

## 20 THAMES STREET – PORTLAND, ME

- D. Splice material: Product standard of quality is York 304 by York Manufacturing, standard self-adhered metal material; material matching system material or use York Manufacturing's Multi-Flash Stainless Steel lap piece and polyether sealant as a splice.
- E. Termination bar: Product standard of quality is York T-96 termination bar. Manufacturer's standard 1" composite material bar or a 1" 26 gauge stainless steel termination bar with sealant lip.
- F. Weep vent protection: Product standard of quality is York's Weep Armor. Geotextile drainage fabric at least 12" in height.
- G. Repair and other materials/accessories: Manufacturer's standard.
- H. Fasteners: Domestic manufactured fastener types and sizes recommended by flashing manufacturer for intended use.

### PART 3 - EXECUTION

#### 3.01 INSTALLATION

- A. General:
  - 1. Install where indicated, specified, or required in accord with flashing manufacturer's written instructions and as follows.
    - a. Prohibited practice: Tucking the flashing into the backer wall.
    - b. Prohibited practice: Bonding or splicing to non-woven drainage fabric.
  - 2. Extend flashing 6" minimum, beyond opening, each side without stretching flashing material. Fold flashing ends at end of openings or horizontal flashing terminations to form end dam or use preformed end dams from manufacturer.
  - 3. Flashing width: Width required starting 1.5" to the exterior of the outside face of exterior wythe, extending through cavity, rising height required to extend above lintel steel at least 2". After inspection by the agreed upon parties the flashing should be cut flush with the leading edge of the brick.
  - 4. Splice end joints by butting ends together over 12" wide piece of self-adhering stainless steel flashing. The self-adhering stainless steel flashing should be sealed metal face down on to the substrate with the mastic. Remove the release linear and butt the two piece of flashing together and embed them into the splice sealant. Then seal the butt seam with sealant.
  - 5. Masonry back up:
    - a. Surface mount flashing after damp proofing installation specified in Damp Proofing Section in accord with manufacturer's installation instructions.
    - b. Apply flashing with drainage surface to outside.
    - c. Fasten to masonry back-up surface at top by embedding in layer of sealant and use a termination bar to fasten to the backer wall and seal the top of the termination bar with sealant.
  - 6. Concrete back up:
    - a. Surface mount flashing after damp proofing installation specified in Damp Proofing Section in accord with manufacturer's installation instructions.
    - b. Apply flashing with drainage surface to outside.
    - c. Fasten to concrete back-up surface at top by embedding in layer of sealant and use a termination bar to fasten to the backer wall and seal the top of the termination bar with sealant.
  - 7. Stud back up with sheathing:
    - a. Surface mount flashing after certified compatible damp proofing installation specified in Damp Proofing Section in accord with manufacturer's installation instructions
    - b. Apply flashing with drainage surface to the outside.
    - c. Fasten to stud back-up surface at top by embedding in layer of sealant and use a

## 20 THAMES STREET – PORTLAND, ME

termination bar to fasten to the backer wall and seal the top of the termination bar with sealant.

8. Confirm compatibility with manufacturer's mutual letters for all lapping components, Air barrier installation lapping over flashing top in the Air Barrier Section.
9. Lay flashing in continuous bead of sealant on masonry supporting steel.
10. Fold ends of flashing at end of opening to form dam; seal with sealant or utilize preformed end dams from manufacturer.
11. Inside corners: Make in manufacturers accepted manner using corner and splice material or utilize preformed corners from manufacturer.
12. Outside corners: Make in manufacturers accepted manner using corner and splice material or utilize preformed corners from manufacturer.
13. Do not coat the entire drainage fabric with air barrier. Leave the drainage fabric exposed at least an inch over the top of the mortar droppings.
14. Weep vent protection use the geotextile drainage and install it on the third row height of standard bricks to have the fabric reach the base of the flashing and covering the weep vents.
15. Cover flashing within a few days of installation to protect it from damage from the different trades, the environment and falling debris. If flashing is left unprotected and it is punctured, torn, or has loose scrim you should contact the manufacturer for repair instructions.

### 3.02 SCHEDULES

- A. Locations:
  1. Exterior door heads.
  2. Window heads and sills.
  3. Storefront heads.
  4. Horizontal control joints.
  5. Changes in veneer materials, vertically.
  6. Other wall openings.
  7. Other locations indicated.

**END OF SECTION 07 65 10**

SECTION 07 81 16

SPRAYED CEMENTITIOUS FIREPROOFING

PART 1 - GENERAL

- 1.0 DESCRIPTION OF WORK: Spray fireproofing of steel structure (columns and beams and as indicated on drawings) to provide required amount of protection, in hours, based upon the Building Codes described on the Cover Sheet and within the construction documents. Work to include, but is not limited to:
- a. The protection of exposed steel members
  - b. The protection of partially exposed members and the necessary overlap of new fireproofing with existing fireproofing to provide a continuous and complete fire protection layer in accordance with manufacturer's installation instructions
  - c. The protection of partially exposed members and the necessary overlap of new fireproofing onto existing historic plaster finish on existing steel. Existing plaster finishes are to remain in place, as indicated on the Drawings, and as directed by the Architect.
  - d. The protection of exposed steel elements where the majority or a portion of the steel member is embedded within concrete (or other) protection.

1.01 SECTION INCLUDES

- A. Cementitious 3 hour spray-on fireproofing of structural steel with clean up of all areas affected by the work of this section.

1.02 RELATED WORK SPECIFIED ELSEWHERE

- A. Fire Stopping: Section 07 84 13

1.03 REFERENCES:

- A. ASTM E 84 - Surface Burning Characteristics
- B. ASTM E 119 - Standard Methods of Fire Tests of Building Construction and Materials
- C. ASTM E 136 - Behavior of Materials in a Vertical Tube Furnace at 750°C
- D. ASTM E 736 - Cohesion/Adhesion of Sprayed Fire-Resistive Materials Applied to Structural Members.
- E. ASTM E 761 - Test Method for Compressive Strength of Sprayed Fire-Resistive Materials Applied to Structural Members
- F. ASTM E 859 - Air Erosion of Sprayed Fire-Resistive Materials Applied to Structural Members
- G. ASTM E 937 - Corrosion Resistance
- H. UBC Standard 7-6 - "Thickness and Density Determination for Spray-Applied Fireproofing"
- I. UL - "Fire Resistance Directory"

1.04 QUALITY ASSURANCE

- A. The applicator shall be licensed (or otherwise approved) by the manufacturer of the fireproofing materials and have 3 years experience in spraying fireproofing on similar projects.
- B. Products, execution and fireproofing material thickness and density shall conform to the applicable IBC 2003, UL "Fire Resistance Directory" and UL test reports or to this specification, which ever is more stringent.

**1.05 SUBMITTALS**

- A. Submit manufacturer's product literature, test reports, and application instructions for each fireproofing material to be used. All test reports shall be representative of current application standards. All test reports shall indicate all materials not in the original fireproofing bags to be added by the applicator. The test report shall indicate concentration and quantity added for the specimens prepared.
- B. After manufacturer approval and prior to application, submit table showing the thickness, density and UL Design Number to be used for each condition. Submit any laboratory test reports used in this table not included in the current UL Fire Resistance Directory.
- C. LEED Submittals: Complete the LEED Materials Documentation Sheet and provide manufacturers' product data for construction adhesives and sealants, including printed statement of VOC content and MSDS Sheets.

**1.06 PRODUCT DELIVERY, STORAGE, AND HANDLING**

- A. Deliver fireproofing material in manufacturer's original, unopened packaging, clearly identified with manufacturer's name, brand, batch number and UL label.
- B. Store materials above ground in a dry location, protected from the weather. Discard and remove from jobsite all materials exposed to moisture or otherwise damaged or deteriorated.

**1.07 PROJECT CONDITIONS**

- A. Maintain temperature of substrate and ambient air at 40 degrees F minimum for 24 hours before, during and after application of fireproofing. If required, use heaters to maintain minimum temperatures.
- B. Provide natural or mechanical ventilation to allow proper curing and drying of the sprayed material during and after its application.

**1.08 MOCK-UP**

- A. Install the proposed materials to an area not less than one bay, demonstrating typical conditions present on the project.
- B. Comply with project requirements as to thickness and density. Testing lab to measure density of mockup.
- C. The mock-up area shall be inspected by the architect prior to proceeding with the work of this section. The mock-up area shall not be disturbed or covered until the completion of the work, unless ordered by the architect.
- D. All work of this section shall be in accordance with the approved mock-up.

**1.09 WARRANTY**

- A. Provide warranty that fireproofing will remain free of cracking, dusting, flaking and loss of bond for a period of 2 years and that failed areas will be repaired to the satisfaction of the owner at no additional cost.

**PART 2 - MATERIALS**

**2.01 ACCEPTABLE MANUFACTURERS:** Products which meet the performance required in this specification:



**20 THAMES STREET – PORTLAND, ME**

- A. A.W.R Grace or Equal.
  - 1. Beams & Interior Columns, Monokote Z-106/HY Medium Density, 3 hour rating.
- B. Fire Resistance Schedule: Steel Columns, Beams & Bracing – 3 Hours.

**2.02 MATERIALS**

- A. Install materials with the following performance characteristics:

	Standard (15# Density)
Minimum Individual and Average Density (unless higher in the UL Fire Resistance Directory)	15 pcf
Compressive Strength ASTM E-761	1,200 psf
Bond Strength ASTM E736	200 psf

- 2. Flame Spread of "0" per ASTM E-84;
  - 3. Classified as to fire resistance in accordance with the designs in the UL "Fire Resistance Directory" using ASTM E-119;
  - 4. Non-combustible per ASTM E-136
  
  - 5. Maximum allowable weight loss shall be 0.005 grams/sq. ft. when tested under ASTM E-859;
  - 6. Fireproofing shall not promote corrosion when measured by ASTM E-937. Testing shall evaluate "as applied" conditions including any accelerators added at the mixer or nozzle.
- B. Fireproofing materials shall contain no asbestos and be formulated to be applied with a wet-slurry, not sprayed fibers with water added at the application site.
  
  - C. Water shall be potable and free of substances which would adversely affect fireproofing materials.

**PART 3 - EXECUTION**

**3.01 PREPARATION**

- A. Clean substrates of rust, mill scale, paint, primers, dirt, dust, grease, oil and other substances which may affect the bond strength.
- B. Painted or primed steel members shall be treated following the requirements in the UL Fire Resistance Directory.

**3.03 INSTALLATION**

- A. Coordinate installation of fireproofing with other Work in order to minimize the need to cut or remove fireproofing.
- B. Mix and apply fireproofing materials in accordance with manufacturer's printed instructions and

fire-resistive ratings specified. Apply to all areas requiring fireproofing, as shown on the Drawings. Thickness and density, as measured by UBC Standard 7-6, to comply with the specifications and UL "Fire Resistance Directory".

- C. Protect fireproofing until permanent cover is installed, or until completion where exposed to view in the completed Work.

#### **3.04 FIELD QUALITY CONTROL**

- A. As the work progresses, the Testing Agency shall perform thickness and density testing using UBC Standard 7-6. The results of that testing shall be made available to contractor and architect at the completion of each Test Area. The Testing Agency shall perform bond tests, if required, using ASTM E 736.

#### **3.05 CLEANING**

- A. After completion of each day's work, remove overspray materials and clean exposed surfaces to remove evidence of soiling by fireproofing materials.

**END OF SECTION**

**SECTION 07 84 13**

**FIRESTOPPING**

**PART 1 - GENERAL**

1.01 RELATED DOCUMENTS

- A. Drawings and general provisions of Contract, including General and Supplementary Conditions and Division-1 Specification Section, apply to work specified in this section.

1.02 DEFINITIONS

- A. Firestopping: Material or combination of materials used to retain integrity of fire-rated construction by maintaining an effective barrier against the spread of flame, smoke, and hot gases through penetrations in, or construction joints between, fire rated wall and floor assemblies.

1.03 GENERAL DESCRIPTION OF THE WORK OF THIS SECTION

Only tested firestop systems shall be used in specific locations as follows:

- A. Penetrations for the passage of duct, cable, cable tray, conduit, piping, electrical busways and raceways through fire-rated vertical barriers (walls and partitions), horizontal barriers (floor/ceiling assemblies), and vertical service shaft walls and partitions.
- B. Safing slot gaps between edge of floor slabs and curtain walls.
- C. Openings between structurally separate sections of wall or floors.
- D. Gaps between the top of walls and ceilings or roof assemblies.
- E. Expansion joints in walls and floors.
- F. Openings and penetrations in fire-rated partitions or walls containing fire doors.
- G. Openings around structural members which penetrate floors or walls.

1.04 RELATED WORK OF OTHER SECTIONS

- A. Coordinate work of this section with work of other sections as required to properly execute the work and as necessary to maintain satisfactory progress of the work of other sections, including:
  - 1. Section 03 30 00 - Cast-In-Place Concrete
  - 2. Section 04 20 00 - Unit Masonry

3. Section 07 90 00 - Joint Sealants
4. Section 09 20 00 - Plaster and Gypsum Board
5. Section 21 00 00 - Fire Suppression
6. Section 22 00 00 - Plumbing
7. Section 23 00 00 - Heating, Ventilating, and Air Conditioning (HVAC)
8. Section 26 00 00 - Electrical
9. Section 26 00 00 - Communications

#### 1.05 REFERENCES

- A. Test Requirements: ASTM E 814, "Standard Method of Fire Tests of Through Penetration Fire Stops"
- B. Test Requirements: UL 1479, "Fire Tests of Through-Penetration Firestops"
- C. Test Requirements: UL 2079, "Tests for Fire Resistance of Building Joint Systems"
- D. Underwriters Laboratories (UL) of Northbrook, IL publishes tested systems in their "FIRE RESISTANCE DIRECTORY" that is updated annually.
  1. UL Fire Resistance Directory:
    - a. Firestop Devices (XHJI)
    - b. Fire Resistance Ratings (BXRH)
    - c. Through-Penetration Firestop Systems (XHEZ)
    - d. Fill, Voids, or Cavity Material (XHHW)
    - e. Forming Materials (XHKU)
    - f. Joint Systems (XHBN)
    - g. Perimeter Fire Containment Systems (XHDG)
  2. Alternate Systems: "Omega Point Laboratories Directory" (updated annually).
- E. Test Requirements: ASTM E 1966, "Standard Test Method for Fire Resistive Joint Systems"
- F. Test Requirements: ASTM E 2307, "Standard Test Method for Determining Fire Resistance of Perimeter Fire Barrier Systems Using Intermediate-Scale, Multi-story Test Apparatus"
- G. Inspection Requirements: ASTM E 2174, "Standard Practice for On-site Inspection of Installed Fire Stops"
- H. ASTM E 84, "Standard Test Method for Surface Burning Characteristics of Building Materials"
- I. International Firestop Council Guidelines for Evaluating Firestop Systems Engineering Judgments
- J. International Building Code (IBC 2009)

- K. NFPA 101 - Life Safety Code
- L. NFPA 70 - National Electric Code

1.06 QUALITY ASSURANCE

- A. Fire-Test-Response Characteristics: Provide through-penetration fire stop systems and fire-resistive joint systems that comply with specified requirements of tested systems.
- B. Fire stop System installation must meet requirements of ASTM E 814, UL 1479 or UL 2079 tested assemblies that provide a fire rating equal to that of construction being penetrated.
- C. Proposed fire stop materials and methods shall conform to applicable governing codes having local jurisdiction.
- D. Fire stop Systems do not reestablish the structural integrity of load bearing partitions/assemblies, or support live loads and traffic. Installer shall consult the structural engineer prior to penetrating any load bearing assembly.
- E. For those firestop applications that exist for which no qualified tested system is available through a manufacturer, an engineering judgment derived from similar qualified tested system designs or other tests will be submitted to local authorities having jurisdiction for their review and approval prior to installation. Engineering judgment documents must follow requirements set forth by the International Firestop Council.

1.07 SUBMITTALS

- A. Submit Product Data: Manufacturer's specifications and technical data for each material including the composition and limitations, documentation of qualified tested firestop systems to be used and manufacturer's installation instructions to comply with Section 01 30 00.
- B. Manufacturer's engineering judgment identification number and document details when no qualified tested system is available for an application. Engineering judgment must include both project name and contractor's name who will install firestop system as described in document.
- C. Submit material safety data sheets provided with product delivered to job-site.

1.08 INSTALLER QUALIFICATIONS

- A. Engage an experienced Installer who is certified, licensed, or otherwise qualified by the firestopping manufacturer as having been provided the necessary training to install manufacturer's products per specified requirements. A supplier's willingness to sell its

firestopping products to the Contractor or to an Installer engaged by the Contractor does not in itself confer qualification on the buyer.

- B. Installation Responsibility: assign installation of through-penetration firestop systems and fire-resistive joint systems in Project to a single sole source firestop specialty contractor.

- NOTE: THE REQUIREMENT FOR A SINGLE SOLE SOURCE FIRESTOP SPECIALTY CONTRACTOR IS A CONDITION OF THE BUILDING PERMIT AND IS NOT NEGOTIABLE. FIRESTOPPING CANNOT BE INSTALLED ON A TRADE-BY-TRADE BASIS.

- C. The work is to be installed by a contractor with at least one of the following qualifications:

FM 4991 Approved Contractor  
UL Approved Contractor  
Hilti Accredited Fire Stop Specialty Contractor

#### 1.09 DELIVERY, STORAGE, AND HANDLING

- A. Deliver materials undamaged in manufacturer's clearly labeled, unopened containers, identified with brand, type, and UL label where applicable.
- B. Coordinate delivery of materials with scheduled installation date to allow minimum storage time at job-site.
- C. Store materials under cover and protect from weather and damage in compliance with manufacturer's requirements, including temperature restrictions.
- D. Comply with recommended procedures, precautions or remedies described in material safety data sheets as applicable.
- E. Do not use damaged or expired materials.

#### 1.10 PROJECT CONDITIONS

- A. Do not use materials that contain flammable solvents.
- B. Schedule installation of firestopping after completion of penetrating item installation but prior to covering or concealing of openings.
- C. Verify existing conditions and substrates before starting work. Correct unsatisfactory conditions before proceeding.

- D. Weather conditions: Do not proceed with installation of firestop materials when temperatures exceed the manufacturer's recommended limitations for installation printed on product label and product data sheet.
- E. During installation, provide masking and drop cloths to prevent firestopping materials from contaminating any adjacent surfaces.

## PART 2 - PRODUCTS

### 2.01 FIRESTOPPING - GENERAL

- A. Provide firestopping composed of components that are compatible with each other, the substrates forming openings, and the items, if any, penetrating the firestopping under conditions of service and application, as demonstrated by the firestopping manufacturer based on testing and field experience.
- B. Provide components for each firestopping system that are needed to install fill material. Use only components specified by the firestopping manufacturer and approved by the qualified testing agency for the designated fire-resistance-rated systems.
- C. Penetrations in Fire Resistance Rated Walls: Provide firestopping with ratings determined in accordance with UL 1479 or ASTM E 814.
  - 1. F-Rating: Not less than the fire-resistance rating of the wall construction being penetrated.
- D. Penetrations in Horizontal Assemblies: Provide firestopping with ratings determined in accordance with UL 1479 or ASTM E 814.
  - 1. F-Rating: Minimum of 1-hour rating, but not less than the fire-resistance rating of the floor construction being penetrated.
  - 2. T-Rating: when penetrant is located outside of a wall cavity, minimum of 1-hour rating, but not less than the fire-resistance rating of the floor construction being penetrated.
  - 3. W-Rating: Class 1 rating in accordance with water leakage test per UL 1479.
- E. Penetrations in Smoke Barriers: Provide firestopping with ratings determined in accordance with UL 1479 or ASTM E 814.
  - 1. L-Rating: Not exceeding 5.0 cfm/sq. ft. of penetration opening at both ambient and elevated temperatures.
- F. Mold Resistance: Provide penetration firestopping with mold and mildew resistance rating of 0 as determined by ASTM G21.

- G. Firestopping Materials are either “cast-in-place” (integral with concrete placement) or “post installed.” Provide cast-in-place firestop devices prior to concrete placement.

## 2.02 ACCEPTABLE MANUFACTURERS

- A. Subject to compliance with through penetration firestop systems (XHEZ), joint systems (XHBN), and perimeter firestop systems (XHDG) listed in Volume 2 of the UL Fire Resistance Directory; provide products of the following manufacturers as identified below:
  - 1. Hilti, Inc., Tulsa, Oklahoma  
800-879-8000  
[www.us.hilti.com](http://www.us.hilti.com)  
Chris Allington 508-509-8316  
Chris.allington@hilti.com
  - 2. Substitution requests shall be considered in accordance with contract provisions.

## 2.03 MATERIALS

- A. Use only firestop products that have been UL 1479, ASTM E 814 or UL 2079 tested for specific fire-rated construction conditions conforming to construction assembly type, penetrating item type, annular space requirements, and fire-rating involved for each separate instance.
- B. Pre-installed firestop devices for use with noncombustible and combustible pipes (closed and open systems), conduit, and/or cable bundles penetrating concrete floors and/or gypsum walls, the following products are acceptable:
  - 1. Hilti Cast-In Place Firestop Device (CP 680-P)
    - a. Add Aerator Adaptor when used in conjunction with aerator system.
  - 2. Hilti Tub Box Kit (CP 681) for use with tub installations.
  - 3. Hilti Cast-In Place Firestop Device (CP 680-M) for use with noncombustible penetrants.
  - 4. Hilti Speed Sleeve (CP 653) for use with cable penetrations.
  - 5. Hilti Firestop Drop-In Device (CFS-DID) for use with noncombustible and combustible penetrants.
  - 6. Hilti Firestop Block (CFS-BL)
- C. Sealants, caulking materials, or foams for use with non-combustible items including steel pipe, copper pipe, rigid steel conduit and electrical metallic tubing (EMT), the following products are acceptable:
  - 1. Hilti Intumescent Firestop Sealant (FS-ONE)
  - 2. Hilti Self-leveling Firestop Sealant (CP 604)
  - 3. Hilti Fire Foam (CP 620)
  - 4. Hilti Flexible Firestop Sealant (CP 606)



5. Hilti Elastomeric Firestop Sealant (CP 601S)
- D. Sealants or caulking materials for use with sheet metal ducts, the following products are acceptable:
1. Hilti Elastomeric Firestop Sealant (CP 601S)
  2. Hilti Flexible Firestop Sealant (CP 606)
  3. Hilti Intumescent Firestop Sealant (FS-ONE)
- E. Sealants, caulking or spray materials for use with fire-rated construction joints and other gaps, the following products are acceptable:
1. Hilti Firestop Joint Spray (CFS-SP WB)
  2. Hilti Elastomeric Firestop Sealant (CP 601S)
  3. Hilti Flexible Firestop Sealant (CP 606)
  4. Hilti Self-leveling Firestop Sealant (CP 604)
- F. Pre-formed mineral wool designed to fit flutes of metal profile deck and gap between top of wall and metal profile deck; as a backer for spray material.
1. Hilti Speed Plugs (CP 777)
  2. Hilti Speed Strips (CP 767)
- G. Intumescent sealants, caulking materials for use with combustible items (penetrants consumed by high heat and flame) including insulated metal pipe, PVC jacketed, flexible cable or cable bundles and plastic pipe, the following products are acceptable:
1. Hilti Intumescent Firestop Sealant (FS-ONE)
- H. Foams, intumescent sealants, or caulking materials for use with flexible cable or cable bundles, the following products are acceptable:
1. Hilti Intumescent Firestop Sealant (FS-ONE)
  2. Hilti Fire Foam (CP 620)
  3. Hilti Elastomeric Firestop Sealant (CP 601S)
  4. Hilti Flexible Firestop Sealant (CP 606)
- I. Non-curing, re-penetrable intumescent putty or foam materials for use with flexible cable or cable bundles, the following products are acceptable:
1. Hilti Firestop Putty Stick (CP 618)
  2. Hilti Firestop Plug (CFS-PL)
- J. Wall opening protective materials for use with U.L. listed metallic and specified nonmetallic outlet boxes, the following products are acceptable:
1. Hilti Firestop Putty Pad (CP 617)

2. Hilti Firestop Box Insert
- K. Firestop collar or wrap devices attached to assembly around combustible plastic pipe (closed and open piping systems), the following products are acceptable:
1. Hilti Firestop Collar (CP 643N)
  2. Hilti Firestop Collar (CP 644)
  3. Hilti Wrap Strips (CP 648E/648S)
- L. Materials used for large openings and complex penetrations made to accommodate cable trays and bundles, multiple steel and copper pipes, electrical busways in raceways, the following products are acceptable:
1. Hilti Firestop Mortar (CP 637)
  2. Hilti Firestop Block (CFS-BL)
  3. Hilti Fire Foam (CP 620)
  4. Hilti Firestop Board (CP 675T)
- M. Non curing, re-penetrable materials used for large size/complex penetrations made to accommodate cable trays and bundles, multiple steel and copper pipes, electrical busways in raceways, the following products are acceptable:
1. Hilti Firestop Block (CFS-BL)
  2. Hilti Firestop Board (CP 675T)
- N. Sealants or caulking materials used for openings between structurally separate sections of wall and floors, the following products are acceptable:
1. Hilti Firestop Joint Spray (CFS-SP WB)
  2. Hilti Elastomeric Firestop Sealant (CP 601S)
  3. Hilti Flexible Firestop Sealant (CP 606)
  4. Hilti Self-leveling Firestop Sealant (CP 604)
- O. For blank openings made in fire-rated wall or floor assemblies, where future penetration of pipes, conduits, or cables is expected, the following products are acceptable:
1. Hilti CFS-BL Firestop Block
  2. Hilti CFS-PL Firestop Plug
- P. Provide a firestop system with a "F" Rating as determined by UL 1479 or ASTM E814 which is equal to the time rating of construction being penetrated.
- Q. Provide a firestop system with an Assembly Rating as determined by UL 2079 which is equal to the time rating of construction joint assembly.

### PART 3 - EXECUTION

#### 3.01 PREPARATION

- A. Verification of Conditions: Examine areas and conditions under which work is to be performed and identify conditions detrimental to proper or timely completion.
  - 1. Verify penetrations are properly sized and in suitable condition for application of materials.
  - 2. Surfaces to which firestop materials will be applied shall be free of dirt, grease, oil, rust, laitance, release agents, water repellents, and any other substances that may affect proper adhesion.
  - 3. Provide masking and temporary covering to prevent soiling of adjacent surfaces by firestopping materials.
  - 4. Comply with manufacturer's recommendations for temperature and humidity conditions before, during and after installation of firestopping.
  - 5. Do not proceed until unsatisfactory conditions have been corrected.

#### 3.02 COORDINATION

- A. Coordinate construction of openings, penetrations and construction joints to ensure that the fire stop systems are installed according to specified requirements.
- B. Coordinate sizing of sleeves, openings, core-drilled holes, or cut openings to accommodate through-penetration fire stop systems. Coordinate construction and sizing of joints to ensure that fire-resistive joint systems are installed according to specified requirements.
- C. Coordinate fire stopping with other trades so that obstructions are not placed in the way prior to the installation of the fire stop systems.
- D. Do not cover up through-penetration fire stop and joint system installations that will become concealed behind other construction until each installation has been examined by the building inspector.

#### 3.03 INSTALLATION

- A. Regulatory Requirements: Install firestop materials in accordance with UL Fire Resistance Directory or Omega Point Laboratories Directory.
- B. Manufacturer's Instructions: Comply with manufacturer's instructions for installation of through-penetration and construction joint materials.
  - 1. Seal all holes or voids made by penetrations to ensure an air and water resistant seal.

2. Consult with mechanical engineer, project manager, and damper manufacturer prior to installation of UL firestop systems that might hamper the performance of fire dampers as it pertains to duct work.
3. Protect materials from damage on surfaces subjected to traffic.

#### 3.04 FIELD QUALITY CONTROL

- A. Examine sealed penetration areas to ensure proper installation before concealing or enclosing areas.
- B. Keep areas of work accessible until inspection by applicable code authorities.
- C. Inspection of through-penetration firestopping shall be performed in accordance with ASTM E 2174, "Standard Practice for On-Site Inspection of Installed Fire Stops" or other recognized standard.
- D. Perform under this section patching and repairing of firestopping caused by cutting or penetrating of existing firestop systems already installed by other trades.
- E. Manufacturer's Field Services: During Installation, provide periodic destructive testing inspections to assure proper installation/application. After installation is complete, submit findings in writing indicating whether or not the installation of the tested system identified was installed correctly.

#### 3.05 IDENTIFICATION & DOCUMENTATION

- A. The firestop contractor is to supply documentation for each single application addressed. This documentation is to identify each penetration and joint location on the entire project.
  - A.1 The Documentation Form for through penetrations is to include:
    1. A Sequential Location Number
    2. The Project Name
    3. Date of Installation
    4. Detailed description of the penetrations location
    5. Tested System or Engineered Judgment Number
    6. Type of assembly penetrated
    7. A detailed description of the size and type of penetrating item
    8. Size of opening
    9. Number of sides of assemblies addressed
    10. Hourly rating to be achieved
    11. Installers Name

A.2 The Documentation Form for Construction Joints is to include:

1. A Sequential Location Number
2. The Project Name
3. Date of Installation
4. Detailed description of the Construction Joints location
5. Tested System or Engineered Judgment Number
6. Type of Construction Joint
7. The Width of the Joint
8. The Lineal Footage of the Joint
9. Number of sides addressed
10. Hourly rating to be achieved
11. Installers Name

B. Copies of these documents are to be provided to the general contractor at the completion of the project.

C. Identify through-penetration firestop systems with pressure-sensitive, self-adhesive, preprinted vinyl labels. Attach labels permanently to surfaces of penetrated construction on both sides of each firestop system installation where labels will be visible to anyone seeking to remove penetrating items or firestop systems. Include the following information on labels:

1. The words: "Warning -Through Penetration Firestop System-Do Not Disturb. Notify Building Management of Any Damage."
2. Contractor's Name, address, and phone number.
3. Through-Penetration firestop system designation of applicable testing and inspecting agency.
4. Date of Installation.
5. Through-Penetration firestop system manufacturer's name.
6. Installer's Name.

### 3.06 ADJUSTING AND CLEANING

- A. Remove equipment, materials and debris, leaving area in undamaged, clean condition.
- B. Clean all surfaces adjacent to sealed holes and joints to be free of excess firestop materials and soiling as work progresses.

### 3.07 LABOR USE TO INSTALL FIRESTOP SYSTEMS

- A. To ensure complete harmony on the project site, the installation of each scope of work is to be performed jurisdictionally correct per existing trade agreements.

**END OF SECTION  
SEE SCHEDULE BELOW**

SECTION 07840 Appendix 1

FIRESTOPPING SCHEDULE

CONCRETE FLOORS		UL-CLASSIFIED SYSTEMS
TYPE OF PENETRANT	F-RATING HR	HILTI
CIRCULAR BLANK OPENINGS	1	FA 0006, CAJ 0070
	2	FA 0006, CAJ 0070
	3	CAJ 0055
SINGLE METAL PIPES OR CONDUIT	1	CAJ 1226, CAJ 1278, FA 1017
	2	CAJ 1226, CAJ 1278, FA 1017
	3	CAJ 1226, CAJ 1278, FA 1017
	4	CAJ 8095, CBJ 1034
SINGLE NON-METALLIC PIPE OR CONDUIT (I.E. PVC, CPVC, ABS, ENT)	1	CAJ 2109,  CAJ 2168, FA 2054, FA 2067
	2	CAJ 2109, CAJ 2168, FA 2054, FA 2067
	3	CAJ 2109, CAJ 2168, FA 2054,
	4	N/A*
SINGLE OR BUNDLED CABLES	1	FA 3007,

**20 THAMES STREET – PORTLAND, ME**

		CAJ 3095,
	2	FA 3007, CAJ 3095,
	3	FA 3007, CAJ 3095,
	4	N/A*
CABLE TRAY	1	CAJ 4034, CAJ 4054, CAJ 4017
	2	CAJ 4034, CAJ 4054, CAJ 4017
	3	CAJ 4034, CAJ 4017
	4	N/A*
<b>CONCRETE FLOORS (CONTINUED)</b>		<b>UL-CLASSIFIED SYSTEMS</b>
<b>TYPE OF PENETRANT</b>	<b>F-RATING HR</b>	<b>HILTI</b>
SINGLE INSULATED PIPES	1	FA 5016, FA 5017, CAJ 5090, CAJ 5091,
	2	FA 5016, FA 5017 CAJ 5090, CAJ 5091,
	3	FA5016, CAJ 5061, CAJ 5090,
	4	CBJ 5006
ELECTRICAL BUSWAY	1	CAJ 6006, CAJ 6017
	2	CAJ 6006, CAJ 6017
	3	CAJ 6006, CAJ 6017
NON-INSULATED MECHANICAL DUCTWORK WITHOUT DAMPERS	1	CAJ 7046



**20 THAMES STREET – PORTLAND, ME**

		CAJ 7051
	2	CAJ 7046 CAJ 7051
	3	CAJ 7046 CAJ 7051
MIXED PENETRANTS	1	CAJ 8056, CAJ 8095, CAJ 8099
	2	CAJ 8056, CAJ 8095, CAJ 8099
	3	CAJ 8056, CAJ 8095, CAJ 8099
	4	CAJ 8095
<b>CONCRETE OR BLOCK WALLS</b>		<b>UL-CLASSIFIED SYSTEMS</b>
<b>TYPE OF PENETRANT</b>	<b>F-RATING</b>	<b>HILTI</b>
CIRCULAR BLANK OPENINGS	1	CAJ 0055,  CAJ 0070
	2	CAJ 0055, CAJ 0070
	3	CAJ 0055
SINGLE METAL PIPES OR CONDUIT	1	CAJ 1226,  CAJ 1278,
	2	CAJ 1226, CAJ 1278,
	3	CAJ 1226, CAJ 1278,
	4	CAJ 8095, CBJ 1034, WJ 1042
SINGLE NON-METALLIC PIPE OR CONDUIT (I.E. PVC, CPVC, ABS, ENT)	1	CAJ 2109,  WJ 2108, WJ 2121
	2	CAJ 2109, WJ 2108,

**20 THAMES STREET – PORTLAND, ME**

		WJ 2121
	3	CAJ 2109, CAJ 2168, WJ 2091
	4	WJ 2091
SINGLE OR BUNDLED CABLES	1	CAJ 3095, WJ 3060 WJ 3074
	2	CAJ 3095, WJ 3060 WJ 3074
	3	CAJ 3095, WJ 3050
	4	WJ 3050
CABLE TRAY	1	CAJ 4034, CAJ 4054, WJ 4016,
	2	CAJ 4034, CAJ 4054, WJ 4016,
	3	CAJ 4034, WJ 8007
	4	WJ 8007
<b>CONCRETE OR BLOCK WALLS (CONT)</b>		<b>UL-CLASSIFIED SYSTEMS</b>
<b>TYPE OF PENETRANT</b>	<b>F-RATING</b>	<b>HILTI</b>
SINGLE INSULATED PIPES	1	CAJ 5090, CAJ 5091, WJ 5042
	2	CAJ 5090, CAJ 5091, WJ 5042
	3	CAJ 5090, CAJ 5091,
	4	WJ 5028, CBJ 5006
ELECTRICAL BUSWAY	1	CAJ 6006, CAJ 6017
	2	CAJ 6006, CAJ 6017
	3	CAJ 6006,

**20 THAMES STREET – PORTLAND, ME**

		CAJ 6017
NON-INSULATED MECHANICAL DUCTWORK WITHOUT DAMPERS	1	CAJ 7046,  WJ 7029, WJ 7022
	2	CAJ 7046, WJ 7029, WJ 7022
	3	CAJ 7046 CAJ 7051
MIXED PENETRANTS	1	CAJ 8096, CAJ 8099 WJ 8007
	2	CAJ 8096, CAJ 8099 WJ 8007
	3	CAJ 8099 WJ 8007
	4	WJ 8007
<b>WOOD FLOORS</b>		<b>UL-CLASSIFIED SYSTEMS</b>
<b>TYPE OF PENETRANT</b>	<b>F-RATING</b>	<b>HILTI</b>
METAL PIPES OR CONDUIT	1	FC 1009, FC 1059
	2	FC 1009, FC 1059
NON-METALLIC PIPE OR CONDUIT	1	FC 2025, FC 2126
	2	FC 2025, FC 2126
SINGLE OR BUNDLED CABLES	1	FC 3012, FC 3044
	2	FC 3012
INSULATED PIPES	1	FC 5004, FC 5036, FC 5037

**20 THAMES STREET – PORTLAND, ME**

	2	FC 5004
NON-INSULATED MECHANICAL DUCTWORK WITHOUT DAMPERS	1	FC 7013
MIXED PENETRANTS	1	FC 8014, FC 8026
	2	N/A*
<b>GYPSUM WALLBOARD ASSEMBLIES</b>		<b>UL-CLASSIFIED SYSTEMS</b>
<b>TYPE OF PENETRANT</b>	<b>F-RATING</b>	<b>HILTI</b>
METAL PIPES OR CONDUIT	1	WL 1054, WL 1164
	2	WL 1054, WL 1164
	4	WL 1110
NON-METALLIC PIPE OR CONDUIT	1	WL 2078, WL 2075, WL 2128
	2	WL 2078, WL 2075, WL 2128
	4	WL 2184, WL 2245
SINGLE OR BUNDLED CABLES	1	WL 3065
	2	WL 3065
	4	WL 3139
CABLE TRAY	1	WL 4011, WL 4019
	2	WL 4011, WL 4019
	4	WL 8014
INSULATED PIPES	1	WL 5029, WL 5096
	2	WL 5029, WL 5096
	4	WL 5073

**20 THAMES STREET – PORTLAND, ME**

NON-INSULATED MECHANICAL DUCTWORK WITHOUT DAMPERS	1	WL 7040,  WL 7042
	2	WL 7040, WL 7042
MIXED PENETRANTS	1	WL 8004, WL 8013
	2	WL 8004, WL 8013
	4	WL 8014

**NOTES:**

- 1 Jobsite conditions of each through-penetration firestop system must meet all details of the UL-Classified System selected.
- 2 If jobsite conditions do not match any UL-classified systems in the schedules above, contact firestop manufacturer for alternative systems or Engineer Judgment Drawings.
- 3 Coordinate work with other trades to assure that penetration-opening sizes are appropriate for penetrant locations, and vice versa.
- 4 For 3-hour rated gypsum walls, contact the firestop manufacturer for a UL-classified system or engineer judgment drawing.
- 5 The Contractor shall verify that the schedule is current at the time of construction, and that each referenced system is suitable for the intended application.

**END OF SECTION**

SECTION 07 92 00

JOINT SEALANTS

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Silicone joint sealants.
2. Urethane joint sealants.
3. Latex joint sealants.
4. Solvent-release-curing joint sealants.
5. Acoustical joint sealants.
6. Preformed seals.

1.2 RELATED REQUIREMENTS

A.

1. Section 04 20 00 "Unit Masonry" for masonry control and expansion joint fillers and gaskets and for compatibility with flexible flashing components.
2. Section 04 21 13 "Brick Masonry" for masonry control and expansion joint fillers and gaskets and for compatibility with flexible flashing components.
3. Section 07 24 00 "Exterior Insulation and Finish Systems" for joint sealants [and compound system warranty for EIFS and joint sealants] used with EIFS.
4. Division 07 air barrier section for compatibility requirements with air barrier components.
5. Section 07 84 46 "Fire-Resistive Joint Systems" for sealing joints in fire-resistance-rated construction.
6. Section 08 85 00 "Glazing Sealants" for sealants for glazing installation, glazing framing perimeters, and structural glazing.
7. Section 08 80 00 "Glazing" for glazing sealants.
8. Section 08 84 00 "Plastic Glazing" for plastic glazing sealants.
9. Section 08 88 53 "Security Glazing" for security glazing sealants.
10. Section 32 13 73 "Concrete Paving Joint Sealants" for traffic grade joint sealants for concrete paving and parking decks.

1.3 REFERENCES

A. ASTM International (ASTM): [www.astm.org](http://www.astm.org):

1. ASTM C 510 - Standard Test Method for Staining and Color Change of Single- or Multicomponent Joint Sealants.
2. ASTM C 661 - Standard Test Method for Indentation Hardness of Elastomeric Type Sealants by Means of a Durometer.
3. ASTM C 719 - Standard Test Method for Adhesion and Cohesion of Elastomeric Joint Sealants Under Cyclic Movement (Hockman Cycle).
4. ASTM C 794 - Test Method for Adhesion-in-Peel of Elastomeric Joint Sealants
5. ASTM C 834 - Specification for Latex Sealants.
6. ASTM C 920 - Specification for Elastomeric Joint Sealants.

7. ASTM C 1087 - Test Method for Determining Compatibility of Liquid-Applied Sealants with Accessories Used in Structural Glazing Systems.
  8. ASTM C 1193 - Guide for Use of Joint Sealants.
  9. ASTM C 1247 - Standard Test Method for Durability of Sealants Exposed to Continuous Immersion in Liquids.
  10. ASTM C 1248 - Test Method for Staining of Porous Substrate by Joint Sealants.
  11. ASTM C 1311 - Specification for Solvent Release Sealants.
  12. ASTM C 1330 - Cylindrical Sealant Backing for Use with Cold Liquid Applied Sealants.
  13. ASTM D 412 - Test Methods for Vulcanized Rubber and Thermoplastic Elastomers—Tension.
  14. ASTM D 624 - Test Method for Tear Strength of Conventional Vulcanized Rubber and Thermoplastic Elastomers.
  15. ASTM D 2203 - Standard Test Method for Staining from Sealants.
  16. ASTM D 2240 - Test Method for Rubber Property - Durometer Hardness.
- B. California Department of Public Health: [www.cdph.ca.gov](http://www.cdph.ca.gov)
1. Standard Method for the Testing and Evaluation of Volatile Organic Chemical Emissions from Indoor Sources Using Environmental Chambers.
- C. NSF International (NSF): [www.nsf.org](http://www.nsf.org):
1. Standard 51 - Food Equipment Materials.
- D. Sealant, Waterproofing, and Restoration Institute (SWRI): [www.swrionline.org](http://www.swrionline.org):
1. SWRI Validation Program.
- E. U. S. Environmental Protection Agency (EPA): [www.epa.gov](http://www.epa.gov):
1. 40 CFR 59, Subpart D - National Volatile Organic Compound Emission Standards for Architectural Coatings.
- F. U.S. Food and Drug Administration (FDA): [www.fda.gov](http://www.fda.gov):
1. 21 CFR 177.2600 - Title 21 Part 177 Indirect Food Additives: Polymers.
- G. US Green Building Council (USGBC): [www.usgbc.org](http://www.usgbc.org):
1. Leadership in Energy and Environmental Design (LEED) Green Building Rating System.
- 1.4 ADMINISTRATIVE REQUIREMENTS
- A. Coordination: Coordinate installation of joint sealants with cleaning of joint sealant substrates and other operations that may impact installation or finished joint sealant work.
  - B. Preinstallation Conference: Conduct conference at Project Site.
- 1.5 ACTION SUBMITTALS
- A. Product Data: For each type of joint sealant product specified, including:
    1. Preparation instructions and recommendations.

2. Standard drawings illustrating manufacturer's recommended sealant joint profiles and dimensions applicable to Project.

B. Samples for Color Selection: For each joint sealant type.

C. Samples for Verification: For each exterior joint sealant product, for each color selected.

#### 1.6 INFORMATIONAL SUBMITTALS

A. Qualification Data: For qualified applicator.

B. Greenguard Certificates: For each sealant and accessory product specified to meet volatile organic emissions standards of the Greenguard Children and Schools Certification.

C. Sealant, Waterproofing, and Restoration Institute (SWRI) Validation Certificate: For each sealant specified to be validated by SWRI's Sealant Validation Program.

D. Warranty: Sample of unexecuted manufacturer and installer special warranties.

E. Preconstruction Compatibility and Adhesion Pull Test Reports: From manufacturer. Include written interpretation of reports and recommendations for primers and substrate preparation.

F. Preconstruction field-adhesion test reports.

G. Field quality control adhesion test reports.

#### 1.7 QUALITY ASSURANCE

A. Installer Qualifications: Company with minimum of three years experience specializing in work of this section, employing applicators trained for application of joint sealants required for this project, with record of successful completion of projects of similar scope, and approved by manufacturer.

B. Single Source Responsibility: Provide exterior joint sealants by a single manufacturer responsible for testing of Project substrates to verify compatibility and adhesion of joint sealants.

C. Preconstruction Manufacturer Laboratory Compatibility, Staining, and Adhesion Testing: Submit samples of each substrate or adjacent material that will be in contact with or affect joint sealants. Current manufacturer test data of products on matching substrates will be acceptable.

1. Adhesion: Use ASTM C 719 and ASTM C 794 to determine requirements for joint preparation, including cleaning and priming.

2. Compatibility: Use ASTM C 1087 to determine materials forming joints and adjacent materials do not adversely affect sealant materials and do not affect sealant color.

3. Stain Testing: Use ASTM C 510, ASTM C 1248, or ASTM D 2203 to verify non-staining characteristics of proposed sealants on specified substrates.

4. Pre-construction manufacturer laboratory testing is not required when sealant manufacturer can furnish data acceptable to Architect based on previous testing for materials matching those of the Work.



## 20 THAMES STREET – PORTLAND, ME

- D. Preconstruction Field-Adhesion Testing: Prior to installing joint sealants, field test adhesion to joint substrates using ASTM C 1193 Method A. Verify adhesion is adequate. Modify joint preparation recommendations for failed joints and re-test. Submit written test report.
- E. Mockups: Provide joint sealant application within mockups required in other sections identical to specified joint sealants and installation methods.

### 1.8 DELIVERY, STORAGE AND HANDLING

- A. Accept materials on site in manufacturer's unopened original packaging.
- B. Store primers and sealants in dry location with ambient temperature range of 60 to 80 deg. F (15 to 27deg. C).

### 1.9 ENVIRONMENTAL REQUIREMENTS

- A. Do not install primers or sealants when atmospheric temperatures or joint surface temperatures are less than 40 deg. F (4 deg. C).

### 1.10 SCHEDULING

- A. Schedule work so waterproofing, water repellents and preservative finishes are installed after sealants, unless sealant manufacturer approves otherwise in writing.
- B. Ensure sealants are cured before covering with other materials.

### 1.11 WARRANTY

- A. Special Manufacturer's Warranty: Manufacturer's standard form in which joint sealant manufacturer agrees to furnish joint sealants to repair or replace those that demonstrate deterioration or adhesive or cohesive failure under normal use within warranty period specified.
  - 1. Warranty Period for Silicone Sealants: Five years date of Substantial Completion.
- B. Special Installer's Warranty: Original statement on Installer's letterhead in which Installer agrees to repair or replace joint sealants that demonstrate deterioration or failure within warranty period specified.
  - 1. Warranty Period: Five years from date of Substantial Completion.

## PART 2 - PRODUCTS

### 2.1 MANUFACTURERS

- A. Basis-of-Design Products: Provide joint sealant products manufactured by **Tremco, Inc., Commercial Sealants and Waterproofing Division, An RPM Company**, Beachwood OH; (866) 321-6357; email: [techresources@tremcoinc.com](mailto:techresources@tremcoinc.com); [www.tremcosealants.com](http://www.tremcosealants.com), [or comparable products of other manufacturer approved by Architect in accordance with Instructions to Bidders and Division 01 General Requirements].

2.2 MATERIALS, GENERAL

- A. VOC Content for Interior Applications: Provide sealants and sealant primers complying with the following VOC content limits per 40 CFR 59, Subpart D (EPA Method 24):
  - 1. Architectural Sealants: 250 g/L.
  - 2. Sealant Primers for Nonporous Substrates: 250 g/L.
  - 3. Sealant Primers for Porous Substrates: 775 g/L.
- B. Low-Emitting Sealants for Interior Applications: Provide sealants and sealant primers complying 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."
- C. Compatibility: Provide joint sealants and accessory materials that are compatible with one another, and with adjacent materials, as demonstrated by sealant manufacturer using ASTM C 1087 testing and related experience.
- D. Joint Sealant Standard: Comply with ASTM C 920 and other specified requirements for each joint sealant.
- E. Stain Test Characteristics: Where sealants are required to be nonstaining, provide sealants tested per ASTM C 1248 as non-staining on porous joint substrates specified.

2.3 SILICONE JOINT SEALANTS

- A. Single-Component, Nonsag, Non-Staining, Neutral-Curing Silicone Joint Sealant: ASTM C 920, Type S, Grade NS, Class 100/50, Use NT; SWRI validated.
  - 1. Basis of Design Product: **Tremco, Inc., Spectrem 1.**
  - 2. Volatile Organic Compound (VOC) Content: 1 g/L maximum.
  - 3. Volatile Organic Emissions (VOE): Not greater than Greenguard Children & Schools Certification emissions levels.
  - 4. Staining, ASTM C 1248: None on concrete, marble, granite, limestone, and brick.
  - 5. Color: As selected by Architect from manufacturer's standard line of not less than 12 colors.
- B. Single-Component, Nonsag, Non-Staining, Neutral-Curing Silicone Joint Sealant: ASTM C 920, Type S, Grade NS, Class 50, Use NT; SWRI validated.
  - 1. Basis of Design Product: **Tremco, Inc., Spectrem 2.**
  - 2. Volatile Organic Compound (VOC) Content: 50 g/L maximum.
  - 3. Volatile Organic Emissions (VOE): Not greater than Greenguard Children & Schools Certification emissions levels.
  - 4. Staining, ASTM C 1248: None on concrete, marble, granite, limestone, and brick.
  - 5. Color: As selected by Architect from manufacturer's standard line of not less than 10 colors.
- C. Single-Component, Nonsag, Non-Staining, Neutral-Curing Silicone Joint Sealant: ASTM C 920, Type S, Grade NS, Class 50, Use NT.
  - 1. Basis of Design Product: **Tremco, Inc., Spectrem 3.**
  - 2. Volatile Organic Compound (VOC) Content: 20 g/L maximum.

**20 THAMES STREET – PORTLAND, ME**

3. Volatile Organic Emissions (VOE): Not greater than Greenguard Children & Schools Certification emissions levels.
4. Staining, ASTM C 1248: None on concrete, marble, granite, limestone, and brick.
5. Color: As selected by Architect from manufacturer's standard line of not less than 15 colors.

- D. Multi-Component, Nonsag, Non-Staining, Field-Tintable Neutral-Curing Silicone Joint Sealant: ASTM C 920, Type S, Grade NS, Class 50, Use NT.

1. Basis of Design Product: **Tremco, Inc., Spectrem 4-TS.**
2. Volatile Organic Compound (VOC) Content: 20 g/L maximum.
3. Volatile Organic Emissions (VOE): Not greater than Greenguard Children & Schools Certification emissions levels.
4. Staining, ASTM C 1248: None on concrete, marble, granite, limestone, and brick.
5. Color: [Match Architect's custom color] [As selected by Architect from manufacturer's standard line of not less than 70 colors].

- E. Mildew-Resistant, Single-Component, Acid-Curing Silicone Joint Sealant: ASTM C 920, Type S, Grade NS, Class 25, Use NT.

1. Basis of Design Product: **Tremco, Inc., Tremsil 200 Sanitary.**
2. Volatile Organic Compound (VOC) Content: 1 g/L maximum.
3. Volatile Organic Emissions (VOE): Not greater than Greenguard Children & Schools Certification emissions levels.
4. Color: [White] [and] [Clear].

2.4 URETHANE JOINT SEALANTS

- A. Single-Component, Nonsag, Moisture-Cure, Polyurethane Joint Sealant: ASTM C 920, Type S, Grade NS, Class 50, Use NT; Greenguard certified.

1. Basis of Design Product: **Tremco, Inc., Dymonic 100.**
2. Volatile Organic Compound (VOC) Content: 40 g/L maximum.
3. Volatile Organic Emissions (VOE): Not greater than Greenguard Children & Schools Certification emissions levels.
4. Tensile Strength ASTM D412: 350 to 450 psi
5. Percent Elongation ASTM D412: 800 to 900%
6. Modulus at 100% ASTM D412: 75 to 85 psi
7. Tear Strength ASTM D412: 65 to 75 psi
8. Smoke Development ASTM E84: 5
9. Color: As selected by Architect from manufacturer's standard line of not less than 20 colors.

- B. Single-Component, Nonsag, Moisture-Cure, Polyurethane Hybrid Joint Sealant: ASTM C 920, Type S, Grade NS, Class 35, Use NT; Greenguard certified.

1. Basis of Design Product: **Tremco, Inc., Dymonic FC.**
2. Extrusion Rate ASTM C1183: 93.1 mL/min
3. Weight Loss ASTM C1246: Pass
4. Tack Free Time ASTM C679: 3 to 4 hr
5. Volatile Organic Compound (VOC) Content: 10 g/L maximum.
6. Volatile Organic Emissions (VOE): Not greater than Greenguard Children & Schools Certification emissions levels.

## 20 THAMES STREET – PORTLAND, ME

7. Color: As selected by Architect from manufacturer's standard line of not less than 15 colors.
- C. Single-Component, Nonsag, Polyurethane Joint Sealant: ASTM C920, Type S, Grade NS, Class 25, Use NT.
1. Basis of Design Product: **Tremco, Inc., Vulkem 116.**
  2. Volatile Organic Compound (VOC) Content: 60 g/L maximum.
  3. Color: As selected by Architect from manufacturer's standard line of not less than 15 colors.
- D. Immersible, Single-Component, Pourable, Traffic Grade Polyurethane Joint Sealant: ASTM C 920, Type S, Grade P, Class 50, Use T and I.
1. Basis of Design Product: **Tremco, Inc., Vulkem 45 SSL.**
  2. Volatile Organic Compound (VOC) Content: 110 g/L maximum.
  3. Volatile Organic Emissions (VOE): Not greater than Greenguard Children & Schools Certification emissions levels.
  4. Color: As selected by Architect from manufacturer's standard line of not less than 5 colors.
- E. Immersible, Multi-Component, Pourable, Traffic-Grade Polyurethane Joint Sealant: ASTM C 920, Type M, Grade P, Class 35, Use T, O, and I.
1. Basis of Design Product: **Tremco, Inc., Vulkem 445SSL.**
  2. Tensile Strength, ASTM D 412: 250 psi (1.7 MPa), at 100 percent elongation.
  3. Tear Strength, ASTM D 412: 35 pli (6.1 kN/m).
  4. Adhesion to Concrete, After Water, ASTM C 794: 28 pli (4.4 kN/m)
  5. Hardness, ASTM C 661: 40 durometer Shore A, minimum.
  6. Accelerated Weathering, ASTM C 793: Pass.
  7. Volatile Organic Compound (VOC) Content: 106 g/L maximum.
  8. Color: As selected by Architect from manufacturer's standard line of 70 colors
- F. Multi-Component, Non-sag, Polyurethane Joint Sealant: ASTM C 920, Type M, Grade NS, Class 50, Use I.
1. Basis of Design Product: **Tremco, Inc., Dymeric 240 FC.**
  2. Volatile Organic Compound (VOC) Content: 0 g/L maximum.
  3. Volatile Organic Emissions (VOE): Not greater than Greenguard Children & Schools Certification emissions levels.
  4. Color: [Match Architect's custom color] [As selected by Architect from manufacturer's standard line of not less than 70 colors].

### 2.5 LATEX JOINT SEALANTS

- A. Latex Joint Sealant: Siliconized acrylic latex, ASTM C 834, Type OP, Grade NF.
1. Basis of Design Product: **Tremco, Inc., Tremflex 834.**
  2. Volatile Organic Compound (VOC) Content: 35 g/L maximum.
  3. Volatile Organic Emissions (VOE): Not greater than Greenguard Children & Schools Certification emissions levels.
  4. Color: White, paintable.

2.6 SOLVENT-RELEASE-CURING JOINT SEALANTS

- A. Butyl-Rubber-Based Joint Sealant: ASTM C 1311.
1. Basis of Design Product: **Tremco, Inc., Tremco Butyl Sealant.**
  2. Volatile Organic Compound (VOC) Content: 250 g/L maximum.
  3. Color: As selected by Architect from manufacturer's standard colors.

2.7 ACOUSTICAL SEALANTS

- A. **Acoustical/Curtainwall Sealant:** Single-component, non-hardening, non-sag, paintable synthetic rubber-tested to reduce airborne sound transmission through perimeter joints and openings in building construction as demonstrated by testing of similar assemblies according to ASTM E 90.
1. Basis of Design Product: **Tremco, Inc., Tremco Acoustical/Curtainwall Sealant.**
  2. Volatile Organic Compound (VOC) Content: 160 g/L maximum.
  3. Color: White, paintable.

2.8 PRE-FORMED SEALS

- A. Preformed Silicone Joint Seals: Manufacturer's standard seal consisting of precured low-modulus silicone extrusion, in sizes to fit applications indicated on Drawings, combined with a neutral-curing liquid silicone sealant for bonding seals to substrates.
1. Basis of Design Product: **Tremco, Inc.; Spectrem SimpleSeal.**
- B. Preformed Foam Joint Seals: Manufacturer's standard preformed, pre-compressed, open-cell foam seal manufactured from urethane foam with minimum density of 10 lb/cu. ft. (160 kg/cu. m), impregnated with water-repellent agent. Provide factory-produced pre-compressed sizes selected to fit joint widths; coated on one side with a pressure-sensitive adhesive.
1. Basis of Design Product: Tremco, illmod 600.
  2. Thermal conductivity ASTM C 518: .28-0.30 BTU-in/hr-°F-ft<sup>2</sup>
  3. Thermal resistance ASTM C 518: 3.3-3.6 hr-°F-ft<sup>2</sup>/BTU
  4. Frame spread ASTM E84: 0
  5. Smoke development ASTM E84: 5
  6. Volatile Organic Compound (VOC) Content: 0 g/L maximum.
  7. Volatile Organic Emissions (VOE): Not greater than Greenguard Children & Schools Certification emissions levels.
  8. Color: Black or Grey.

2.9 JOINT SEALANT ACCESSORIES

- A. Cylindrical Sealant Backing: ASTM C 1330, Type B non-absorbent, bi-cellular material with surface skin, or Type O open-cell polyurethane, as recommended by sealant manufacturer for application.
- B. Bond Breaker Tape: Polymer tape compatible with joint sealant and adjacent materials and recommended by sealant manufacturer.
- C. Joint Substrate Primers: Substrate primer recommended by sealant manufacturer for application.

- D. Cleaners: Chemical cleaners acceptable to joint sealant manufacturer.
- E. Masking tape: Non-staining, non-absorbent tape product compatible with joint sealants and adjacent joint surfaces.

### PART 3 - EXECUTION

#### 3.1 EXAMINATION

- A. Examine joint profiles and surfaces to determine if work is ready to receive joint sealants. Verify joint dimensions are adequate for development of sealant movement capability. Verify joint surfaces are clean, dry, and adequately cured. Proceed with joint sealant work once conditions meet sealant manufacturer's written recommendations.

#### 3.2 PREPARATION

- A. Joint Surface Cleaning: Clean joints prior to installing joint sealants using materials and methods recommended by sealant manufacturer. Comply with ASTM C 1193.
  - 1. Remove curing compounds, laitance, form-release agents, dust, and other contaminants.
  - 2. Clean nonporous and porous surfaces utilizing chemical cleaners acceptable to sealant manufacturer.
  - 3. Protect elements surrounding the Work of this section from damage or disfiguration. Apply masking tape to adjacent surfaces when required to prevent damage to finishes from sealant installation.

#### 3.3 SEALANT APPLICATION

- A. Sealant and Primer Installation Standard: Comply with ASTM C 1193 and manufacturer's written instructions.
- B. Joint Backing: Select joint backing materials recommended by sealant manufacturer as compatible with sealant and adjacent materials. Install backing material at depth required to produce profile of joint sealant allowing optimal sealant movement.
  - 1. Install joint backing to maintain the following joint ratios:
    - a. Joints up to 1/2 inch (13 mm) wide: 1:1 width to depth ratio.
    - b. Joints greater than 1/2 inch (13 mm) wide: 2:1 width to depth ratio; maximum 1/2 inch (13 mm) joint depth.
  - 2. Install bond breaker tape over substrates when sealant backings are not used.
- C. Masking: Mask adjacent surfaces to prevent staining or damage by contact with sealant or primer.
- D. Joint Priming: Prime joint substrates when recommended by sealant manufacturer or when indicated by preconstruction testing or experience. Apply recommended primer using sealant manufacturer's recommended application techniques.
- E. Liquid Sealant Application: Install sealants using methods recommended by sealant manufacturer, in depths recommended for application. Apply in continuous operation from

bottom to top of joint vertically and horizontally in a single direction. Apply using adequate pressure to fill and seal joint width.

1. Tool sealants immediately with appropriately shaped tool to force sealants against joint backing and joint substrates, eliminating voids and ensuring full contact.
  2. Install sealant free of air pockets, foreign embedded matter, ridges, and sags.
  3. Tool exposed joint surface concave using tooling agents approved by sealant manufacturer for application.
- F. Cleaning: Remove excess sealant using materials and methods approved by sealant manufacturer that will not damage joint substrate materials.
1. Remove masking tape immediately after tooling joint without disturbing seal.
  2. Remove excess sealant from surfaces while still uncured.
- G. Installation of Acoustical Sealant: At sound-rated assemblies and elsewhere as indicated, seal construction at perimeters, behind control joints, and at openings and penetrations on both sides of assemblies with a continuous bead of acoustical sealant. Comply with ASTM C 919 and with manufacturer's written recommendations.
- H. Installation of Preformed Seals: Install seals immediately after removing protective wrapping. Do not stretch or misshape material. Place seals to provide continuity at ends, turns, and intersections. Apply heat to sealant when recommended by sealant manufacturer's written instructions.

### 3.4 FIELD QUALITY CONTROL

- A. Field-Adhesion Testing: Perform adhesion tests in accordance with manufacturer's instructions and with ASTM C 1193, Method A.
1. Perform [5] tests for the first [1000 feet (300 m)] of joint length for each kind of sealant and joint substrate, and one test for each [1000 feet (300 m)] of joint length thereafter or 1 test per each floor per building elevation, minimum.
  2. For sealant applied between dissimilar materials, test both sides of joint.
- B. Remove sealants failing adhesion test, clean substrates, reapply sealants, and re-test. Test adjacent sealants to failed sealants.
- C. Submit report of field adhesion testing to Architect indicating tests, locations, dates, results, and remedial actions taken.

### 3.5 EXTERIOR JOINT-SEALANT SCHEDULE

- A. Exterior concealed transition joints in air barrier.
1. Joint Sealant: Single-component non-sag urethane sealant Dymonic 100 or 3M as part of the system.
  2. Compatibility: Compatible with air barrier components specified in Division 07 air barrier section.
- B. Exterior construction joints in [cast-in-place] [and] [tilt-up] concrete.
1. Joint Sealant: Single-component non-sag urethane sealant Dymonic 100.
  2. Joint-Sealant Color: As selected by Architect from manufacturer's standard colors.

- C. Exterior movement joints in concrete unit masonry.
  - 1. Joint Sealant: Single-component non-sag urethane sealant Dymonic 100.
  - 2. Joint-Sealant Color: As selected by Architect from manufacturer's standard colors.
  
- D. Exterior movement joints in brick masonry.
  - 1. Joint Sealant: Single-component non-sag urethane sealant Dymonic 100.
  - 2. Joint-Sealant Color, Vertical Joints: As selected by Architect from manufacturer's standard colors.
  - 3. Joint-Sealant Color, Horizontal Joints: As selected by Architect from manufacturer's full range] [Approved custom match to mortar at horizontal joints.
  
- E. Exterior joints within exterior insulation finish systems (EIFS).
  - 1. Joint Sealant: Single-component non-sag urethane sealant Dymonic FC.
  - 2. Joint-Sealant Color: As selected by Architect from manufacturer's standard colors] [Approved custom match to EIFS colors
  
- F. Exterior exposed joints in metal panel cladding systems.
  - 1. Joint Sealant: Single-component neutral-curing non-staining silicone sealant Spectrem 1.
  - 2. Joint Sealant: Multi-component neutral-curing non-staining field tintable silicone sealant Spectrem 4-TS.
  - 3. Joint-Sealant Color: As selected by Architect from manufacturer's standard colors.
  
- G. Exterior joints between different materials listed above.
  - 1. Joint Sealant: Single-component non-sag urethane sealant Dymonic 100.
  - 2. Joint-Sealant Color: As selected by Architect from manufacturer's standard colors.
  
- H. Exterior perimeter joints at frames of doors, windows, storefront frames, curtain wall frames, and louvers.
  - 1. Joint Sealant: Single-component non-sag urethane sealant Dymonic 100.
  - 2. Joint-Sealant Color: As selected by Architect from manufacturer's standard colors.
  
- I. Exterior joints within aluminum storefront framing, curtain walls, and window systems:
  - 1. Joint Sealant: Single-component neutral-curing non-staining silicone sealant Dymonic 100at perimeter to Precast concrete and metal panels.
  - 2. Joint-Sealant Color: As selected by Architect from manufacturer's standard colors.
  
- J. Exterior joints within structural glazing, aluminum storefront framing, curtain walls, and window systems: Refer to Division 08 Section ["Glazing Sealants"] ["Structural-Sealant-Glazed Curtain Walls"].
  - 1. Joint-Sealant Color: As selected by Architect from manufacturer's standard colors.

END OF SECTION



**STEEL DOORS AND FRAMES**

**SECTION 08 11 13**

**PART 1 - GENERAL**

1.01 GENERAL PROVISIONS:

- A. The CONDITIONS OF THE CONTRACT and all Sections of Division 1 are hereby made a part of this section.

1.02 DESCRIPTION OF WORK:

- A. Work Included: Provide labor, materials, and equipment necessary to complete the work of this section. Extent of steel doors and frames required is indicated on drawings and in schedules.

- 1. Furnish and Install:

- a. Steel frames for hollow metal doors - exterior doors and frames shall be thermally broken.
    - b. Steel frames for wood doors - exterior doors and frames shall be thermally broken.
    - c. Steel sidelite, borrowed lite, and transom frames
    - d. Hollow metal doors

- 2. Install Only: Finish hardware for hollow metal doors as specified in Section 08 71 00 Finish Hardware.

- B. Related work specified elsewhere:

- 1. SECTION 08 14 16: WOOD DOORS
  - 2. SECTION 08 71 00: FINISH HARDWARE
  - 3. SECTION 09 90 00 : PAINTING

1.03 QUALITY ASSURANCE; SUBMITTALS:

- A. General: Comply with requirements of SECTION 01 31 00 - SUBMITTALS, MEETINGS & RECORD DOCUMENTS and SECTION 01 45 00 - QUALITY CONTROL SERVICES.

- B. Manufacturer: Provide steel doors and frames complying with these specifications from one of the following:

- 1. CECO
  - 2. Curries
  - 3. Steelcraft

- C. Supplier: A recognized hollow metal supplier, with in-house fabrication facilities, who has been furnishing doors and frames in the project's vicinity for a period of not less than five years.

D. Product Data: Submit four copies of manufacturers technical product data for each item. Include whatever information may be necessary to show compliance with requirements, and include instructions for installation and maintenance.

E. Door Schedule: Submit final door schedule in manufacturer's standard format and as outlined below. Coordinate doors, frames and related work to ensure proper size, thickness, hand, function, and fasteners.

1. **NOTE: Contractor shall make all submittals for finish hardware, doors, frames and related items simultaneously, only after proper review and coordination by own staff beforehand.**

2. Final Door Schedule Content: Based on doors and frames in drawings, organize door schedule to indicate complete designations of every item required for each door or opening. Include the following information:

- a. Type, style, hand, size and construction of each item.
- b. Anchors and fastenings to related work.
- c. Corner construction of welded and/or knocked down frames.
- d. Location of door and frame cross-referenced to indications on drawings both on floor plans and in hardware schedule.
- e. Explanation of all abbreviations, symbols, codes, etc. contained in schedule.
- f. Mounting locations for hardware.
- g. Door construction and materials.
- h. Gage and finish of all materials.

3. Shop Drawings: Submit separate detail drawings, referenced to door schedule, showing size, hand, construction, fasteners, anchors and all other details pertinent to the fabrication of doors and frames for this project.

1.04 APPROVAL OF SUBSTITUTIONS:

A. Manufacturers and model numbers specified herein are to establish a standard of quality. If products other than those specifically identified herein are to be considered for this Project, they must be submitted for approval of the Architect not less than ten (10) calendar days prior to receipt of General Bids.

B. Requests for approval of substitutions shall be in writing, accompanied by catalog cuts, technical information and physical samples.

C. Approval of substitutions shall only be valid when issued by Architect to all bidders in the form of Addendum.

1.05 REFERENCES:

A. ANSI A115 Series: Standards for Steel Doors And Frames.

B. NFPA 80, NFPA 101.

## 20 THAMES STREET – PORTLAND, ME

- C. Other applicable building and life safety codes.
  - D. Door and Hardware Institute: "Recommended Locations for Builder's Hardware.
  - E. ANSI A117.1: American National Standard Providing Accessibility and Usability for Physically Handicapped People.
  - F. Other applicable industry standards.
- 1.06 PRODUCT PACKAGING AND HANDLING:
- A. Tag each item or package separately, with identification related to final door schedule.
  - B. All doors shall be packaged in full cartons and securely banded.
  - C. Doors and frames shall be received by the contractor at the jobsite and handled in a manner so as not to be damaged. They shall be stored upright in a protected area on wood runners or skids and shall be covered with vented tarpaulins or plastic.
- 1.07 WARRANTY: Doors and frames specified for this Project shall be guaranteed against defects in material and workmanship for a period of one (1) year from date of Substantial Completion of Project.

## PART 2 - PRODUCTS

- 2.01 MATERIALS:
- A. Doors shall be manufactured from commercial quality cold-rolled steel sheets. Exterior doors shall be A60 hot-dipped galvanized.
  - B. Frames shall be manufactured from commercial quality cold-rolled steel sheets. Exterior frames shall be A60 hot-dipped galvanized.
  - C. Steel shall conform to ASTM standards A366 or A620 and A568 (uncoated), ASTM A526 or A642 and A525 (galvanized).
  - D. All doors and frames shall be chemically treated for paint adhesion and prime painted to meet performance requirements of ANSI A224.1.
- 2.02 DOOR FABRICATION:
- A. Interior doors shall be 1-3/4" thick, manufactured from two 18 gage steel sheets. A one piece resin-impregnated honeycomb core with sanded edges shall be securely bonded to both face sheets. Doors shall have mechanically interlocked vertical edges, flush face sheets, and hairline seam edges. The top and bottom of the door shall be closed flush by 16 gage steel channels (where concealed door bottoms are specified, bottom channel shall be reversed to allow insertion of door bottom into door web). At contractor option, in lieu of honeycomb cores, doors may be provided with a rigid polystyrene foam core, continuously bonded to the face sheets, and completely filling the door.

## 20 THAMES STREET – PORTLAND, ME

- B. Exterior doors shall be 1-3/4" thick, manufactured from two 16 gage galvanized steel sheets. The interior of the doors shall be completely filled with a foamed-inplace polyurethane core, chemically bonded to all interior surfaces. Doors shall have mechanically interlocked vertical edges, flush face sheets, and hairline seam edges, and shall be thermally broken. The top and bottom of the door shall be closed flush by 16 gage steel channels (where concealed door bottoms are specified, bottom channel shall be reversed to allow insertion of door bottom into door web). Exterior Doors must have a U-factor of 0.15 or less.2.02
- C. All doors shall be handed type with factory preparation for all concealed or mortised Finish Hardware scheduled. Door closer reinforcements shall be provided for all doors whether scheduled to receive closer or not. Reinforce doors for all surface applied hardware.
- D. Non-handed doors, and/or filler plates for cutouts not required for scheduled hardware preparation shall NOT be acceptable.

### 2.03 FRAME FABRICATION:

- A. General: Frames shall be knocked down and field assembled or welded type at contractor option.
- B. Standard knockdown or welded frames shall be manufactured from 16 gage steel sheets with 2" face and 5/8" integral stop. Jamb depth to be determined by wall thickness in accordance with the drawings. Supply appropriate anchors for wall construction.
- C. Drywall frames shall be manufactured from 16 gage steel sheets with 2" face and 5/8" integral stop and double back bend to grip the partition firmly without marring the wall surface. Jamb depth to be determined by wall thickness in accordance with the drawings. Provide adjustable plumb anchors to insure square and plumb installation. Supply standard floor anchors for bottom of each jamb.
- D. Prepare frames for all concealed or mortised hardware and reinforce for all surface applied hardware.
- E. Provide plaster guards for all hardware cutouts.
- F. Prepare frames to receive pneumatic type silencers: two for each pair frame, three for each single frame.
- G. Exterior frames shall include a thermal break.

### 2.04 FIRE RATED ASSEMBLIES

- A. All labeled fire doors and frames shall be of a type tested in accordance with ANSI/UL-10b, ASTM E-152, NFPA-252, or UL-305, and shall provide the degree of fire protection, heat transmission, panic-loading capabilities, and/or smoke control as indicated on the label and required by the drawings.
- B. Labeled doors and frames shall bear the label of Underwriters Laboratories, Warnock Hersey, or Factory Mutual and shall meet all requirements of the labeling agencies current procedures and policies.

**PART 3 - EXECUTION**

3.01 INSTALLATION

- A. Doors and frames shall be assembled, installed, and erected plumb and in true alignment and in conformance with manufacturer's recommendations and final approved shop drawings. Preparation for surface applied hardware shall be performed on the jobsite. Frames shall be rigid and securely anchored in place. Doors shall be installed in a manner to achieve functional operation and appearance.
- B. Install hardware in compliance with 08 71 00 FINISH HARDWARE.

**END OF SECTION**

SECTION 08 14 23

INTERIOR APARTMENT DOORS

**A. GENERAL:**

SCOPE: The extent of work shall be as shown on Drawings and called for in these Specifications. Performance shall meet the requirements of these Specifications. The work covered by this section of Specifications consists of the following:

1. Furnishing and installing all door frames as called for on drawings or noted in Specifications.
2. Furnishing and installing all interior wood and exterior metal doors as specified.
3. Furnishing and installing hardware in accordance with Door Schedule, including locksets, closers, holders etc.

NOTE: The Contractor shall submit drawings on every item specified in this section. There shall be no substitutions without a specific written explanation from the subcontractor that the specific item is equal with the item specified by the Architect. All substitutions shall be approved by the Architect and the Owner.

**B. PRODUCTS:**

All doors and frames shall be of the material, type and finish as called for on Drawings or in these Specifications. All dimensions shall be as shown by Door Schedule on Drawings. Door identified by manufacturer's name and type of brand name may be substituted for others of equal quality only with the approval of the Architect. Doors delivered for installation shall be carefully stored to prevent damage or warping.

Apartment Entry Door: Metal frame. Doors shall be 1-3/4" thick with particle board cores bonded to stiles and rails. Provide standard 3-ply face veneer of plain slice oak.

Interior unit doors: typical unit doors shall be 1-3/8" 'MDF 1 Panel Square Smooth Door' by Masonite Inc. All interior pocket unit doors shall be 1 3/4" of the same make and model. Units shall be prehung and primed. Verify finish and coordinate with painting specification.

Hardware: See Hardware Schedule

**C. EXECUTION:**

Install doors after completion of all other work which would raise the moisture content of wood doors or damage door surfaces. Fit, hang and trim as required by the opening so the doors will close and not bind. Solid blocking at hinges and latch required. Provide even clearance of 1/8" at sides and top, 1/4" over thresholds, and 3/4" over floors. See also Section 06100 & 06200 Rough and Finish Carpentry.

Install doorstops for all swing doors.

At completion of work, door glass shall be cleaned, leaving no masking tape or any other visible marks on the surface; doors shall be free of any nicks, scratches or marks; all doors shall open and close freely; and all locksets shall operate with key, (if required) and hardware function properly.

20 THAMES STREET – PORTLAND, ME

END OF SECTION

**SECTION 08 41 13**  
**ALUMINUM STOREFRONT SYSTEMS**

**PART 1 GENERAL**

**1.01 SUMMARY**

- A. Section Includes: Aluminum Swing Doors, including:
  - 1. YKK AP Series YES 45 TU Storefront System.
- B. Related Sections:
  - 1. Sealants: Refer to Division 7 Joint Treatment Section for sealant requirements.
  - 2. Glass and Glazing: Refer to Division 8 Glass and Glazing Section for glass and glazing requirements.

**1.02 SYSTEM PERFORMANCE DESCRIPTION**

- A. Performance Requirements: Provide aluminum storefront systems that comply with performance requirements indicated, as demonstrated by testing manufacturer's assemblies in accordance with test method indicated.
  - 1. Wind Loads: Completed storefront system shall withstand wind pressure loads normal to wall plane.
  - 2. Deflection: Maximum allowable deflection in any member when tested in accordance with ASTM E 330-90 with allowable stress in accordance with AA Specifications for Aluminum Structures.
    - a. Without Horizontals: L/175 or 3/4" (19.1mm) maximum. .
    - b. With Horizontals: L/175 or L/240 + 1/4" (6.4mm) for spans greater than 13'-6" (4.1m) but less than 40'-0" (12.2m).
  - 3. Thermal Movement: Provide for thermal movement caused by 180 degrees F. (82.2 degrees C.) surface temperature, without causing buckling stresses on glass, joint seal failure, undue stress on structural elements, damaging loads on fasteners, reduction of performance, or detrimental effects.
  - 4. Air Infiltration: Completed storefront systems shall have 0.03 CFM/FT<sup>2</sup> (0.56 m<sup>3</sup>/h·m<sup>2</sup>) maximum allowable infiltration when tested in accordance with ASTM E 283-91 at differential static pressure of 6.24 PSF (299 Pa).
  - 5. Water Infiltration: No uncontrolled water on indoor face of any component when tested in accordance with ASTM E 331-93 at a static pressure of 12 PSF (718 Pa).
  - 6. Thermal Performance: When tested in accordance with AAMA 1503.1-88 and ASTM C 236-89:
    - a. Condensation Resistance Factor (CRF): A minimum of 63.
    - b. Thermal Transmittance U Value: 0.46 BTU/HR/FT<sup>2</sup>/°F or less.Note: The CRF for the glazed system as a whole will be affected by the characteristics of the glass specified.

**1.03 SUBMITTALS**

- A. General: Prepare, review, approve, and submit specified submittals in accordance with "Conditions of the Contract" and Division 1 Submittals Sections. Product data, shop drawings, samples, and similar submittals are defined in "Conditions of the Contract."
- B. Product Data: Submit product data for each type storefront series specified.
- C. Shop Drawings: Submit shop drawings showing layout, profiles, and product components, including anchorage, accessories, finish colors and textures.
- D. Samples: Submit verification samples for colors on actual aluminum substrates indicating full color range expected in installed system.
- E. Quality Assurance / Control Submittals:
  - 1. Test Reports: Submit certified test reports showing compliance with specified performance characteristics and physical properties.
  - 2. Installer Qualification Data: Submit installer qualification data.



## 20 THAMES STREET – PORTLAND, ME

- F. Closeout Submittals:
  - 1. Warranty: Submit warranty documents specified herein.
  - 2. Project Record Documents: Submit project record documents for installed materials in accordance with Division 1 Project Closeout (Project Record Documents) Section.

### 1.04 QUALITY ASSURANCE

- A. Qualifications:
  - 1. Installer Qualifications: Installer experienced (as determined by contractor) to perform work of this section who has specialized in the installation of work similar to that required for this project. If requested by Owner, submit reference list of completed projects.
- B. Pre-Installation Meetings: Conduct pre-installation meeting to verify project requirements, substrate conditions, manufacturer's installation instructions, and manufacturer's warranty requirements.

### 1.05 PROJECT CONDITIONS / SITE CONDITIONS

- A. Field Measurements: Verify actual measurements/openings by field measurements before fabrication; show recorded measurements on shop drawings. Coordinate field measurements, fabrication schedule with construction progress to avoid construction delays.

### 1.06 WARRANTY

- A. Project Warranty: Refer to "Conditions of the Contract" for project warranty provisions.
- B. Manufacturer's Warranty: Submit, for Owner's acceptance, manufacturer's standard warranty document executed by authorized company official. Manufacturer's warranty is in addition to, and not a limitation of, other rights Owner may have under the Contract Documents.
  - 1. Beneficiary: Issue warranty in the legal name of the project Owner.
  - 2. Warranty Period: Two years commencing on Date of Substantial Completion.
  - 3. Warranty Acceptance: Owner is sole authority who will determine acceptability of manufacturer's warranty documents.

## PART 2 PRODUCTS

### 2.01 MANUFACTURERS (Acceptable Manufacturers/Products)

- A. Acceptable Manufacturers: YKK AP America Inc.
  - 7680 The Bluffs, Suite 100
  - Austell, GA 30168
  - Telephone: (678) 838-6000; Fax: (678) 838-6001
- 1. Storefront System: YKK AP YES 45 TU Storefront System.
- B. Storefront Framing System:
  - 1. Description: Center set, exterior flush glazed; jambs and vertical mullions continuous; head, sill, intermediate horizontal attached by screw spline joinery or shear block attachment.
  - 2. Components: Manufacturer's standard extruded aluminum mullions, 90 degree corner posts, entrance door framing, and indicated shapes.
  - 3. Thermal Barrier: Provide continuous thermal barrier by means of a poured and debridged pocket consisting of a two-part, chemically curing high density polyurethane which is bonded to the aluminum by YKK ThermaBond Plus™. Systems employing non-structural thermal barriers are not acceptable.

### 2.02 MATERIALS

- A. Extrusions: ASTM B 221 (ASTM B 221M), 6063-T5 Aluminum Alloy.
- B. Aluminum Sheet:
  - 1. Painted Finish: ASTM B 209 (ASTM B 209M), 3003-H14 Aluminum Alloy, 0.080" (1.95 mm)

## 20 THAMES STREET – PORTLAND, ME

minimum thickness.

### 2.03 ACCESSORIES

- A. Manufacturer's Standard Accessories:
  - 1. Fasteners: Zinc plated steel concealed fasteners; Hardened aluminum alloys or AISI 300 series stainless steel exposed fasteners, countersunk, finish to match aluminum color.
  - 2. Sealant: Non-skinning type, AAMA 803.3
  - 3. Glazing: Setting blocks, edge blocks, and spacers in accordance with ASTM C 864, shore durometer hardness as recommended by manufacturer; Glazing gaskets in accordance with ASTM C 864.

### 2.04 RELATED MATERIALS (Specified In Other Sections)

- A. Glass: Refer to Division 8 Glass and Glazing Section for glass materials.

### 2.05 FABRICATION

- A. Shop Assembly: Fabricate and assemble units with joints only at intersection of aluminum members with uniform hairline joints; rigidly secure, and sealed in accordance with manufacturer's recommendations.
  - 1. Hardware: Drill and cut to template for hardware. Reinforce frames and door stiles to receive hardware in accordance with manufacturer's recommendations.
  - 2. Welding: Conceal welds on aluminum members in accordance with AWS recommendations or methods recommended by manufacturer. Members showing welding bloom or discoloration on finish or material distortion will be rejected.
- B. Fabrication Tolerances:
  - 1. Material Cuts: Square to 1/32 inch (0.8 mm) off square, maximum, over largest dimension; proportionate amount of 1/32 inch (0.8 mm) on other two dimensions.
  - 2. Maximum Offset: 1/64 inch (0.4 mm) in alignment between two consecutive members in line, end to end.
  - 3. Maximum Offset: 1/64 inch (0.4 mm) between framing members at glazing pocket corners.
  - 4. Joints (Between adjacent members in same assembly): Hairline and square to adjacent member.
  - 5. Variation (In squaring diagonals for doors and fabricated assemblies): 1/16 inch (1.6 mm).
  - 6. Flatness (For doors and fabricated assemblies): +/- 1/16 inch (1.6 mm) off neutral plane.

### 2.06 FINISHES AND COLORS

- A. High Performance Organic Coating Finish:
  - 1. Type Factory applied two-coat 70% Kynar resin by Auto Chem or 70% Hylar resin by Ausimont, fluoropolymer based coating system, Polyvinylidene Fluoride (PVF-2), applied in accordance with YKK AP procedures and meeting AAMA 2605 specifications.
  - 2. Colors: Selected by Architect from the following:
    - a. Standard coating color charts.
- B. Finishes Testing:
  - 1. Apply 0.5% solution NaOH, sodium hydroxide, to small area of finished sample area; leave in place for sixty minutes; lightly wipe off NaOH; Do not clean area further.
  - 2. Submit samples with test area noted on each sample.

## PART 3 EXECUTION

### 3.01 MANUFACTURER'S INSTRUCTIONS / RECOMMENDATIONS

- A. Compliance: Comply with manufacturer's product data, including product technical bulletins, product catalog installation instructions, and product carton instructions.

## **20 THAMES STREET – PORTLAND, ME**

### **3.02 EXAMINATION**

- A. Site Verification of Conditions: Verify conditions (which have been previously installed under other sections) are acceptable for product installation in accordance with manufacturer's instructions.

### **3.03 PREPARATION**

- A. Adjacent Surfaces Protection: Protect adjacent work areas and finish surfaces from damage during product installation.
  - 1. Aluminum Surface Protection: Protect aluminum surfaces from contact with lime, mortar, cement, acids, and other harmful contaminants.

### **3.04 INSTALLATION**

- A. General: Install manufacturer's system in accordance with shop drawings, and within specified tolerances.
  - 1. Protect aluminum members in contact with masonry, steel, concrete, or dissimilar materials using nylon pads or bituminous coating.
  - 2. Shim and brace aluminum system before anchoring to structure.
  - 3. Provide sill flashing at exterior storefront systems. Extend extruded flashing continuous with splice joints; set in continuous beads of sealant.
  - 4. Verify storefront system allows water entering system to be collected in gutters and wept to exterior. Verify metal joints are sealed in accordance with manufacturers installation instructions.
  - 5. Locate expansion mullions where indicated on reviewed shop drawings.
  - 6. Seal metal to metal storefront system joints using sealant recommended by system manufacturer.

### **3.05 FIELD QUALITY CONTROL**

- A. Manufacturer's Field Services: Upon Owner's request, provide manufacturer's field service consisting of product use recommendations and periodic site visit for inspection of product installation in accordance with manufacturer's instructions.
- B. Field Test: Conduct field test to determine watertightness of storefront system. Conduct test in accordance with AAMA 501.3-94 at locations selected by Architect.
  - 1. Perform minimum of one test. Perform test in Architect's presence.

### **3.06 ADJUSTING AND CLEANING**

- A. Adjusting: Adjust swing doors for operation in accordance with manufacturer's recommendations.
- B. Cleaning: The General Contractor shall clean installed products in accordance with manufacturer's instructions prior to owner's acceptance, and remove construction debris from project site. Legally dispose of debris.
- C. Protection: The General Contractor shall protect the installed product's finish surfaces from damage during construction.

**END OF SECTION**

SECTION 08 81 00

GLAZING

**PART 1 GENERAL**

1.1 SUMMARY

- A. Section Includes:
  - 1. Clear tempered glass.
- B. Related Sections:
  - 1. Section 08 14 16 Wood Doors: Glazed doors and storefronts.
  - 2. Section 08 41 13 Aluminum Framed Storefronts

1.2 REFERENCES

- A. American National Standards Institute (ANSI):
  - 1. ANSI Z97.1 - Safety Performance Specifications and Methods of Test for Safety Glazing Material Used in Buildings.
- B. American Society for Testing and Materials (ASTM):
  - 1. ASTM C920 - Standard Specification for Elastomeric Joint Sealants.
  - 2. ASTM C1036 - Standard Specification for Flat Glass.
  - 2. ASTM C1048 - Standard Specification for Heat-Treated Flat Glass-Kind HS, Kind FT Coated and Uncoated Glass.
  - 3. ASTM D2000 - Standard Classification System for Rubber Products in Automotive Applications.
- C. Consumer Product Safety Standards for Architectural Glazing. CPSC 16 CFR, Part 1201.
- D. Flat Glass Marketing Association (FGMA):
  - 1. FGMA - Glazing Manual and Glazing Sealing Systems Manual.

1.3 SUBMITTALS

- A. Procedures for submittals.
  - 1. Product Data:
    - a. Glass: Structural, physical and environmental characteristics, size limitations, special handling or installation requirements.
    - b. Glazing compound: Provide chemical, functional, and environmental characteristics, limitations, special application requirements.
  - 2. Samples:
    - a. Glazing: Submit one sample 12 x 12 inches (300 x 300 mm) in size of each type of glazing, illustrating tinting, and finish of glazing materials. Label each sample indicating kind, quality and manufacturer.
  - 3. Assurance/Control Submittals:
    - a. Certificates: Manufacturer's certificate that Products meet or exceed specified requirements.

**20 THAMES STREET – PORTLAND, ME**

- b. Qualification Documentation: Submit documentation of experience indicating compliance with specified qualification requirements.

**1.4 QUALITY ASSURANCE**

- A. Identification: Each unit of tempered glass shall be permanently identified by the manufacturer. The identification shall be etched or ceramic fired on the glass and be visible when the unit is glazed.
- B. Perform Work in accordance with FGMA Glazing Manual.
- C. Installer Qualifications: Company specializing in performing the Work of this Section with minimum 5 years documented experience.

**1.5 DELIVERY, STORAGE, AND HANDLING**

- A. Transport, handle, store, and protect Products.

**1.6 PROJECT CONDITIONS OR SITE CONDITIONS**

- A. Environmental Requirements:
  - 1. Do not install glazing when ambient temperature is less than 40 degrees F.
  - 2. Maintain minimum ambient temperature before, during and 24 hours after installation of glazing compounds.

**1.7 WARRANTY**

- A. Procedures for closeout submittals.
- B. Special Warranty:
  - 1. Include coverage for cracking, breakage, and replacement of same.
    - a. Warranty Period: 1 year.
  - 2. Include coverage for sealed glass units from seal failure, interpane dusting or misting, and replacement of same.
    - a. Warranty Period: 10 years.

**PART 2 PRODUCTS**

**2.1 MANUFACTURERS**

- A. Subject to compliance with project requirements, manufacturer's offering Products which may be incorporated in the Work include the following:
  - 1. Falconer Glass Industries.
  - 2. Libbey-Owens-Ford Company, Toledo, OH (800) 526-6557.
  - 3. PPG Industries, Pittsburgh, PA (412) 434-2858.
  - 4. Viracon, Owatonna, MN (800) 533-2080.
- C. Product options and substitutions. Substitutions: Permitted.

## 20 THAMES STREET – PORTLAND, ME

### 2.2 GLASS MATERIALS

- A. Glass Type 1 - Clear Tempered Insulated Glass Units, Low E: Double pane units of clear tempered glass.
  - 1. Glass Thickness, Inner: 5/16 inch.
  - 2. Glass Thickness, Outer: 5/16 inch.
  - 3. Unit Thickness: 1 inch (25 mm) thick units.
- B. Glass Type 2 - Clear Tempered Glass Units. Single pane units with clear tempered glass.
  - 1. Glass Thickness, Inner: 1/4 inch (6 mm).

### 2.3 GLAZING COMPOUNDS

- A. Polysulphide Sealant: Two component, chemical curing, non-sagging type; cured Shore A hardness of 15-25.
- B. Silicone Sealant: Single component, chemical curing; capable of water immersion without loss of properties; non-bleeding, non-staining; cured Shore A hardness of 15-25.
  - 1. Color: Clear.
- C. Acrylic terpolymer compounded especially for glazing; non-hardening, non-staining, and non-bleeding.

### 2.4 GLAZING ACCESSORIES

- A. Setting Blocks: Resilient blocks of 70 to 90 Shore A durometer hardness; compatible with glazing sealant.
- B. Spacers: Resilient blocks of 40 to 50 Shore A durometer hardness; self adhesive on one side; compatible with glazing sealant.
- C. Filler Rods: Closed cell or jacketed foam rods of polyethylene, butyl, neoprene, polyurethane, or vinyl; compatible with glazing sealant.
- D. Joint Cleaners, Primers, and Sealers: As recommended by glazing sealant manufacturer.
- E. Gaskets: ASTM D2000, SBC 415 to 3BC 620; extruded or molded neoprene or EPDM, black.
- F. Mastic: Non-solvent type adhesive as recommended by mirrored glass manufacturer.

## PART 3 EXECUTION

### 3.1 EXAMINATION

- A. Execution Requirements: Verify existing conditions before starting work.
- B. Verification of Conditions: Verify that field measurements, surfaces, substrates and conditions are as required, and ready to receive Work.
  - 1. Verify that openings for glazing are correctly sized and within tolerance.

## 20 THAMES STREET – PORTLAND, ME

2. Verify that surfaces of glazing channels or recesses are clean, free of obstructions that may impede moisture movement, weeps are clear, and ready to receive glazing.
- C. Report in writing to Architect prevailing conditions that will adversely affect satisfactory execution of the Work of this Section. Do not proceed with Work until unsatisfactory conditions have been corrected.
- D. By beginning Work, Contractor accepts conditions and assumes responsibility for correcting unsuitable conditions encountered at no additional cost to the Owner.

### 3.2 PREPARATION

- A. Clean contact surfaces with solvent and wipe dry.
- B. Seal porous glazing channels or recesses with substrate compatible primer or sealer.
- C. Prime surfaces scheduled to receive sealant.

### 3.3 GLAZING

- A. Install glazing from interior only. No exterior glazing permitted. No glazing removal permitted from exterior.
- B. Locate setting blocks at quarter points of sill; set in sealant if heel or toe bead is required.
- C. Install spacers inside and out except where preshimmed tape or glazing gaskets are to be used.
- D. Set each piece in a series to other pieces in pattern draw, bow, or other visually perceptible characteristics.
- E. Provide glazing sealants and gaskets as required for particular glazing application. Coordinate with other Sections for material compatibility.
- F. Gaskets:
  1. Provide adequate anchorage, particularly for driven-in wedge gaskets.
  2. Miter and weld ends of channel gaskets at corners to provide continuous gaskets.
  3. Seal face gaskets at corners with sealant to close opening and prevent withdrawal of gaskets from corners.
- G. Do not leave voids in glazing channels except as specifically indicated or recommended by glass manufacturer. Force sealant into channel to eliminate voids. Tool exposed surfaces to slight wash away from joint. Trim and clean promptly.
- H. Do not allow sealant to close weeps of aluminum framing.
- I. Provide filler rod where sealants are used in the following locations:
  1. Head and jamb channels.
  2. Colored glass over 75 united inches in size.
  3. Clear glass over 125 united inches in size.

## **20 THAMES STREET – PORTLAND, ME**

### **3.4 CONSTRUCTION**

- A. Interface with Other Work: Coordinate glazing with installation of entrances and storefronts specified in Section 08400.

### **3.5 FIELD QUALITY CONTROL**

- A. Inspect preparation and installation of glass.

### **3.6 CLEANING**

- A. Remove glazing materials from finish surfaces.
- B. Remove labels after Work is complete.
- C. Clean glass and adjacent surfaces.

### **3.8 PROTECTION**

- A. After installation, mark pane with an 'X' by using removable plastic tape or paste.

**END OF SECTION**



SECTION 09 21 16

GYPSON BOARD ASSEMBLIES ON METAL FRAMING

PART 1 - GENERAL

1.1 SUMMARY

- A. Description of Work: Work of this section includes, but is not limited to, the following:
  - 1. Gypsum board and accessories
  - 2. Metal studs and furring
  - 3. Metal shaftwall systems
  - 4. Metal suspension systems
  - 5. Sound-rated construction and accessories
  - 6. Gypsum board finishing
  - 7. Trim and accessories

1.2 RELATED WORK SPECIFIED ELSEWHERE

- A. Section 05 41 00 - Lightgauge Metal Framing.
- B. Section 06 10 00 - Rough Carpentry.
- C. Section 07 21 16 - Thermal and Acoustic Insulation.
- D. Section 07 84 13 - Firestopping.
- E. Section 09 90 00 - Painting for gypsum board prime and finish coats.
- F. Section 09 29 00 - Gypsum Board.

1.3 SUBMITTALS

- A. Product Data: Submit manufacturer's specifications and installation instructions with project conditions and materials clearly identified or detailed for each required system.

1.4 SYSTEM REQUIREMENTS

- A. Performance Requirements: Fabricate and install systems as indicated but not less than that required to comply with ASTM C754 under the following conditions:
  - 1. Gypsum board partitions:
    - a. Standard systems: Maximum deflection of  $l/240$  of partition height.
  - 2. Cavity shaftwall systems: Withstand minimum positive and negative pressure of 5 psf.
  - 3. Interior suspended ceilings and soffits: Maximum deflection of  $l/360$  of distance between supports.
  - 4. Nonstructural components that are permanently attached to structures and their support attachments, shall be designed and constructed to resist the effects of earthquake motions in accordance to local jurisdiction.
- B. Fire Resistance Ratings: Where fire resistance classifications are indicated, provide materials and application procedures identical to those listed by UL or tested according to ASTM E119 for type of construction shown.
- C. Acoustical Ratings: Where sound ratings are indicated, provide materials and application procedures identical to those tested by manufacturer to achieve Sound Transmission Class (STC) scheduled or indicated in accordance with ASTM E90.

## 20 THAMES STREET – PORTLAND, ME

- D. Expansion (Control) Joint: Use where indicated or as required. On long wall and ceiling runs, provide joints spaced between 32'-0" and 36'-0" O.C. or as indicated on the drawings.

### 1.5 QUALITY ASSURANCE

- A. Reference Standards:
  - 1. Applicable requirements of ASTM C754 for installation of steel framing.
  - 2. Install gypsum board in accordance with applicable requirements and recommendations of Gypsum Association GA 216, "Recommended Specifications for the Application and Finishing of Gypsum Board" except for more stringent requirements of manufacturer.
  - 3. Apply acoustical sealant in accordance with applicable requirements of ASTM C919.

### 1.6 DELIVERY, STORAGE AND HANDLING

- A. Delivery:
  - 1. Deliver material to site promptly without undue exposure to weather.
  - 2. Deliver in manufacturer's unopened containers or bundles, fully identified with name, brand, type and grade.
- B. Storage:
  - 1. Store above ground in dry, ventilated space.
  - 2. Protect materials from soiling, rusting and damage.

### 1.7 PROJECT CONDITIONS

- A. Environmental Requirements:
  - 1. Do not install gypsum board when ambient temperature is below 40°F.
  - 2. For adhesive attachment of gypsum board, and for finishing of gypsum board, maintain ambient temperature above 55°F from one week prior to attachment or joint treatment, and until joint treatment is complete and dry.

## PART 2 - PRODUCTS

### 2.1 PRODUCTS AND MANUFACTURERS

- A. Gypsum Board and Accessories: Listed products establish standard of quality and are manufactured by United States Gypsum Company (USG), Chicago, IL. Or approved equal.
- B. Steel Framing and Furring: Company acceptable to installer.
- C. Grid Suspension Assemblies: Listed products establish standard of quality and are manufactured by United States Gypsum Company (USG), Chicago, IL. Or approved equal.

### 2.2 BOARD MATERIALS

- A. Gypsum Board:
  - 1. ASTM C1396 (Section 5), regular type except where Type X fire-resistant type is indicated or required to meet UL assembly types.
  - 2. Edges: Tapered.
  - 3. Acceptable products:
    - a. Typical partitions and ceilings: Equivalent to SHEETROCK® brand SW, FIRECODE® or FIRECODE® "C" Core gypsum panels by USG.

## 20 THAMES STREET – PORTLAND, ME

- b. OR Equivalent to SHEETROCK® brand Regular, FIRECODE® or FIRECODE® "C" Core gypsum panels by USG.
- c. Acceptable product for fire-rated walls: Equivalent to ULTRACODE® Core, 3/4 inch thick, by USG.
- d. Use gypsum board and joint compound with little or no VOCs and formaldehyde emissions. Gypsum board shall have a minimum of 5% Post-consumer and 20% Post-industrial (nation-wide average for company) as defined by FTC (Federal Trade Commission) by USG.

Note1: Gypsum board to be installed behind all tubs and shower units where tub and shower units are on rated (demising and corridor) walls, which results in double gypsum board on some bathroom walls. See bathroom drawing sheet.

Note 2: Fire rated gypsum board ceiling in concealed spaces. IE: Under acoustic tile ceiling in corridors tape to be set in compound and several coats of compound applied over tape, no exposed tape will be accepted.

### B. Moisture & Mold Resistant (FOR USE AT ALL BATHROOMS):

1. ASTM C1396 (Section 5), regular type except where Type X fire-resistant type is indicated or required to meet UL assembly types.
2. Edges: Tapered.
3. Thickness: 5/8 inch.
4. Acceptable products: Sheetrock® brand Mold Tough™ Firecode (Type X), Firecode® C Core or ULTRACODE® Core gypsum panels by USG.

### C. Shaftwall:

1. Liner boards:
  - a. ASTM C442, Type SLX.
  - b. Edges: Beveled.
  - c. Thickness: 1 inch.
  - d. Acceptable product: Equivalent to SHEETROCK® gypsum liner panels by USG.
2. Face boards:
  - a. ASTM C1396 (Section 5), Type X.
  - b. Thickness: 1/2 inch, unless otherwise indicated.
  - c. Acceptable product: Equivalent to SHEETROCK® FIRECODE® C Core and FIRECODE® Core gypsum panels by USG.

## 2.3 METAL FRAMING AND FURRING MATERIALS

### A. Metal Studs and Runners:

1. ASTM C645, "C" shaped, gauge:
  - a. Provide gauge as indicated for studs; runner gauge as recommended by stud manufacturer.
  - b. Provide runner gauge as recommended by stud manufacturer.
2. Depth of sections: As indicated.
3. Corrosion protection: G40 hot-dipped galvanized coating per ASTM A525.

### B. Shaft Wall Supports:

1. Conform to ASTM A446, Grade A, with G40 hot-dipped galvanized coating per ASTM A525.

## 20 THAMES STREET – PORTLAND, ME

2. Studs:
  - a. Shape: "CH", or as standard with manufacturer.
  - b. Gauge: As required to fulfill performance criteria, minimum 25 gauge. Provide 20 gauge for jamb and lintel components.
  - c. Size: As indicated.
  - d. J runners: 24 gauge, size as required for coordination with studs.
  - e. Jamb struts: 20 gauge with 3 inch back leg for use at elevator frames.
- C. Metal Furring Channels:
  1. Hat-shaped:
    - a. ASTM C645, 7/8 inch high, 25 gauge, with G40 hot-dipped galvanized coating per ASTM A525.
    - b. Provide 20 gauge at furring to receive tile backer board.
    - c. Acceptable products: DWC-25 for ½" and 5/8" gypsum board and DWC-20 by USG.
  2. Z-shaped: ASTM C645, depths as indicated, 24 gauge minimum, with G40 hot-dipped galvanized coating per ASTM A525.
  3. Resilient: Manufacturer's standard type designed to reduce sound transmission; 1/2 inch deep, 25 gauge steel with G40 hot-dipped galvanized coating per ASTM A525.

### 2.4 CEILING AND SOFFIT SUPPORT MATERIALS

- A. Hanger Anchorage Devices: Screws, clips, bolts or other devices compatible with indicated structural anchorage for ceiling hangers and whose suitability has been proven through standard construction practices or by certified test data.
- B. Hangers:
  1. Steel wire or rods, sizes to comply with requirements of ASTM C754 for ceiling or soffit area and loads to be supported.
  2. Wire: ASTM A 641, soft, Class 1 galvanized.
  3. Rods and flats:
    1. Mild steel components.
    2. Finish: Galvanized or painted with rust-inhibitive paint for interior work; galvanized for exterior work.
- C. Framing System:
  1. Main runners:
    1. Cold-rolled, "C" shaped steel channels, 16 gauge minimum.
    2. Finish: Galvanized or painted with rust-inhibitive paint for other interior work.
  2. Cross furring: Hat-shaped steel furring channels, ASTM C645, 7/8 inch high, 25 gauge, galvanized.
  3. Furring anchorages: 16 gauge galvanized wire ties, manufacturer's standard wire-type clips, bolts, nails or screws recommended by furring manufacturer and complying with ASTM C754.
  4. Provide compression posts and other accessories as required to comply with seismic requirements.
- D. Proprietary Framing System:
  1. Framing system for gypsum board panels consisting of cold-rolled steel members conforming to ASTM C635, with exposed surfaces finished in manufacturer's standard enamel paint finish.
  2. Fire rating: 1 hour rating in accordance with UL assembly indicated.
  3. Components: Main tees, furring cross channels, furring cross tees, and cross tees.
  4. Accessories:

## 20 THAMES STREET – PORTLAND, ME

- a. U-shaped channel molding.
  - b. Galvanized carbon steel (12 ga.) hanger wire.
5. Acceptable product: Equivalent to Drywall Suspension System by USG.

### 2.5 ACCESSORIES

- A. Metal Trim for Gypsum Board:
1. Conform to profile and dimensions indicated.
  2. Material for interior work: Galvanized steel, 26 gauge minimum.
  3. Corner beads: Equivalent to Dur-A-Bead No. 103 by USG.
  4. Casing beads (edge beads): Equivalent to 200A by USG.
  5. J-Beads.
  6. Expansion (Control) Joint: Use where indicated or as required. On long wall and ceiling runs, provide joints spaced between 32'-0" and 36'-0" O.C. or as indicated on the drawings.
- B. Adhesives and Joint Treatment Materials:
1. Conform to requirements of ASTM C475.
  2. Joint compounds:
    - a. Drying-type (ready-mixed): Equivalent to SHEETROCK® brand taping joint compound and topping joint compound, or SHEETROCK® all purpose joint compound [or ready-mixed lightweight all purpose joint compound by USG.
- C. Gypsum Board Screws: Self-drilling, self-tapping steel screws.
1. For steel framing less than 0.03 inch thick: Comply with ASTM C1002.
  2. For steel framing from 0.033 inch thick to 0.112 inch thick: Comply with ASTM C954.
  3. Provide Type S or Type S-12 screws.
- D. Backer Board Accessories: Provide accessories and corrosion-resistant-coated steel screws as recommended by backer board manufacturer and required for complete installation.
- E. Acoustical Sealant: Equivalent to SHEETROCK® acoustical sealant by USG.
- F. Miscellaneous Accessories: Provide as required for complete installations.

## PART 3 - EXECUTION

### 3.1 EXAMINATION

- A. Examine substrates and adjoining construction and conditions under which work is to be installed. Do not proceed with work until unsatisfactory conditions are corrected.

### 3.2 GENERAL INSTALLATION REQUIREMENTS

- A. Install in accordance with reference standards and manufacturer's instructions [and as required to comply with seismic requirements].
- B. Tolerances:
1. Do not exceed 1/8 inch in 8'-0" variation from plumb or level in exposed lines of surface, except at joints between gypsum board units.
  2. Do not exceed 1/16 inch variation between planes of abutting edges or ends.

## 20 THAMES STREET – PORTLAND, ME

3. Shim as required to comply with specified tolerances.
- C. Install framing to comply with ASTM C754 and with ASTM C840 requirements that apply to framing installation.
- D. Install supplementary framing, blocking and bracing at terminations in gypsum board assemblies to support fixtures, equipment, heavy trim, grab bars, toilet accessories, door stops, furnishings or similar construction.

### 3.3 METAL SUPPORT INSTALLATION

- A. Metal Runners:
  1. Align and secure runner tracks accurately to partition layout at both floor and ceiling.
  2. Provide fasteners appropriate to substrate construction as recommended by manufacturer.
- B. Metal Studs:
  1. Position metal studs vertically in the runners, spaced as indicated.
  2. Place studs so that flanges face in same direction.
  3. Cut studs 1/2 inch short of full height to provide perimeter relief.
  4. Align and plumb partition framing accurately.
  5. Where partitions abut ceiling or deck construction or vertical structural elements, provide slip or cushion type joint between partition and structure as recommended by stud manufacturer to prevent transfer of structural loads or movements to partitions, and to provide lateral support.
  6. Provide horizontal bracing where necessary for lateral support.
  7. Chase walls:
    - a. Position steel studs on opposite sides of chase directly across from each other.
    - b. Cut cross-bracing from gypsum board 12 inches high by chase wall width.
- C. Ceiling and Soffit Support Systems:
  1. Secure hangers or rods to structural support by connecting directly to structure where possible; otherwise connect to inserts, clips or other anchorage devices or fasteners indicated.
  2. Space main runners, hangers and furring according to requirements of ASTM C754, except as otherwise indicated.
  3. Where spacing of structural members, or width of ducts or other equipment, prevents regular spacing of hangers, provide supplemental hangers and suspension members and reinforce nearest affected hangers to span extra distance.
  4. Install compression posts, splay wires and other accessories as required to comply with seismic requirements.
  5. Extend runners to within 6 inches of walls.
  6. Wire-tie or clip furring members to main runners and to other structural supports indicated. In fire resistance rated assemblies, wire-tie furring members; do not clip.
  7. Do not permit furring or runners to contact masonry or concrete walls.
  8. Provide 1 inch clearance between furring or runners and abutting walls and partitions.

### 3.4 FINISHING

- A. Provide levels of gypsum board finish for locations as follows, in accordance with Gypsum Association GA 214, "Recommended Specification: Levels of Gypsum Board Finish".
  1. Level 1: Ceiling plenum areas and concealed areas, except provide higher level of finish as required to comply with fire resistance ratings and acoustical ratings.
  2. Level 2: Gypsum board substrate at tile [stone], except remove tool marks and ridges.

## **20 THAMES STREET – PORTLAND, ME**

3. Level 3: Gypsum board surfaces, where textured finishes or heavy vinyl wall papering will be used [High-build Primer required as specified in Section 09911 or USG First Coat primer].
4. Level 4: Gypsum board surfaces, except where another finish level is indicated High-build Primer required as specified in Section 09911 or USG First Coat primer.

**END OF SECTION**

**SECTION 09 29 00**

**GYPSUM BOARD**

**1. GENERAL**

1.1 REFERENCES:

- A. Drawings and general provisions of Contract, including General Conditions and Division 1 specifications, apply to work in this section.
- B. NOTE: Selection of Finish colors and patterns in overall color scheme to be made by Architect. Contractor to notify Architect prior to commencing Gypsum Board work, to allow adequate time for color selections, Owner's approval and material ordering lead time.

1.2 DESCRIPTION OF WORK: The extent of work shall be as shown on Drawings and called for in these Specifications. Performance shall meet the requirements of these Specifications. The work covered by this section of Specifications consists of the following:

- A. Drywall installation as required by Drawings and noted in these Specifications.
- B. Taping and finishing all walls and ceilings, except where other kind of finish is specified.

1.3 RELATED WORK SPECIFIED ELSEWHERE

- A. Section 05 41 00 - Lightgauge Metal Framing.
- B. Section 06 10 00 - Rough Carpentry.
- C. Section 07 21 16 - Thermal and Acoustic Insulation.
- D. Section 07 84 13 - Firestopping.
- E. Section 09 90 00 - Painting for gypsum board prime and finish coats.
- F. Section 09 21 16 - Gypsum Board Assemblies on Metal Framing.

**2. PRODUCTS**

2.1 Acceptable Manufactures

- American Gypsum
- Atlantic Group Limited
- Celotix Corporation
- Continental Gypsum Company
- James Hardie Gypsum
- Lafarge Gypsum
- United States Gypsum Company
- USG Durock Cement Board

2.2 NOTE: GWB types are shown as U.S.G. brand names "Sheetrock", "Firecode", "Firecode C", "M.R. Board" and "Shaftwall". Substitutions must have equal U.L. and STC ratings. See Drawings for Specific assembly.



## **20 THAMES STREET – PORTLAND, ME**

- 2.3 EXTERIOR & INTERIOR WALLS & CEILINGS: See rated & non rated assemblies and wall types on the drawings.
- 2.4 NOTE: Type M.R. in bathrooms, walls and ceiling. See Drawings for double layer of gyp board to cover fiberglass tub flange.
- 2.5 RESILIENT CHANNEL: USG-RC-1
- 2.6 USG Drywall Suspension System.
- 2.7 Corner Bead
- 2.8 USG Durock Brand Cement Board to be installed behind all tiled shower and bath walls.

### **3. EXECUTION**

- 3.1 THE DRYWALL CONTRACTOR shall inspect all areas affected by his work to ascertain that all work is complete and has been accepted. Defective installations shall be corrected before finished surfaces are painted or sprayed with acoustical material.
- 3.2 DRYWALL INSTALLATION. Install drywall as shown on plans, noted in the UL Specifications, and as set forth in U.S.G. Handbook. Installation of non-UL rated drywall assemblies on steel studs shall comply with the following minimum requirements:
  - A. Spacing for attachment members shall not exceed 24" o.c. for walls and 16" o.c. for ceilings. All drywall shall be screwed with approved drywall screws made specifically for the purpose and of length adequate for wall types. On walls, screws shall not be placed more than 16" apart for 16" o.c. framing or 12" apart for 24" o.c. framing. Screw all edges 12" o.c. maximum. See Structural Drawings S3.2 and S3.3 for shear walls sheathing attachment.
  - B. The drywall contractor may use a few drywall nails to temporarily secure a sheet of drywall before securing with drywall screws. In this event, the drywall nails must be countersunk prior to taping. Corner beads shall be used on all corners and casing beads used whenever Gypsum Board abuts dissimilar material. Caulking to also be applied at these junctions. At all party and unit/corridor walls, Gypsum Board to be set in caulking (for sound).
  - C. Drywall shall be laid vertically or horizontally. No tapered joints at floor base. See Structural Drawings for shear walls.
  - D. Gypsum Sheathing Application  
Apply 24" wide sheathing horizontally with tongue edge up. Install supplementary bracing as required by applicable code. Fasten sheathing with nails spaced 8" o.c. along each stud.  
Apply 48" wide sheathing vertically with bottom edge bearing on foundation or subfloor. Install supplementary bracing (and adhesive) as required by applicable code. Fasten sheathing to studs and plates with nails 8" o.c.

E. Joint System

Prefill Application

- a. Mix SHEETROCK Brand Setting-Type (DURABOND) or Lightweight Setting-Type (EASY SAND) Joint Compound according to directions on bag. Do not over mix, or use extremely cold water or cold joint compound.
- b. Prefill all “V” grooves formed by abutting tapered eased edges of SHEETROCK Brand Gypsum Panels, SW Edge, with SHEETROCK Brand Setting-Type (DURABOND) or Lightweight Setting-Type (EASY SAND) Joint Compound using a flexible 5” or 6” joint finishing knife or Ames Pre-Fill Tool. Fill “V” joint flush and wipe off excess compound beyond the “V” groove, leaving a clear depression to receive tape. Allow prefill to harden prior to the next application (tape or embedding coat).

SHEETROCK Brand Joint Tape

- a. Mix joint compound in strict accordance with manufacturer’s recommendations.
- b. Apply joint compound in a thin uniform layer to all joints and angles to be reinforced. Immediately apply SHEETROCK Brand Joint Tape centered over joint and seated into compound. Sufficient compound—approx. 1/64” to 1/32”— must remain under the tape to provide proper bond. Follow immediately with a thin skim coat to embed tape, but not to function as a second coat. Fold and embed tape properly in all interior angles to provide a true angle. The tape or embedding coat must be thoroughly dry prior to application of second coat. (Exception: DURABOND Setting-Type and EASY SAND Lightweight Setting-Type Joint Compounds need only have hardened prior to application of next coat.)
- c. Apply second coat of joint compound over embedding coat, filling panel taper flush with surface; cover tape and feather out at least 2” beyond first coat. On joints with no taper, cover the tape and feather out at least 4” on either side of tape. Allow second coat to dry thoroughly prior to application of finish coat. (Exception: DURABOND Setting-Type and EASY SAND Lightweight Setting-Type Joint Compounds need only have hardened prior to second coat application.)
- d. Spread finish coat evenly over and extend at least 2” beyond second coat on all joints and feather to a smooth uniform finish. Do not allow finished joint to protrude beyond plane of the surface. Where necessary, sand lightly between coats and following the final application of compound to provide a smooth surface ready for decoration. When sanding, take care not to roughen face paper.

SHEETROCK Brand Fiberglass Drywall Tape

- a. Mix joint compound in strict accordance with manufacturer’s recommendations.
- b. Center and apply SHEETROCK Brand Fiberglass Drywall Tape directly over joint, pressing tape firmly so that it adheres evenly to surface. To eliminate wrinkles and ensure maximum bond, press entire length of taper with drywall knife. Avoid overlapping tape at intersections. Cut tape with drywall knife.
- c. Cover with a layer of SHEETROCK Brand Setting-Type (DURABOND) or Lightweight Setting-Type (EASY SAND) Joint Compound, forcing compound through the tape with a drywall knife/trowel to completely fill and level the joint. Failure to completely fill the joint may result in cracking. Let dry and sand lightly as required.

## 20 THAMES STREET – PORTLAND, ME

- d. Apply second coat of SHEETROCK Brand Setting-Type (DURABOND) or Lightweight Setting-Type (EASY SAND) Joint Compound or SHEETROCK Brand Drying-Type Joint Compound (powder or ready mixed), feathering approximately 2" beyond first coat. Let dry and sand lightly as required.

### FINISHING FASTENERS

- a. Apply a setting-type, all-purpose, or lightweight all-purpose compound to fastener depressions as the first coat. Follow with a minimum of two additional coats of topping or all-purpose compound, leaving all depressions level with the surface. (Exception: Setting-type and lightweight all-purpose joint compounds need only one additional coat.)

### F. SHEETROCK Brand Paper Faced Drywall Metal Bead and Trim

#### Application and Finishing

- a. Apply compound to both sides of corner, extending 2" on each side for outer corners, 1-1/2" for inside corners. Cut bead to desired length; align tightly to ceiling and press firmly with fingers along length of corner to set. Do not bend bead. Run taping knife over corner at a 45° angle with even pressure. Remove excess compound using knife to eliminate air bubbles under paper. Allow to dry.
- b. For outer corners, apply another coat of compound to both sides, feathering out 5"-6" on each side. Let dry; sand lightly as necessary. For inner corners, apply fill coat to one side, feathering out 1". Let dry. Apply fill coat to other side using same procedure. Let dry. Sand lightly where necessary.
- c. For outer corner, apply finishing coat, feathering 8" from nose of bead. Draw knife along one side of bead with one edge resting on nose of bead and other on surface of wallboard. Repeat for other side. Let dry. Sand and prime. For inner corners, apply finishing coat to one side, feathering 1" past previous coat. Let dry. Apply finishing coat to other side. Let dry. Sand and prime.

### G. Other Bead and Trim

#### Installation

- a. Reinforce all vertical and horizontal exterior corners with corner bead fastened with nails or 9/16" galvanized staples 9" o.c. on both flanges along entire length of bead.
- b. Where partition or ceiling terminates against masonry or other dissimilar material, apply metal trim over gypsum panel edge and fasten with nails or galvanized staples 9" o.c.

#### Finishing

- a. Apply first coat to all bead and trim and properly feather out from ground to plane of surface. Compound must thoroughly dry prior to application of second coat (exception: SHEETROCK Brand Setting-Type [DURABOND] and Lightweight Setting-Type [EASY SAND] Joint Compounds need only have hardened prior to application of next coat.)
- b. Apply second coat in same manner as first coat, extending compound slightly beyond face of panel. Compound must be thoroughly dry prior to application of finish coat (exception: Setting-Type joint compounds need only have hardened prior to application of next coat.)
- c. Apply finish coat to all bead and trim, extending compound slightly beyond the second coat and properly feathering from ground to plane or surface (exception: Only two coats of SHEETROCK Brand Setting-Type [DURABOND] or Lightweight Setting-Type [EASY SAND] Joint Compound or SHEETROCK Brand Lightweight All Purpose Joint Compound Ready

## 20 THAMES STREET – PORTLAND, ME

Mixed [PLUS 3] are needed.) When dry, sand finish as necessary to provide a flat smooth surface ready for decoration. When sanding, take care not to roughen face paper.

- Note1: Gypsum board to be installed behind all tubs and shower units where tub and shower units are on rated (demising and corridor) walls, which results in double gypsum board on some bathroom walls. See bathroom drawing sheet.
- Note 2: Fire rated gypsum board ceiling in concealed spaces. IE: Under acoustic tile ceiling in corridors tape to be set in compound and several coats of compound applied over tape, no exposed tape will be accepted.

### H. Ceiling suspension system:

1. Space hangers not over 48 in. o.c. in direction of main runner channels, and within 6 in. of ends of main runner runs and of boundary walls, structural steel, partitions, and similar interruptions of ceiling continuity. Install additional hangers at ends of each suspension member and at ceiling equipment not separately suspended, 6 in. from vertical surfaces. Do not splay wires more than 5 in. in a 4 ft. vertical drop. Wrap wire a minimum of three times horizontally, turning ends upward.
  2. Attach hangers directly to ceiling structure, or to supplementary framing members supplied and installed under this section. Hangers may not be suspended from mechanical or electrical equipment such as ductwork, conduit or piping.
  3. Install 1-1/2 in. main runner channels spaced not over 48 in. o.c. within 6 in. of wall. Position channels for proper ceiling height, level and secure, with hanger wire saddle-tied along channel. Provide 1 in. clearance between runners and abutting walls and partitions. At channel splices, interlock flanges, overlap ends 12 in., and secure each end with double-strand 18 ga. tie wire.
  4. Erect 3/4 in. metal furring channels at right angles to main runner channels or main support members. Space furring not over 16 in. o.c., and within 6 in. of wall. Provide 1 in. clearance between furring ends and abutting walls and partitions. Secure furring to carrying channels with clips or saddle-tie to supports with double strand 18 ga. tie wire. At splices, next furring channels at least 8 double-strand 18 ga. tie wire.
  5. At openings interrupting main or furring channels, install additional cross-reinforcing as required, to restore lateral stability of ceiling framing system.
  6. Finished installations shall be level to within 1/4 in. in 10 ft.
- 3.3 ON SURFACES TO BE PAINTED: tape and cement all joints and screw locations with three coats of compound, then sand to smooth finish, acceptable to paint.
- 3.4 DURING WORK PROGRESS, remove all excess materials and debris resulting from operations, which may disrupt the work of other trades and after completion leave the premises broom clean.

**END OF SECTION**

SECTION 09 90 00

PAINTING

1. GENERAL

1.1 DESCRIPTION OF WORK

- A. Drawings and general provisions of Contract, including General Conditions and Division 1 specifications, apply to work in this section.
- B. The extent of work shall be as shown on Drawings and called for in these Specifications. Performance shall meet the requirements of these Specifications. The work covered by this section of Specifications consists of the following:
  - 1. Painting or staining all interior and exterior surfaces in these Specifications.
  - 2. Painting interior walls, door trim, window trim, etc.
  - 3. Staining and varnishing rails as called for on Drawings.
  - 4. Painting all exterior doors as specified.
  - 5. Painting and finishing any other work requiring finishing left unfinished by others.
  - 6. Walls painted accent as called for on Drawings.
  - 7. Frames and exterior doors.
- C. Volatile Organic Compound (VOC) emissions from paints & coatings must not exceed the VOC limits of Green Seal's Standards GS-11 requirements.
  - 1. Non-flat: 150 g/l
  - 2. Flat: 50 g/l

NOTE: All colors to be selected by Architect. The Contractor shall submit to the Architect, for approval, color samples of stain finishes, See general Note Section 09250.

1.2 SUBMITTALS

- A. Issue submittals in accordance with Section 01300, Submittals.
- B. Submit as follows:
  - 1. Manufacturer's data, application instructions, and color chips on all specified products.
  - 2. Paint schedule covering all surfaces to be painted.

## **20 THAMES STREET – PORTLAND, ME**

3. Contractor to provide 4' x 8' test panels in finished spaces for up to 3 trials for each required color selection. Test panel colors to be selected by Architect. Final color to be approved by Architect from test panels.
4. Provide as maintenance material, a minimum of one gallon of each type and color of paint used on job, in labeled and well-sealed containers, for future touch-up. Also provide typed list of each type and color of paint used on job, including name of distributor from whom paint may be obtained.

### **2. PRODUCTS**

#### 2.1 General

- A. Paint: Acceptable manufacturers, unless specific manufacturer is noted: California Products Corporation, Benjamin Moors, Pratt & Lambert, Sherwin-Williams, Tnemec.
- B. All products used shall be manufacturer's top quality product for each type of finish specified.

#### 2.2 MATERIALS

- A. Where primer is called for, use primer recommended by manufacturer for particular combination of substrate and finish coat. Where painting over shop-applied primers, verify that finish paint proposed for field application is compatible with shop primers actually used.
- B. Exterior Doors: Steel-Clad: Benjamin Moore Ironclad Retardo
- C. All Gypsum Walls and Ceilings to be painted: Primer - Benjamin Moore Vinyl Latex Primer Sealer.
- D. Finish-Walls - Benjamin Moore Moorcraft Latex Eggshell.
- E. Finish Ceiling – Flat Ceiling White Latex
- F. Interior exposed softwood woodwork as noted on Drawings: One (1) coat Primer; two (2) finish coats Semigloss Latex.
- G. Interior Door Frames & Trim, & Miscellaneous interior wood trim: Benjamin Moore Wood Primer and two (2) coats Latex Semigloss.

### **3. EXECUTION**

#### 3.1 JOB CONDITIONS

- A. Store materials in sealed containers. Provide a fire extinguisher in storage room. Remove flammable rags and waste from building at end of day.

## 20 THAMES STREET – PORTLAND, ME

- B. Do not perform exterior work in rain or when precipitation is forecast imminently; or in hot, dry, or windy weather which would cause finish to cure too rapidly, or be marred by windstorm dust; or at temperatures below 40 degrees F.
- C. Maintain temperature at interior locations between 50 and 75 degrees F, maximum 80 percent relative humidity, while paint is being applied. Provide adequate ventilation, by mechanical means if necessary, for drying of paint and prevention of condensation and mildew. Do not apply finish in areas in which dust is being generated.
- D. Protect finished surfaces and equipment not being painted with masking tape, canvas drop cloths, polyethylene sheets, etc. Items such as lighting switch covers, fixture canopies, and door handles shall be temporarily removed, carefully stored, and replaced after painting, or carefully covered during painting operations.

### 3.2 PREPARATION

- A. Preparation of newly-installed materials to receive finish painting is specified under those Sections installing materials. This includes, but is not necessarily limited to: touch-up of damaged shop coats; taping, sealing and sanding of drywall; patching masonry; sanding finish wood; and cleaning off grease, oil, dirt, mildew, factory-applied protective coatings, and other foreign materials.
- B. At wood surfaces to be painted, scrape and clean small, dry, seasoned knots, and apply a thin coat of white shellac or other recommended knot sealer, before application of priming coat. After priming, fill holes and imperfections in finish surfaces with putty or plastic wood-filler. Sandpaper smooth when dried. Caulk all interplay between wood trim, door frames and base boards with gyp board.
- C. Before beginning work under this Section, verify that preparation of substrates under other Sections has been done as specified. Thoroughly remove water, dirt, and dust with clean cloths, brooms, or brushes. Allow masonry mortar joints to cure as long as possible before beginning paint application, 7 days minimum, 28 days preferably.

### 3.3 APPLICATION

- A. Apply all materials in accordance with the manufacturer's recommendations.
- B. Apply materials with suitable brushes, rollers, and spraying equipment. Keep application equipment clean, dry, and free from contaminants. Thoroughly stir materials before applying, and periodically during application.
- C. Rate and method of application and drying time between coats shall be strictly in accordance with manufacturer's recommendations.
- D. Prepare field test panels in accordance with paragraph 1.4-B.3 of this Section for each type and color of finish specified. Request review of first completed room, color scheme, special items, etc., which shall serve as project standard after approval.

## 20 THAMES STREET – PORTLAND, ME

- E. Touch-up shop applied primers before field painting.
- F. Do not apply first coat until surface is dry to touch. Moisture content of surface shall be within limitations recommended by paint manufacturer.
- G. Leave all parts of moldings and ornaments clean and true to detail, without excessive paint in corners and depressions. Make edges of paint adjoining other materials or colors clean and sharp with no overlapping. Paint surfaces visible through grilles one coat flat black.
- H. Finish coats shall be smooth, free of brush marks, streaks, laps or pile-up of paint, and skipped or missed areas. Refinish whole wall if unacceptable finish is extensive or of such a nature that it cannot be repaired by normal touch-up.
- I. After completion of painting work, remove spilled or spattered paint. Touch-up and repair finishes damaged in any way by work under this Section. Protect finished surfaces.

### 3.4 Exterior

- A. Exterior and interior - Steel-Clad door: Two (2) coats exterior enamel over factory primer. Doors shall be laid flat if sprayed. Doors may be rolled or brushed in place, however with no visible brush marks, drips or imperfections.
- B. All exterior metal work (steel) to include railings, brackets and grids.
  - a. Alkyd Systems  
Gloss Finish
    - 1<sup>st</sup> Coat: S-W All surface Enamel Primer, A11w210
    - 2<sup>nd</sup> Coat: S-W All Surface Enamel, A11 Series
    - 3<sup>rd</sup> Coat: S-W All Surface Enamel, A11 Series  
(4 mils wet, 1.6 mils dry per coat)

### 3.5 Interior

- A. Interior Painting: Paint shall be applied in the following number of coats, primer and finish. Tint all primers to match finish color.
  - 1. One (1) fully applied finish coat of even coverage. NOTE: Contractor to adequately cover M.R. (Blueboard) or other colored drywall by primer or finish coat as necessary to eliminate any visible "bleed through".
  - 2. Drywall: All interior walls including garage to receive paint: one (1) coat latex base primer-sealer, two (2) finish coats latex eggshell. Ceiling: One (1) coat primer and two (2) coats latex flat.
  - 3. Concrete Block: One (1) coat latex base primer, two (2) finish coats latex eggshell finish.



**20 THAMES STREET – PORTLAND, ME**

- B. Interior Window Sill, Door Frames & Trim, and Miscellaneous Interior Wood Trim- one (1) coat primer and two (2) coats finish for all soft wood.
- C. All hardwood to receive three (3) coats urethane. Apartment entry doors, three (3) coats urethane.
- D. Exterior Oak Door, five (5) coats marine varnish.
- E. ***NOTE: Painting Contractor to verify that interior apartment doors are prefinished.***

**END OF SECTION**

SECTION 10550

POSTAL SPECIALTIES (MAILBOXES)

1. GENERAL

1.1 DESCRIPTION OF WORK

- A. Drawings and general provisions of Contract, including General Conditions and Division 1 specifications, apply to work in this section.
- B. The extent of work shall be as shown on Drawings and called for in these Specifications. The work under this section of Specifications includes furnishing and installing the items listed as indicated on Drawings.

2. PRODUCTS:

- 2.1 Mailboxes shall be manufactured by Auth – Florence 1400-65 HAS Series, dark bronze, front loading, installed to Postal Regulations. Provide for twenty-eight (28) mailboxes. Refer to Drawings for configurations per building.
- 2.2 Provide Locking Device 2090. Provide a “Key Keeper” by entry door for mailman.

3. EXECUTION:

- 3.1 Mailboxes shall be framed into wall as shown on drawings. Care shall be taken to insure tight fit and that Vertical Placement (Ht. to boxes) meets Postal Regulations. Properly secure, block and align unit as shown in manufacturer's installation guidelines. All work shall be done in first-class manner insuring high-grade finish.
- 3.2 NOTE: The Contractor shall submit drawings on every item specified in this section. There shall be no substitutions without a written explanation from the subcontractor that the specific item is equal with the item specified by the Architect. All substitutions shall be approved by the Architect and the Owner.

END OF SECTION

## SECTION 14 21 00

### Electric Traction Elevators

#### Part 1 - GENERAL

##### 1.01 SUMMARY

- A. This Section specifies electric traction elevators.
- B. Related work not specified herein: The following sections contain requirements that relate to this section and are performed by trades other than the elevator manufacturer/installer.
  - 1. Section 01 50 00 - Construction Facilities and Temporary Controls: protection of floor openings and personnel barriers; temporary power and lighting.
  - 2. Section 31 20 00 - Earthwork: excavation for elevator pit.
  - 3. Section 03 30 00 - Cast-In-Place Concrete: elevator pit, and elevator machine foundation.
  - 4. Section 04 20 00 - Unit Masonry: masonry hoistway enclosure, building-in and grouting hoistway doorframes, and grouting of sills.
  - 5. Section 05 50 00 - Metal Fabrications: pit ladder, divider beams, and supports for entrances, rails and hoisting beam at top of elevator hoistway.
  - 6. Section 07 14 00 - Cementitious Waterproofing: waterproofing of elevator pit.
  - 7. Section 26 00 00 - Electrical:
    - a. Main disconnects for each elevator.
    - b. Electrical power for elevator installation and testing.
    - c. Disconnecting device to elevator equipment prior to activation of sprinkler system.
    - d. The installation of dedicated GFCI receptacles in the pit and overhead.
    - e. Lighting in controller area, machine area and pit.
    - f. Wiring for telephone service to controller.
  - 8. Section 28 31 13 - Fire Alarm Systems: The installation of fire and smoke detectors at required locations and interconnecting devices; fire alarm signal lines to contacts in the machine area.
  - 9. Section 27 15 33- Telephone Systems: ADAAG-required emergency communications equipment.
- C. Applicable Codes: Comply with applicable building and elevator codes at the project site, including but not limited to the following
  - 1. ANSI A117.1, Buildings and Facilities, Providing Accessibility and Usability for Physically Handicapped People.
  - 2. ADAAG, Americans with Disabilities Act Accessibility Guidelines.
  - 3. ANSI/NFPA 70, National Electrical Code.
  - 4. ANSI/NFPA 80, Fire Doors and Windows.
  - 5. ASME/ANSI A17.7, Safety Code for Elevators and Escalators.
  - 6. ANSI/UL 10B, Fire Tests of Door Assemblies.
  - 7. CAN/CSA C22.1, Canadian Electrical Code.

- 8. CAN/CSA-B44, Safety Code for Elevators and Escalators.
- 9. EN 12016 (May 1998): “EMC Product Family Standards for lifts, escalators, and passenger conveyors Part 2 – immunity”
- 10. Local Building Codes
- 11. All other local applicable codes.

## 1.02 SYSTEM DESCRIPTION

- A. Equipment Description: Gen2® gearless traction elevator with Machine-Roomless application
- B. Equipment Control: Elevonic® Control System.
- C. Drive: Regenerative
- D. Quantity of Elevators: One (1)
- E. Elevator Stop Designations: Thur 6
- F. Stops: Six (6)
- G. Openings: Front Only
- H. Travel:
- I. Rated Capacity: 2500 lbs. Passenger
- J. Rated Speed: 200 fpm
- K. Platform Size: 6' 6-3/4" wide x 4' 11-1/8" deep
- L. Clear Inside Dimensions: 6' - 5 9/16" wide x 5' – 5 9/16" deep
- M. Cab Height: 93"
- A. Clear Cab Height: 7' 3 3/8"
- N. Entrance Type and Width: One Speed Side Slide 42" doors
- O. Entrance Height: 84"
- P. Main Power Supply: 208 Volts + or - 5% of normal, three-Phase, with a separate equipment grounding conductor.
- Q. Car Lighting Power Supply: 120 Volts, Single-phase, 15 Amp, 60 Hz.
- R. Signal Fixtures: Manufacturer's standard with metal buttons.
- S. Controller Location: Machine-Roomless Controller shall be located at the front opening of the top terminal landing in the entrance frame.
- T. Performance:

**20 THAMES STREET – PORTLAND, ME**

1. Car Speed:  $\pm 3\%$  of contract speed under any loading condition or direction of travel.
2. Car Capacity: Safely lower, stop and hold up to 120% of rated load. (code required).

U. Ride Quality:

1. Vertical Vibration (maximum): 20 milli-g
2. Horizontal Vibration (maximum): 12 milli-g
3. Vertical Jerk (maximum):  $4.59 \pm 1.0 \text{ ft./ sec}^3$  ( $1.4 \pm 0.3 \text{ m/ sec}^3$ )
4. Acceleration/Deceleration (maximum):  $2.62 \text{ ft./ sec}^2$  ( $0.8 \text{ m/ sec}^2$ )
5. In Car Noise: 55 – 60 dB(A)
6. Stopping Accuracy:  $\pm 0.375 \text{ in. max, } \pm 0.25 \text{ in. Typical}$
7. Re-leveling Distance:  $\pm 0.5 \text{ in. } (\pm 12 \text{ mm})$

V. Simplex Collective Operation:

1. Using a microprocessor-based controller, operation shall be automatic by means of the car and hall buttons. If all calls in the system have been answered, the car shall park at the last landing served.

W. Operating Features – Standard

1. Full Collective Operation
2. Anti-nuisance.
3. Fan and Light Protection.
4. Load Weighing Bypass.
5. Full Collective Operation.
6. Firefighters' Service Phase I and Phase II:
7. Top of Car Inspection.

X. Operation Features – Optional

1. Zoned Access at Bottom Landing.
2. Zoned Access at Upper Landing.

Y. Door Control Features:

1. Door control to open doors automatically when car arrives at a landing in response to a normal hall or car call.
2. Elevator doors shall be provided with a reopening device that will stop and reopen the car door(s) and hoistway door(s) automatically should the door(s) become obstructed by an object or person.  
Door protection shall consist of a two dimensional, multi-beam array projecting across the car door opening.
3. Door nudging operation to occur if doors are prevented from closing for an adjustable period of time.

Z. Provide equipment according to: Seismic Zone 0

**1.03 SUBMITTALS**

- A. Product Data: Submit manufacturer's product data for each system proposed for use. Include the following:
  - 1. Signal and operating fixtures, operating panels and indicators.
  - 2. Cab design, dimensions and layout.
  - 3. Hoistway-door and frame details.
  - 4. Electrical characteristics and connection requirements.
  - 5. Expected heat dissipation of elevator equipment in control room space and machine space (BTU).
  - 6. Color selection chart for Cab and Entrances.
  
- B. Shop Drawings: Submit approval layout drawings. Include the following:
  - 1. Car, guide rails, buffers and other components in hoistway.
  - 2. Maximum rail bracket spacing.
  - 3. Maximum loads imposed on guide rails requiring load transfer to building structure.
  - 4. Clearances and travel of car.
  - 5. Clear inside hoistway and pit dimensions.
  - 6. Location and sizes of access doors, hoistway entrances and frames.
  
- C. Operations and Maintenance Manuals: Provide manufacturer's standard operations and maintenance manual.

**1.04 QUALITY ASSURANCE**

- A. Manufacturer: Elevator manufacturer shall be ISO 9001 certified.
  
- B. Permits, Inspections and Certificates: The Elevator Contractor shall obtain and pay for necessary Municipal or State Inspection and permit as required by the elevator inspection authority, and make such tests as are called for by the regulations or such authorities. These tests shall be made in the presence of such authorities or their authorized representatives.

**1.05 DELIVERY, STORAGE AND HANDLING**

- A. Should the building or the site not be prepared to receive the elevator equipment at the agreed upon date, the General Contractor will be responsible to provide a proper and suitable storage area on or off the premises.
  - 1. Should the storage area be off-site and the equipment not yet delivered, then the elevator contractor, upon notification from the General Contractor, will divert the elevator equipment to the storage area. If the equipment has already been delivered to the site, then the General Contractor shall transport the elevator equipment to the storage area. The cost of elevator equipment taken to storage by either party, storage, and redeliver to the job site shall not be at the expense of the elevator contractor.

**1.06 WARRANTY**

- A. The elevator contractor’s acceptance is conditional on the understanding that their warranty covers defective material and workmanship. The guarantee period shall not extend longer than one (1) year from the date of completion or acceptance thereof by beneficial use, whichever is earlier, of each elevator. The guarantee excludes: ordinary wear and tear, improper use, vandalism, abuse, misuse, or neglect or any other causes beyond the control of the elevator contractor and this express warranty is in lieu of all other warranties, express or implied, including any warranty of merchantability or fitness for a particular purpose.

**1.07 MAINTENANCE and SERVICE**

- A. Maintenance service consisting of regular examinations and adjustments of the elevator equipment shall be provided by the elevator contractor for a period of 12 months after the elevator has been turned over for the customer’s use. This service shall not be subcontracted but shall be performed by the elevator contractor. All work shall be performed by competent employees during regular working hours of regular working days and shall include emergency 24-hour callback service. This service shall not cover adjustments, repairs or replacement of parts due to negligence, misuse, abuse or accidents caused by persons other than the elevator contractor. Only genuine parts and supplies as used in the manufacture and installation of the original equipment shall be provided.
- B. The periodic lubrication of elevator components shall not be required, including: Sheaves, Rails, Belts, Ropes, Car and CWT guides, etc.
- C. The elevator control system must:
  - 1. Provide in the controller the necessary devices to run the elevator in inspection operation.
  - 2. Provide on top of the car the necessary devices to run the elevator in inspection operation.
  - 3. Provide in the controller an emergency stop switch. This emergency stop switch when opened disconnects power from the brake and prevents the motor from running.
  - 4. Provide in the event of a power outage, means from the controller to electrically lift and control the elevator brake to safely bring the elevator to the nearest available landing.
  - 5. Provide the means from the controller to reset the governor over speed switch and also trip the governor.
  - 6. Provide the means from the controller to reset the emergency brake when set because of an unintended car movement or ascending car over speed.
- D. Provide system capabilities to enable a remote expert to create a live, interactive connection with the elevator system to enable the following functions:
  - 1. Remotely diagnose elevator issues with a remote team of experts
  - 2. Remotely return an elevator to service
  - 3. Provide real-time status updates via email
  - 4. Remotely make changes to selected elevator functions including:

- a. Control building traffic: Restrict floor access, remove car from group operation, shut down elevator, select up peak/down peak mode, activate independent service
- b. Conserve energy: Activate cab light energy save mode, activate fan energy save mode, shut down car(s)
- c. Improve passenger experience: Extend door open times, change parking floor, activate auto car full, activate anti-nuisance, advance door opening, door nudging, extend specific floor extended opening time, release trapped passengers

## Part 2 - PRODUCTS

### 2.01 DESIGN AND SPECIFICATIONS

- A. Provide machine-roomless Gen2™ traction passenger elevators from Otis Elevator Company. The control system and car design based on materials and systems manufactured by Otis Elevator Company. Specifically, the system shall consist of the following components:
  - 1. Controller located entirely inside the hoistway. No extra machine room or control closet space required.
  - 2. An AC gearless machine using embedded permanent magnets mounted at the top of the hoistway.
  - 3. Polyurethane Coated-Steel Belts for elevator hoisting purposes.
  - 4. Regenerative drive that captures normally wasted energy and feeds clean power back into the building's power grid.
  - 5. LED lighting standard in ceiling lights and elevator fixtures.
  - 6. Sleep mode operation for LED ceiling lights and car fan.
- B. Approved Installer: Otis Elevator Company

### 2.02 EQUIPMENT: CONTROLLER COMPONENTS

- A. Controller: A microcomputer based control system shall be provided to perform all of the functions of safe elevator operation. The system shall also perform car and group operational control.
  - 1. All high voltage (110V or above) contact points inside the controller shall be protected from accidental contact when the controller doors are open.
  - 2. Controller shall be separated into two distinct halves; Motor Drive side and Control side. High voltage motor power conductors shall be routed so as to be physically segregated from the rest of the controller.
  - 3. Field conductor terminations points shall be segregated; high voltage (>30 volts DC and 110 VAC,) and low voltage (< 30 volts DC).
  - 4. Controllers shall be designed and tested for Electromagnetic Interference (EMI) immunity according to the EN 12016 (May 1998): "EMC Product Family Standards for lifts, escalators, and passenger conveyors Part 2 – immunity"



- 5. Controller shall be located inside the wall next to the top landing entrance frame. Emergency access shall be provided through an access panel in the entrance frame secured by a key lock.
  - 6. A separate control room or cabinet should not be required.
- B. Drive: A Variable Voltage Variable Frequency AC drive system shall be provided. The drive shall be set up for regeneration of AC power back to the building grid.

**2.03 EQUIPMENT: MACHINE AND GOVERNOR**

- A. Machine: AC gearless machine, with a synchronous permanent-magnet motor, dual solenoid service and emergency disc brakes, mounted at the top of the hoistway.
- B. Governor: The governor shall be a tension type car-mounted governor.
- C. Buffers, Car and Counterweight: Polyurethane type buffers shall be used.
- D. Hoistway Operating Devices:
  - 1. Emergency stop switch in the pit
  - 2. Terminal stopping switches.
- E. Positioning System: Consists of an encoder, reader box, and door zone vanes.
- F. Guide Rails and Attachments: Guide rails shall be Tee-section steel rails with brackets and fasteners. Side counterweight arrangements shall have a dual-purpose bracket that combines both counterweight guide rails, and one of the car guide rails to building fastening.
- G. Coated-Steel Belts: Polyurethane coated belts with high-tensile-grade, zinc-plated steel cords and a flat profile on the running surface and the backside of the belt. All driving sheaves and deflector sheaves should have a crowned profile to ensure center tracking of the belts. A continuous 24/7 monitoring system using resistance based technology has to be installed to continuously monitor the integrity of the coated steel belts and provide advanced notice of belt wear.
- H. Governor Rope: Governor Rope shall be steel and shall consist of at least eight strands wound about a sisal core center.
- I. Fascia: Galvanized sheet steel shall be provided at the front, and rear, of the hoistway.
- J. Hoistway Entrances:
  - 1. Frames: Entrance frames shall be of bolted construction for complete one-piece unit assembly. All frames shall be securely fastened to fixing angles mounted in the hoistway and shall be of UL fire rated steel.
  - 2. Sills shall be extruded aluminum.
  - 3. Doors: Entrance doors shall be of metal construction with vertical channel reinforcements.
  - 4. Fire Rating: Entrance and doors shall be UL fire rated for 1-1/2 hour
  - 5. Entrance Finish to be painted Baked Enamel at all follow levels.
  - 6. Frame Finish to be painted Baked Enamel at all follow levels.

- 7. Entrance marking plates: Entrance jambs shall be marked with 4" x 4" (102 mm x 102 mm) plates having raised floor markings with Braille located adjacent to the floor marking. Marking plates shall be provided on both sides of the entrance.
- 8. Sight Guards: Black sight guards will be furnished with all doors.

**2.04 EQUIPMENT: CAR COMPONENTS**

- A. Carframe and Safety: A carframe fabricated from formed or structural steel members shall be provided with adequate bracing to support the platform and car enclosures. The car safety shall be integral to the carframe and shall be Type "B", flexible guide clamp type.
- B. Cab Options:
  - 1. Steel cab shell with raised laminate, vertical panels.
  - 1. Black vertical trim pieces
  - 2. Paints and laminate to be selected from manufacturer's catalog of choices.
  - 3. Brushed Stainless Steel finished base plate located at top and bottom.
- C. Car Front Finish: Satin Stainless Steel.
- D. Car Door Finish: Satin Stainless Steel
- E. Ceiling Type: Brushed Satin Stainless Steel Finish Dropped Steel Ceiling with 6 LED Lights
- F. Emergency Car Lighting: An emergency power unit employing a 6-volt sealed rechargeable battery and totally static circuits shall be provided to illuminate the elevator car in the event of building power failure.
- G. Fan: A one-speed 120 VAC fan will be mounted to the structural ceiling to facilitate in-car air circulation, meeting A17.1 code requirements. The fan shall be rubber mounted to prevent the transmission of structural vibration and will include a baffle to diffuse audible noise. A switch shall be provided in the car-operating panel to control the fan.
- H. Handrails: Handrails shall be provided on the Side & Rear walls of the car enclosure. Handrails shall be 1 ½" dia. Round Bar with a Brushed Satin Steel Finish.
- I. Threshold / Sill: Extruded Aluminum.
- J. Emergency Exit Contact: An electrical contact shall be provided on the car-top exit.
- K. Guides: The car shall have 3" diameter roller guides at top and bottom and the counterweight shall have slide type guides at the top and the bottom.
- L. Platform: The car platform shall be constructed of metal. Load weighing device shall be mounted on the belts at the top of the hoistway.
- M. Zoned Certificate frame- Provide a Certificate frame with a satin stainless steel finish.

**2.05 EQUIPMENT: SIGNAL DEVICES AND FIXTURES**

- A. Car Operating Panel: A car operating panel shall be provided which contains all push buttons, key switches, and message indicators for elevator operation. The car operating panel shall have a satin stainless steel finish.
  - 1. A car operating panel shall be furnished. It shall contain a bank of round stainless steel, mechanical LED illuminated buttons. Flush mounted to the panel and marked to correspond to the landings served. All buttons to have raised numerals and Braille markings with these options:
    - a. Flat Flush Mounted satin stainless steel button with blue or white LED illuminating halo)
    - b. Option- 1/8" (3mm) satin stainless steel projecting button with blue illuminating halo
    - c. Vandal-Resistant, Flush satin stainless steel button with blue LED illuminating center jewel
    - d. Plastic 1/8" (3mm) fully illuminated button with white LED (required by some local California codes)
  - 2. The car operating panel shall be equipped with the following features:
    - a. Raised markings and Braille to the left hand side of each push-button.
    - b. Car Position Indicator at the top of an integral to the car operating panel.
    - c. Door open and door close buttons.
    - d. Inspection key-switch.
    - e. Elevator Data Plate marked with elevator capacity and car number.
    - f. Help Button: The help button shall initiate two-way communication between the car and a location inside the building, switching over to another location if the call is unanswered, where personnel are available who can take the appropriate action. Visual indicators are provided for call initiation and call acknowledgement.
    - g. Landing Passing Signal: A chime bell shall sound in the car to signal that the car is either stopping at or passing a floor served by the elevator.
    - h. In car stop switch (toggle or key unless local code prohibits use)
    - i. Firefighter's hat
    - j. Firefighter's Phase II Key-switch
    - k. Call Cancel Button
  - 3. Optional
    - a. Firefighter's Phase II Emergency In-Car Operating Instructions: worded according to A17.1 2000, Article 2.27.7.2.
  
- B. Car Position Indicator: A digital, LED car position indicator shall be integral to the car operating panel.
  - 1. Hall Fixtures: Hall fixtures shall be provided with necessary push buttons and key switches for elevator operation. Hall fixtures shall feature:
    - a. Stainless Steel Hall Position Indicators atB,1
  - 2. Integral Hall fixtures shall feature:
    - a. Round stainless steel, mechanical buttons marked to correspond to the landings.
    - b. Hall fixtures to be located in the entrance frame face. Therefore, separate wiring and installation of electrical boxes inside the wall for the hall buttons are not required.
    - c. Buttons shall be in vertically mounted fixture. Fixture shall be satin stainless steel finish.
  - 3. Button Options:
    - a. Flat Flush Mounted satin stainless steel button with blue or white LED illuminating halo)

- C. Car Lantern and Chime: A directional lantern visible from the corridor shall be provided in the car entrance. When the car stops and the doors are opening, the lantern shall indicate the direction in which the car is to travel and a chime will sound.
- D. Access key-switch at Top and Bottom floors mounted in the entrance frame jamb.

**Part 3 - EXECUTION**

**3.01 PREPARATION**

- A. Take field dimensions and examine conditions of substrates, supports, and other conditions under which this work is to be performed. Do not proceed with work until unsatisfactory conditions are corrected.

**3.02 INSTALATION**

- A. Installation of all elevator components except as specifically provided for elsewhere by others.

**3.03 DEMONSTRATION**

- A. The elevator contractor shall make a final check of each elevator operation with the Owner or Owner's representative present prior to turning each elevator over for use. The elevator contractor shall determine that control systems and operating devices are functioning properly.

END OF SECTION

SECTION 21 13 13 - WET-PIPE SPRINKLER SYSTEMS

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 a pressurized, fully supervised, wet or dry pipe fire protection system for full building protection in accordance with NFPA, IBC, the City of Portland Fire Department and the Owner's insurance underwriter. Areas subject to freezing shall have a dry pipe system, dry pendent or sidewall heads, per NFPA. Provide a 4" standpipe in each stairwell with a 2½" valve at each floor. Provide multiple risers, as required.
- B. The sprinkler systems design shall be based on NFPA13 requirements.

1.2 RELATED DOCUMENTS

- A. The drawings and the specifications including SECTION 23 05 00 "Common Work Results for HVAC" are hereby made a part of the work of this section.

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 NICET III 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 Common Work Results for HVAC, 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.

## Thames Street Building

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.

### 1.5 SPRINKLER COVERAGE

- A. Sprinkler head coverage shall conform with NFPA 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:

<u>Sprinkler Heads on Project</u>	<u>Number of Spare heads of each type.</u>
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 glycol and water loop or separate dry-pipe system.
- C. Fire Department Connection: Provide a 4" Storz connection or siamese 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. Conform to the requirements of NFPA-13, Installation of Sprinkler Systems.

## Thames Street Building

### 2.3 DEVICES

- A. Detection devices and associated low voltage and line voltage 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. Provide AMES MODEL 2000.

### 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.

## Thames Street Building

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. ¾ 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. ¾ 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. The building shall have area zone alarms to connect to the building fire alarm panel (six (6) total zones). Each floor shall be a separate sprinkler system zone. Each zone alarm shall consist of a flow switch, isolation valve with tamper switch and other components per NFPA. See Architectural Drawings for additional information. Coordinate with the Portland Fire Department. Coordinate with the Electrical Contractor and Fire Alarm Contractor.

## 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 where possible. Piping in other areas may be run exposed. Piping shall not be exposed in occupied spaces unless indicated on the drawings or accepted by the Architect.
- C. Pipe penetrations through walls and floors shall be in accordance with Section 23 05 00 – Common Work Results for HVAC. 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.



## Thames Street Building

- 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. For areas with acoustical tile ceilings, sprinkler heads shall be located in the center of acoustical tiles. Coordinate with the Reflected Ceiling Plans. The Architect shall review the 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 \*

# Thames Street Building

## SECTION 22 00 00 - PLUMBING

### PART 1 GENERAL

#### 1.1 RELATED DOCUMENTS

- A. The drawings and the specifications including Section 23 05 00 "Common Work Results for HVAC" are hereby made a part of the work of this section.

#### 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 "Common Work Results for HVAC", apply are as follows:
  - 1. Piping materials.
  - 2. Valves.
  - 3. Pipe hangers.
  - 4. Fixtures and trim.
  - 5. Miscellaneous equipment.
  - 6. Water heating equipment.
  - 7. Piping, valves and equipment identification.
  - 8. Gas piping system.
  - 9. Thermostatic mixing valves.
  - 10. Firestopping.

### PART 2 PRODUCTS

#### 2.1 PIPING MATERIALS

- A. Soil and Waste (Sanitary), Rainwater and Vent Piping:
  - 1. Below Grade: Sched. 40 PVC with solvent welded joints. Contractor shall use Purple Primer on all solvent welded joints.
  - 2. Above Grade: Sanitary piping stacks with water closets connected to the stack shall be cast iron "no Hub" (ONLY). All other above grade sanitary piping may

## Thames Street Building

be Schedule 40 PVC. Vent piping shall be Sched. 40 PVC with solvent welded joints, cast iron (ONLY) thru roof. Contractor shall use Purple Primer on all solvent welded joints.

- B. Domestic Water Piping:
  - 1. Pipe sizes larger than 1": Type L hard copper tubing and cast bronze or wrought copper solder fittings.
  - 2. Pipe sizes 1" and smaller: Uponor AquaPEX, NSF rated, 180°F at 100psi, red (HW), blue (CW) and white (RHW).
- C. Exposed Water and Waste Piping at Fixtures: Schedule 40 PVC with solvent welded joints and deep one piece escutcheon plates at traverse points. Provide cleanout plug at all sink traps.
- D. Solder: Lead-free (ONLY), Englehard Silvabrite 100, 440°F melting point, ASTM B32.
- E. Condensate Piping: Schedule 40 PVC with solvent welded joints.
- F. Radon Vent Piping (above slab): Schedule 40 ABS with solvent-welded joints.
- G. Underground Cold Water Piping (building entrance, to 10 ft outside of building): ASTM D2737 black polyethylene tubing, 200 psi rated with brass or bronze adapters complete with stainless steel clamps. Coordinate with Civil Documents.
- H. Sprinkler Service Entrance Piping (to 10 ft outside of building): Cement-lined ductile iron, coordinate with Section 211313 - Automatic Fire Protection and Civil Documents.

### 2.2 GAS PIPING SYSTEM

- A. Rigid Gas Piping: Schedule 40 carbon steel pipe conforming to ASTM 120 or A53, with threaded joints and malleable iron fittings (exposed above grade).
- B. Below grade Gas piping: TracPipe PS stainless steel underground gas piping with a polyethylene jacket and a vented polyethylene sleeve and vent tees.
- C. Ball Valves for Gas Service: Copper alloy with chromium plated floating ball per Federal Specification WW-V-35B, Type II, Class 3. Blowout-proof stem, reinforced teflon seats, threaded ends, quarter turn on-off, 600 WOG rating, 250 psi rating for natural gas, UL-listed as a natural gas shutoff valve, Apollo Model 80-100 series.
- D. Flexible Gas Piping: OmegaFlex TracPipe (concealed above grade no joints). Provide appropriate grounding if used.
- E. Gas Pressure Regulators: Maxitrol 325 Series, lever acting, vent limiting device.

## Thames Street Building

### 2.3 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, BOCA and local codes and requirements.

### 2.4 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: Quarter-Turn Ball Valve Stop, Lead-Free, NSF & ANSI compliant, similar to Watts KwikStop.
  - 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. Main Service Entrance Pressure Reducing Valve (PRV): Watts Regulator Model LFX65B, 2", bronze body, bronze and stainless steel internals, 400 psi working pressure, 180°F maximum temperature, adjustable pressure range 20-80 psig. Provide with inlet strainer (screen). Capacity shall be 100 GPM at a 7 psig pressure drop.

### 2.5 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.

## Thames Street Building

### 2.6 FIXTURES AND TRIM

- A. Any substitutions to fixtures specified below must be submitted and approved by the Architect during the bid period. Even after review by the Architect, the fixtures will be subject to the normal submittal process and review by the Engineer.
- B. (P-1) Water Closet: Fixture provided and installed by Plumbing Contractor. See Drawing I1.01 for fixture details.
- C. (P-2) Lavatory: Fixture provided and installed by Plumbing Contractor. See Drawing I1.01 for fixture details.
- D. (P-3) Tub/Shower: Fixture provided and installed by Plumbing Contractor. See Drawing I1.01 for fixture details.
- E. (P-3A) Shower: Fixture provided and installed by Plumbing Contractor. See Drawing I1.01 for fixture details.
- F. (P-4) Kitchen Sink: Fixture provided and installed by Plumbing Contractor. See Drawing I1.01 for fixture details.
- G. (P-5) Washing Machine Supply and Drain: Guy Gray model WB-200 recessed supply and drain unit with ½" Watts duo-cloz valve and 2" drain. Provide with two PPP laundry mini water hammer arrestors each.
- H. (P-6) Icemaker Connection: IPS Water-Tite AB9700HA, ½" outlet, quarter turn ball valve shutoff and water hammer arrestor.
- I. (P-7) Dog Wash: Mustee 65M, molded stone, 36"x24"x10" with 1" wide shoulders, 3" stainless steel drain with removable strainer.
  - 1. Faucet: Mustee 63.600A wall mount service faucet, chrome-plated with vacuum breaker, integral stops, adjustable wall brace, pail hook, and ¾" hose thread on spout.
  - 2. Hose and Hose Holder: Mustee 65.700, 31" long flexible heavy duty 5/8" reinforced rubber hose with ¾" brass coupling at one end, 5"x3", stainless steel bracket with rubber grip.
  - 3. Wall Guard: Mustee Duraguard, 12" high 20 gauge stainless steel wall guards.
  - 4. Mop Hanger: Mustee 65.600, 24" stainless steel.
  - 5. Caulk around mop basin at floor and walls with white silicone caulk.

### 2.7 MISCELLANEOUS EQUIPMENT

- A. Floor Drain (FD): Zurn Z-415B, cast iron body with 3" bottom outlet, combination invertible membrane clamp and adjustable collar. Strainer shall be 6" diameter Zurn

## Thames Street Building

"Type B", polished nickel-bronze. Floor drains shall have "deep seal" traps and trap primer connection, connect to nearest plumbing fixture.

- B. Floor Drain, wood deck (FD): Zurn FD-2240, cast iron body with steel flange for wood deck mounting with flexible sheet flooring, 3" bottom outlet, nickel top. Floor drains shall have "deep seal" traps and trap primer connection, connect to nearest plumbing fixture.
- C. Floor/Yard Cleanout (FCO/YCO): Zurn Z-1400 adjustable floor cleanout, cast iron body, with gas and watertight ABS tapered thread plug. Provide size equal to piping served with maximum size of 4".
  - 1. Concrete floor finishes: Scoriated round polished bronze top.
  - 2. Sheet tile finishes: Scoriated square polished bronze top recessed to receive tile.
  - 3. Carpeted finishes: Scoriated round polished bronze top and carpet marker.
- D. 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.
- E. Vacuum Breaker: Watts Model N36, 3/4" size, 20 CFM capacity.
- F. 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.
- G. Backflow Preventor (BFP): Conforming to AWWA C506, FCCHR-USC Manual Section 10, and UL listed. Types, sizes and capacities scheduled.
  - 1. Double Check (DC): Double check backflow assembly with test ports, bronze body with stainless steel springs, corrosion resistant internals, stop and waste ball valves.
  - 2. Atmospheric Double Check (DCA): Double check continuous pressure type with atmospheric port for low hazard applications, 250°F maximum water temperature, bronze body, stainless steel internals with rubber seals and integral strainer.
  - 2. 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.
- H. Freezeless Wall Hydrant (FPHB): Zurn Model Z-1300, "Ecolotrol", Josam, or approved equal, encased, non-freeze, anti-siphon, automatic draining, flush installation, 3/4" connection, hinged cover. Wall box shall be nickel bronze construction. Wall hydrants shall have an integral backflow preventer. Furnish with key lock.
- I. Hose Bibb (HB): For indoor use only. Woodford model 24, Zurn, Josam or approved equal, anti-siphon, vacuum breaker protected hose bibb with EPDM packing, adjustable packing nut with metal wheel handle.

## Thames Street Building

- J. Thermometers: Terrice 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.
- J. Pressure Gauges: Terrice 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.
- K. 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
- L. Vacuum Breaker: Watts Model N36, 3/4" size, 15 CFM capacity.
- M. 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.
- M. Electronic Thermostatic Mixing Valve (TMV): Shall be Heat-Timer Model ETV Plus "Electronic Tempering Valve" and TMC "Temperature Monitoring Control" or equal, capacities and performance as scheduled with stainless steel tempering valve, control module with built-in transformer, model "TMC" monitoring high limit control, stainless steel solenoid valve, swivel action check-stops, thermometer, shut-offs and strainer. Controller shall consist of a liquid fill thermal motor with bellows mounted out of the water, UL-listed. Installation shall be per the manufacturers recommendations, complying with ASSE 1017 or CSA B125.3. Furnish with integral check-stops and thermometer. Construction shall be lead-free.
- N. 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.
- O. Roof Drain (RD): Zurn Z-100, 15" Diameter, 3" outlet, or as indicated, cast iron body with combination membrane flashing clamp/gravel guard and low silhouette cast iron dome. Provide with roof sump receiver, underdeck clamp, static extension as required, and line size vertical expansion joint as required due to inflexibility of drainage piping.



## Thames Street Building

Overflow roof drains (ORD) shall be the same with inlet 2" above the primary roof drain inlet level.

- P. Elevator Pit Drainage System: Stancor, Inc., Model SE75 "Oil-Minder System", Zoeller or approved equal, 50GPM at 20FT head, 3/4HP, 3600 RPM, 120V, 5A, 2" discharge with check valve, float switch. A NEMA 4X control panel and a self-cleaning, hermetically sealed, stainless steel oil sensing probe shall alarm if oil is sensed. The pump shall be submersible with discharge check valve. The equipment shall be UL-listed. Provide control panel cable extensions as required for location indicated on drawings. The Code requirement is 50GPM per elevator cab, provide a sump pump per cab or a single unit rate at total GPM required.
- Q. Rainwater Inline Filters: BioClean Model BC-DF downspout filter with stainless steel filter cartridge with #40 stainless steel screen, powder coated housing, high flow bypass and hydrocarbon boom, line size inlet and outlet. Unit shall include 10 year warranty.
- R. Downspout Nozzle: Zurn model Z-199, threaded inlet connection with nickel-bronze body.

### 2.8 WATER HEATING EQUIPMENT

- A. High Efficiency Gas Water Heaters (GWH-#): AO Smith "BTH-250A", Bradford-White, State Industries, or approved equal, packaged unit of make, model, and performance as scheduled on Drawings; UL 732 and ASHRAE 90.1 compliant, ASME code construction with adjustable range thermostat. Set to provide 140°F water temperature. Provide thermostatic mixing valve set to 120°F (see TMV spec) to fixtures. Controls shall include a microprocessor based system with LCD display. Provide with condensate neutralization kit.

### 2.9 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
  - 3. Domestic Cold Water
  - 4. Vent Piping
  - 5. Exposed Above-ground Sanitary Drain Piping
  - 6. Gas Piping
  - 7. 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

## Thames Street Building

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 HVAC 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 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.

## Thames Street Building

- 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 brass 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 15000 "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.

### 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 Pipe: Supported at 4 foot intervals.
- 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.

### 3.4 CLOSING IN UNINSPECTED WORK

## Thames Street Building

- 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.

## Thames Street Building

### 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 eight (8) 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 \*

# 30" Bottom Mount Refrigerator

#1 & #2

KFN 9855 iDE LI / KFN 9855 iDE RE



# Bottom Mount Refrigerator

## KFN 9855 iDE LI / KFN 9855 iDE RE



KFN 9855 iDE LI /  
KFN 9855 iDE RE

### Features:

- DynaCool
- Easy Sensor Controls
- Plumbed Ice Maker
- Super Freeze function
- Bottle Rack
- Sabbath Mode
- Energy Star Qualified

### SPECIFICATIONS

KFN 9855 iDE LI (Left Hinge) - Item 38985552CDN

KFN 9855 iDE RE (Right Hinge) - Item 38985551CDN

Overall Unit Width 29<sup>7</sup>/<sub>8</sub>" (759 mm)

Overall Unit Height 79<sup>13</sup>/<sub>16</sub>" (2,027 mm)

Overall Unit Depth 24" (610 mm)

#### Niche

Minimum Cabinet Opening Width 30" (762 mm)

Minimum Cabinet Opening Height 80" (2,032 mm)

Minimum Cabinet Opening Depth 24" (610 mm)

#### Plumbing

#### Water Supply Requirements

Connect to a cold water supply only. Must be connected to a shut-off valve. The water shut-off valve must be accessible after installation. The water pressure must be between 22 psi (1.5 bar) and may not exceed 87 psi (6 bar). If the pressure is higher than 87 psi (6 bar), a pressure reducing valve must be installed.

#### Water Connection Line

Unit comes with a male 3/4" BPT connection on back of unit. The connection parts included with the appliance permit the connection of various water lines (included 1/4" compression fitting). Water line is not included.

#### Electrical

Electrical Requirements - Volts/Amps 110V / 120V, 60Hz, 15A (single)  
110V / 120V, 60Hz, 20A (2 Individual units installed side-by-side, using a Duplex outlet)

Power Cord - Plug Yes - NEMA 5-15 plug, 6' 6" (2 m)

#### Custom Panel

Refer to manual for further detail

Maximum Panel Weight Door Panel - 60 lbs (27 kg)

Maximum Panel Thickness 3/4" (19 mm)

Minimum Panel Thickness 5/8" (16 mm)

#### Shipping

Shipping Weight 345 lbs (156.5 kg)

Shipping Dimension 32<sup>5</sup>/<sub>16</sub>" W x 82<sup>11</sup>/<sub>16</sub>" H x 29<sup>7</sup>/<sub>8</sub>" D

#### Support

Call Miele 800.843.7231

Miele Website [www.mieleusa.com](http://www.mieleusa.com)

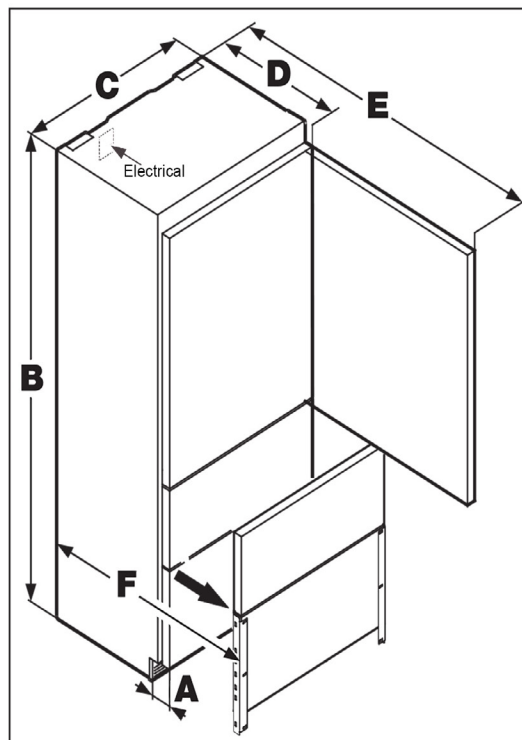
20/20 Link [2020technologies.com](http://2020technologies.com)

# Bottom Mount Refrigerator

## KFN 9855 iDE LI / KFN 9855 iDE RE

**Miele**

### Unit Dimension



	<b>A</b>	<b>B</b>	<b>C</b>	<b>D</b>	<b>E</b>	<b>F</b>
<b>KFN 9855 iDE</b>	3" (76 mm)	79-13/16" (2,027 mm)	29-7/8" (759 mm)	24" (610 mm)	55 1/4" (1,413 mm)	37-1/8" (952 mm)

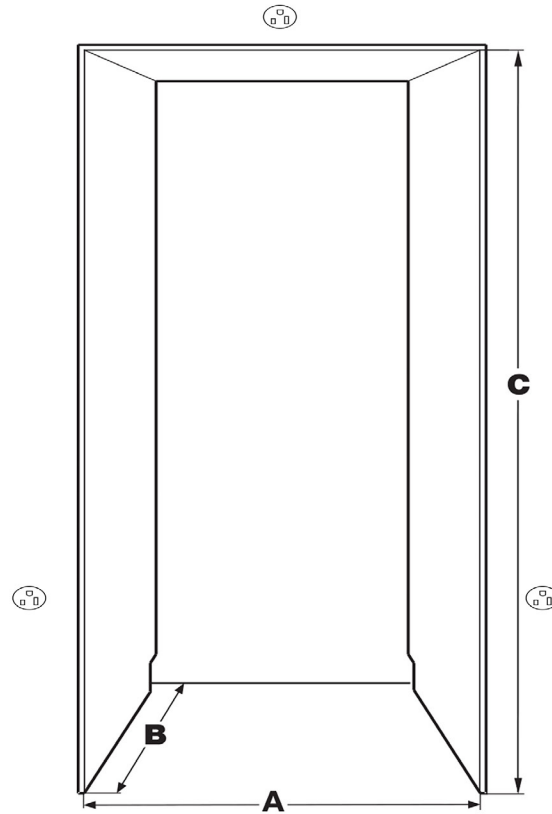
Power Cord exits at the top right when looking at the rear of the unit.



# Bottom Mount Refrigerator

## KFN 9855 iDE LI / KFN 9855 iDE RE

### Niche Dimension



<b>A</b> Cabinet Width	<b>B</b> Inset cabinet Depth	<b>B</b> Frameless/faceframe cabinet Depth	<b>C</b> Cabinet Height
30" (762 mm)	24" (610 mm) + panel thickness	24" (610 mm)	80" (2,032 mm)

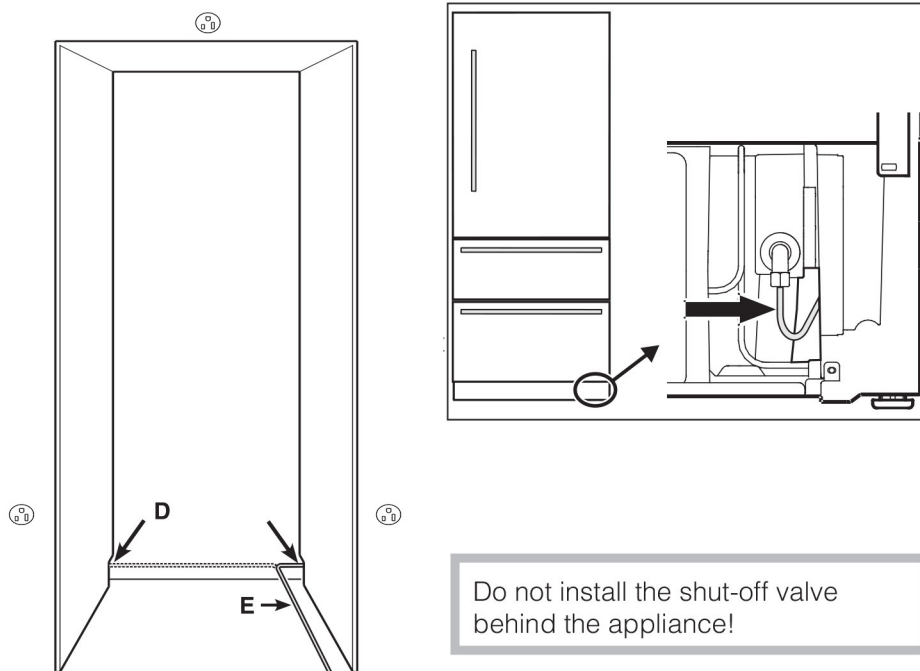
For appliance with panel to be flush, adjacent cabinetry depth must equal appliance depth (24") (610mm) plus panel thickness (5/8" – 3/4") (16mm - 19mm).

# Bottom Mount Refrigerator

## KFN 9855 iDE LI / KFN 9855 iDE RE

**Miele**

### Water Supply Installation



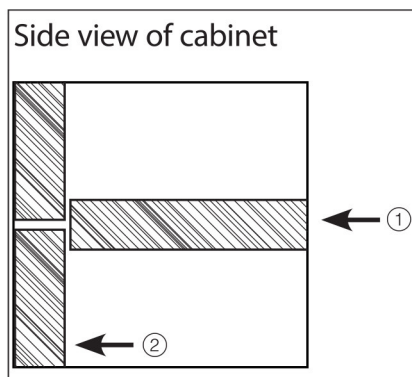
Water line feed-in (**D**) from left or right above the anti-tipping bracket.

The water line lead-through for the water supply line (**E**) is at the bottom right of the appliance:

# Bottom Mount Refrigerator

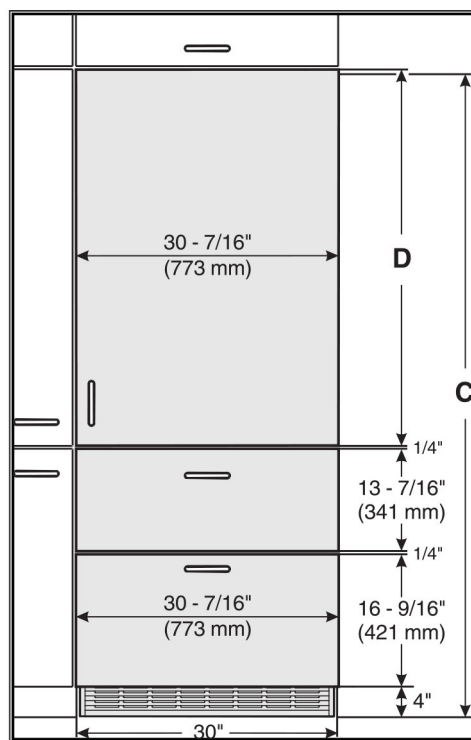
## KFN 9855 iDE LI / KFN 9855 iDE RE

### Frameless Installation Panel Dimensions



① Cabinet frame

② Door panel



Cabinet opening C	Refrigerator door panel D
80" (2,032 mm)	45-3/4" (1,162 mm)

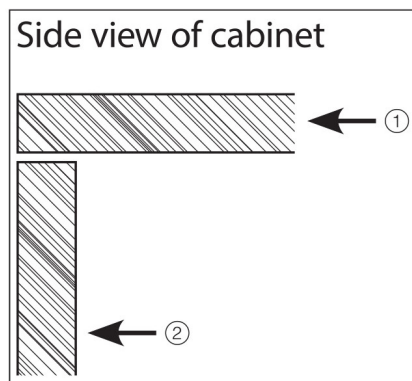
**Please take into account the following information concerning the cabinet front:**

- The panels should be at least 5/8" (16 mm) thick to allow the connecting rails to be fastened to them.
- The maximum panel thickness is 3/4" (19 mm).
- The door panel weight must not exceed 60 lb (27 kg).

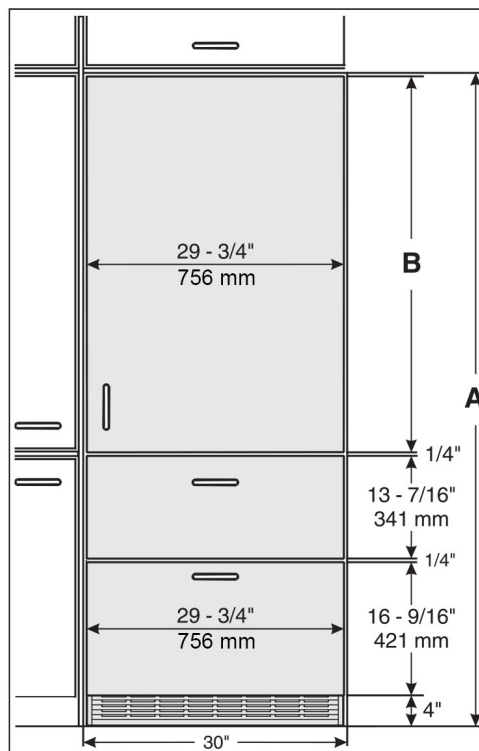
# Bottom Mount Refrigerator

## KFN 9855 iDE LI / KFN 9855 iDE RE

### Inset Installation Panel Dimensions



- ① Cabinet frame
- ② Door panel



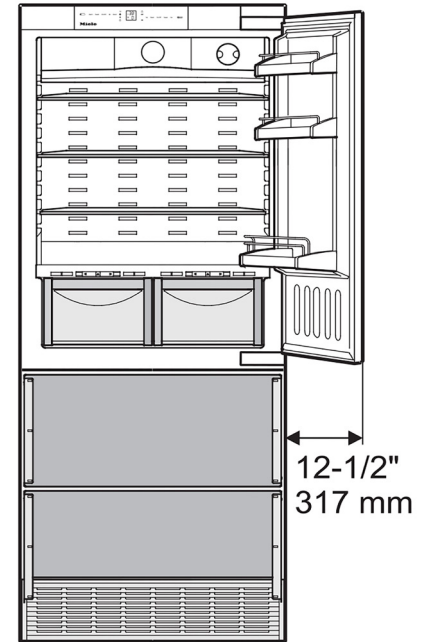
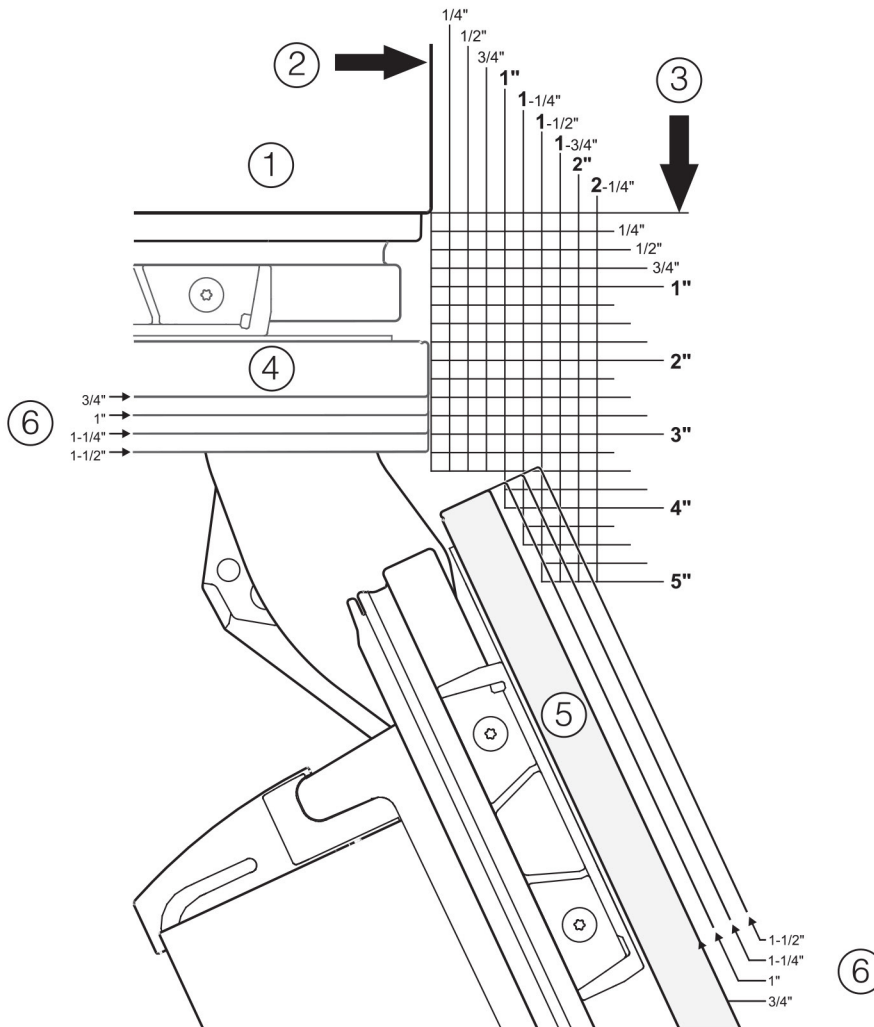
Cabinet opening A	Refrigerator door panel B
80" (2,032 mm)	45-1/4" (1,150 mm)

**Please take into account the following information concerning the cabinet front:**

- The panels should be at least 5/8" (16 mm) thick to allow the connecting rails to be fastened to them.
- The maximum panel thickness is 3/4" (19 mm).
- The door panel weight must not exceed 60 lb (27 kg).

# Bottom Mount Refrigerator KFN 9855 iDE LI / KFN 9855 iDE RE

## Door Swing Dimensions



These measurements do not take the cabinet front and the door handle into account; they must be added on accordingly.

- ① Top View
- ② Right side wall of appliance housing
- ③ Front of appliance housing
- ④ Front panel - door closed
- ⑤ Front panel - door opening angle = 115°
- ⑥ Panel thickness

ContourLine  
30" Convection Oven

H 6180 BP



# ContourLine 30" Convection Oven H 6180 BP

**Miele**

## H 6180 BP

### Features:

- DirectSelect controls offer turn dial operation with a 7-segment liquid crystal display
- Self Clean oven
- 8 Operating Modes
- Rapid PreHeat
- CleanGlass Door
- Timer
- TwinPower Fans provide optimum and even distribution of hot air
- Soft Open and Soft Close for an easier handling
- Comfort Handle provides smooth, clean lines

# ContourLine 30" Convection Oven H 6180 BP



<p><b>Comfort Handle:</b> Standard with ContourLine (DS 6708 Item #09828380)</p>	<p><b>ComfortSwivel Handle:</b> Optional for ContourLine Optional for PureLine (DS 6718 Item # 09828390)</p>
--	--

<p>Comfort Handle standard on H 6180 BP</p>		<p>ComfortSwivel Handle standard on H 6580 BP</p>
---	--	---

**Silhouette Handle:**  
Standard with Pureline  
Optional for Contourline  
(DS 6808 Item # 09828400)

Silhouette Handle  
standard on  
H 6280 BP and  
H 6680 BP

<p><b>Silhouette Handle (Chrome):</b> Standard with BrilliantWhite (DS 6808 Item # 09828410)</p>	<p><b>Silhouette Handle:</b> Standard with Truffle Brown (DS 6808 Item # 09870690)</p>
--	--




# ContourLine 30" Convection Oven

## H 6180 BP



### SPECIFICATIONS

#### H 6180 BP – Item 22618053USA

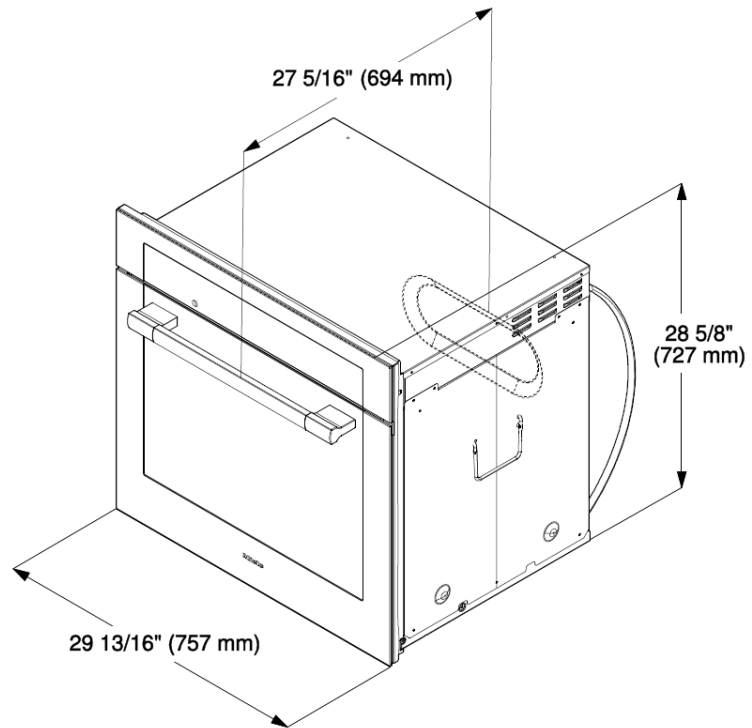
Overall Unit Width - Excluding Fascia Dimension	28 <sup>7</sup> / <sub>16</sub> " (722mm)
Overall Height - Excluding Fascia Dimension	27 <sup>3</sup> / <sub>4</sub> " (705mm)
Overall Unit Depth - Excluding Fascia Dimension	23 <sup>3</sup> / <sub>4</sub> " (603mm)
Oven Door Clearance	23" (584mm)
Overall Fascia Dimensions	29 <sup>13</sup> / <sub>16</sub> " (757mm) W x 28 <sup>5</sup> / <sub>8</sub> " (727mm) H x 7 <sup>7</sup> / <sub>8</sub> " (23mm) D
<b>Built-In</b>	
Minimum Cabinet Width	28 <sup>1</sup> / <sub>2</sub> " (724mm)
Minimum Cabinet Depth	24" (610mm)
Minimum Cabinet Opening Height	28 <sup>1</sup> / <sub>4</sub> " (718mm)
Minimum Base Support	193 lbs
Additional Cut-outs Required	Venting cut-out required at base of cabinet (4" x 28" / 100 mm x 720 mm) in the bottom of the cabinet for power cord and ventilation
<b>Electrical</b>	
Electrical Requirements	208/240V 30A 60Hz circuit
Power Cord	Yes - NEMA 14-30 plug
Electrical Rating	120/208V, 60Hz, 4700w / 120/240V, 60Hz, 6200w
Total Amps	240V / 25.8A / 208V / 22.6A
<b>Shipping</b>	
Shipping Weight	216 lbs
Shipping Dimensions	32 <sup>11</sup> / <sub>16</sub> " W x 35 <sup>1</sup> / <sub>16</sub> " H x 30 <sup>5</sup> / <sub>16</sub> " L
<b>Support</b>	
Call	800.843.7231
20/20	 2020technologies.com

# ContourLine 30" Convection Oven H 6180 BP

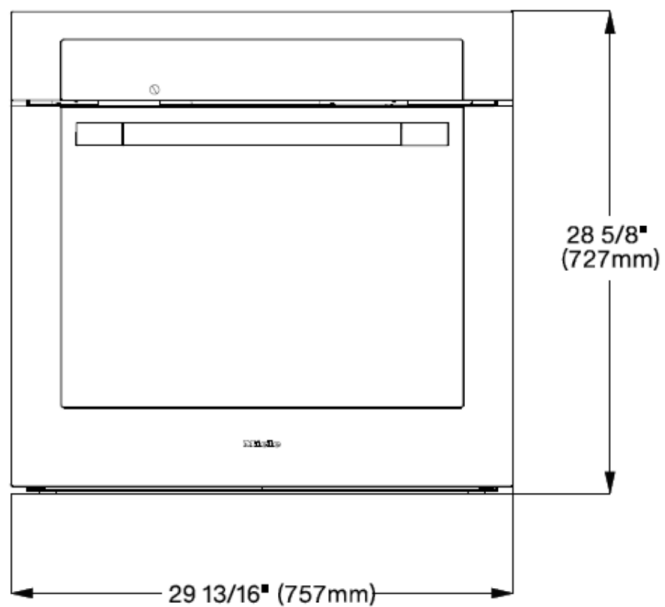


## PRODUCT VIEWS

Isometric



Front

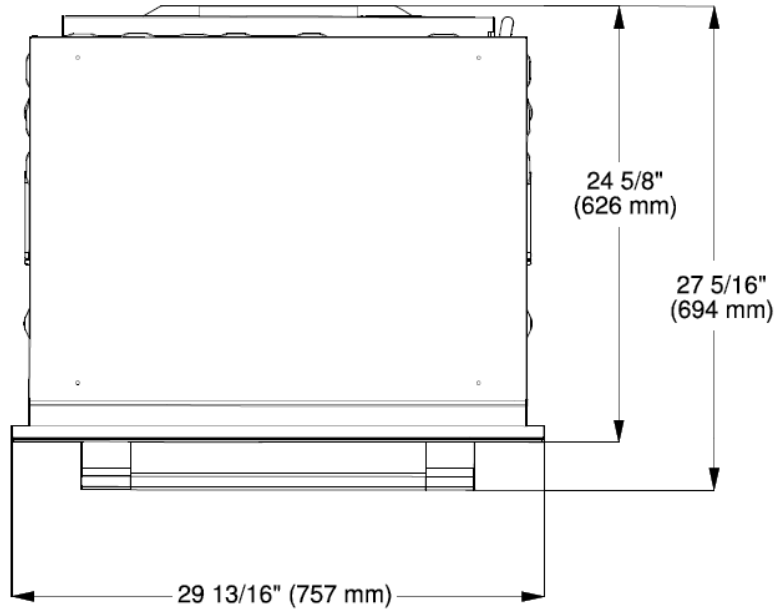


# ContourLine 30" Convection Oven H 6180 BP

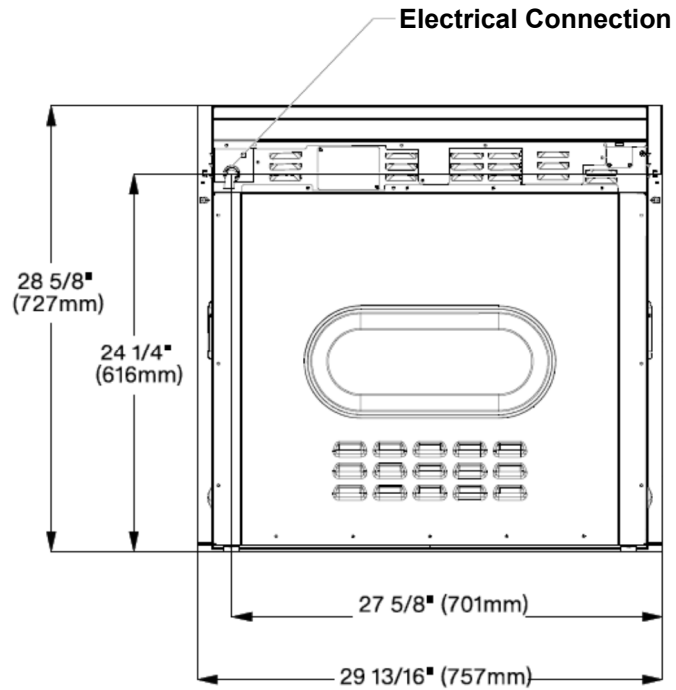


## PRODUCT VIEWS

Top View



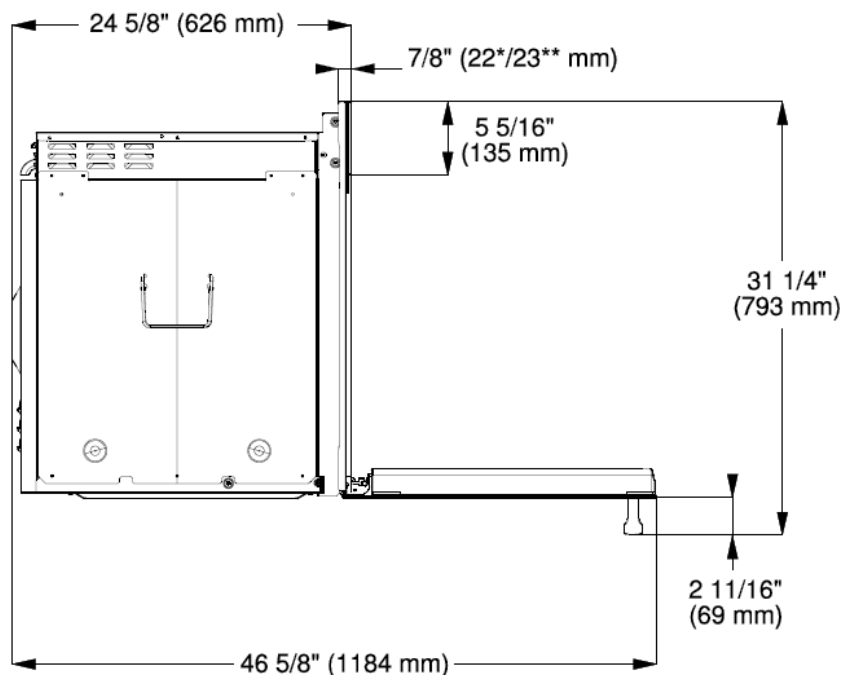
Rear View



# ContourLine 30" Convection Oven H 6180 BP

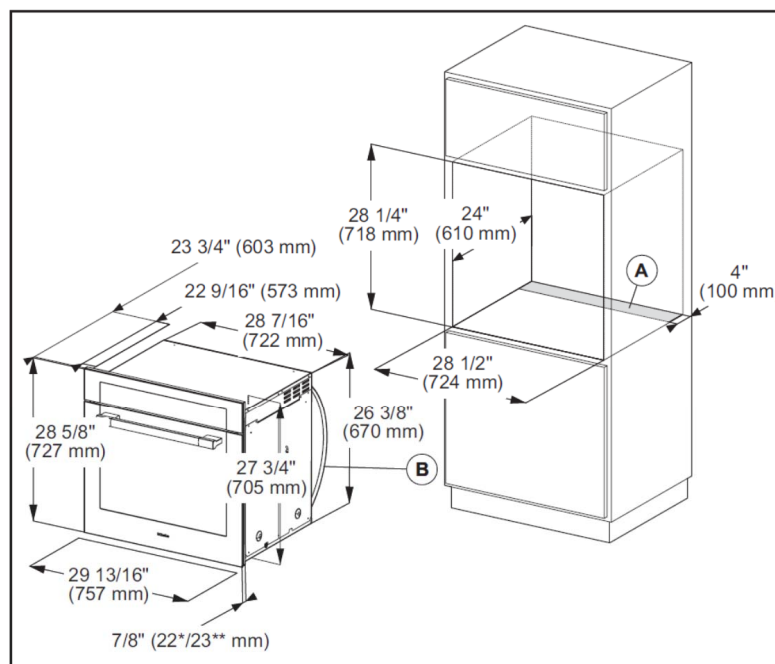
## PRODUCT VIEWS

Side View



## INSTALLATION SPECIFICATIONS

Install in Tall Cabinet



- Ⓐ Cut-out (4" x 28" / 100 mm x 720 mm) in the bottom of the cabinet for power cord and ventilation  
 Ⓑ Power cord with plug

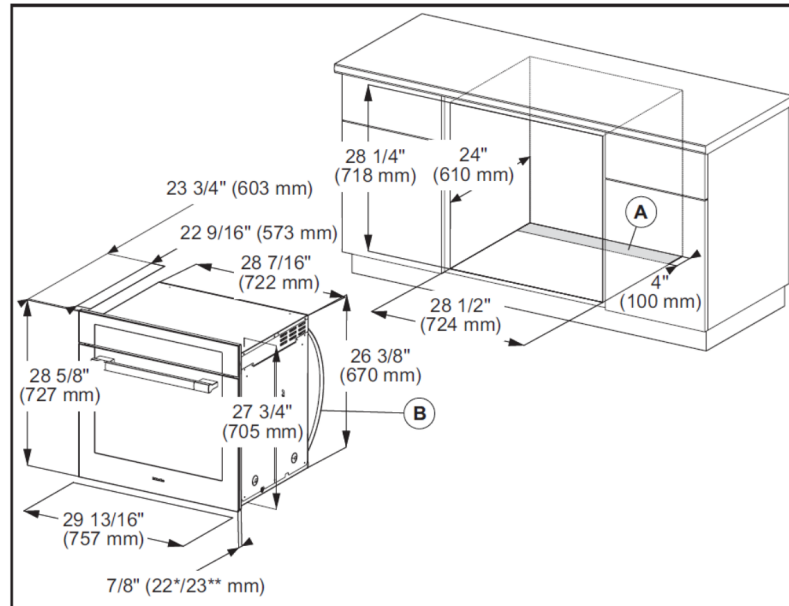
\* Oven with glass front  
 \*\* Oven with metal front

# ContourLine 30" Convection Oven H 6180 BP

# Miele

## INSTALLATION SPECIFICATIONS

### Undercounter Installation



Ⓐ Cut-out (4" x 28" / 100 mm x 720 mm) in the bottom of the cabinet for power cord and ventilation

Ⓑ Power cord with plug

\* Oven with glass front

\*\* Oven with metal front

ContourLine  
24" Microwave Oven

M 6160 TC



# ContourLine 24" Microwave Oven M 6160 TC



## M 6160 TC

### Features:

- DirectSelect controls offer turn dial operation with a 7-segment liquid crystal display
- Popcorn button
- 900 watt microwave
- XL cavity — 1.62 cu ft (46 l) with a 5.8" turntable diameter to reheat several plates at one time
- 16 automatic programs
  - 9 for defrosting
  - 3 for cooking frozen food
  - 4 for fresh ingredients
- Minute plus button
- Timer
- LED lighting for the perfect illumination and low maintenance
- Horizontal alignment with other 60cm appliances
- Comfort handle

### SPECIFICATIONS

#### M 6160 TC — Item 24616050USA

Overall Unit Width - Excluding Fascia Dimension	21 <sup>5</sup> / <sub>8</sub> " (550 mm)
Overall Height - Excluding Fascia Dimension	16 <sup>1</sup> / <sub>4</sub> " (413 mm)
Overall Depth - Excluding Fascia Dimension	19 <sup>3</sup> / <sub>16</sub> " (487 mm)
Oven Door Clearance	15 <sup>1</sup> / <sub>2</sub> " (394 mm)
Overall Oven Interior Capacity	Suitable for plates with a diameter up to 15.8"
Overall Fascia Dimensions	23 <sup>7</sup> / <sub>16</sub> " (595 mm) W x 17 <sup>15</sup> / <sub>16</sub> " (455.5 mm) H x 7 <sup>7</sup> / <sub>8</sub> " (23 mm) D

#### Built-In

Minimum Cabinet Width	22 <sup>1</sup> / <sub>16</sub> " (562 mm)
Minimum Cabinet Depth	21 <sup>5</sup> / <sub>8</sub> " (550 mm)
Minimum Cabinet Height	17 <sup>11</sup> / <sub>16</sub> " (450 mm)
Minimum Base Support	40 lbs (18 kg)

#### Electrical

Electrical Requirements	120V 15A 60Hz
Power Cord	Molded NEMA 5-15 plug, 5 ft. (1.5 m)
Total Amps	11.4A (120V)

#### Shipping

Shipping Weight	49 lbs (22 kg)
Shipping Dimensions	25 <sup>7</sup> / <sub>8</sub> " W x 19 <sup>13</sup> / <sub>16</sub> " H x 21 <sup>1</sup> / <sub>8</sub> " L

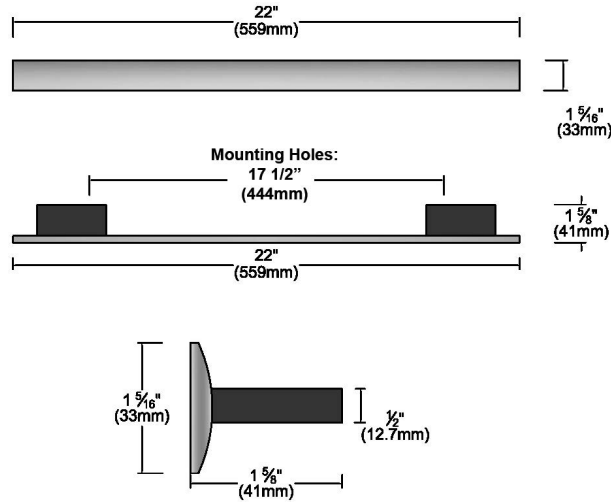
#### Support

Call Miele	800.843.7231
Miele Website	🌐 <a href="http://www.mieleusa.com">www.mieleusa.com</a>
20/20 Link	🌐 <a href="http://2020technologies.com">2020technologies.com</a>

# ContourLine 24" Microwave Oven M 6160 TC

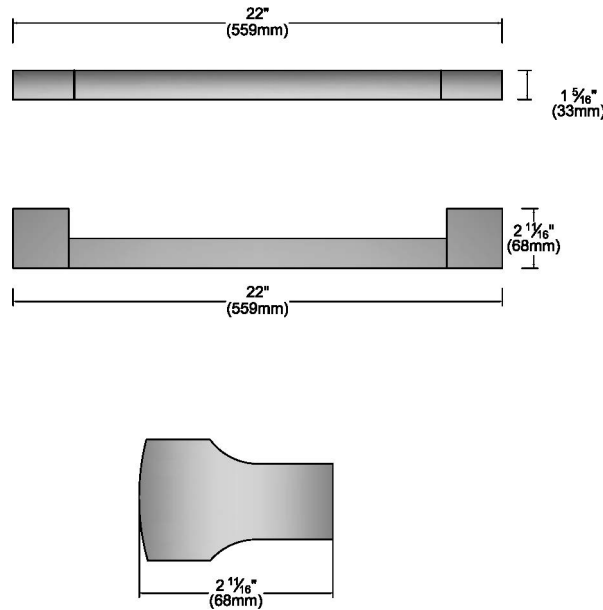
## HANDLE DETAILS

All Miele Signature And PureLine  
Handle Dimensions



Please note hinges may require adjusting or replacing when changing from a ContourLine Handle to a Pureline or Signature handle.

All ContourLine Handle  
Dimensions



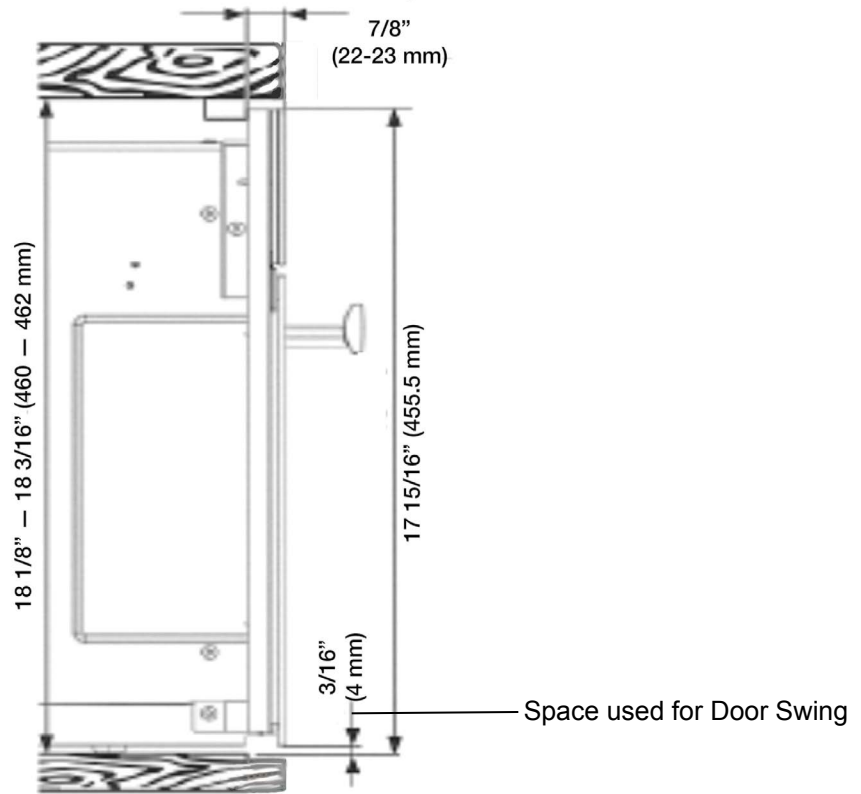
Please note hinges may require adjusting or replacing when changing from a Pureline or Signature handle to a ContourLine Handle.



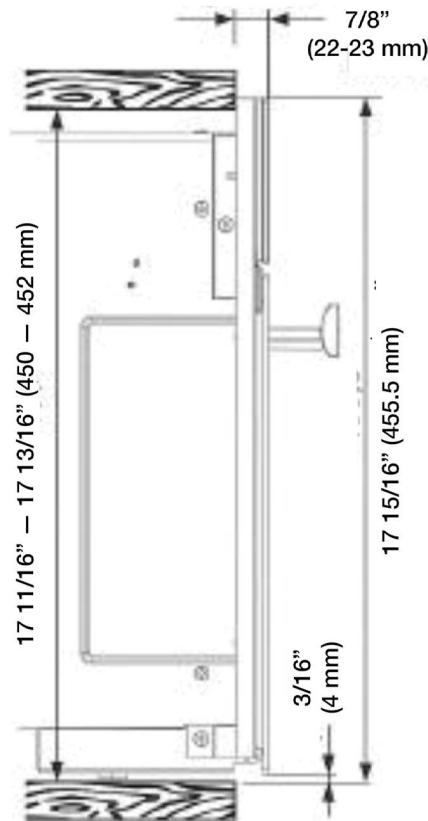
# ContourLine 24" Microwave Oven M 6160 TC

## INSTALLATION SPECIFICATIONS

Side flush



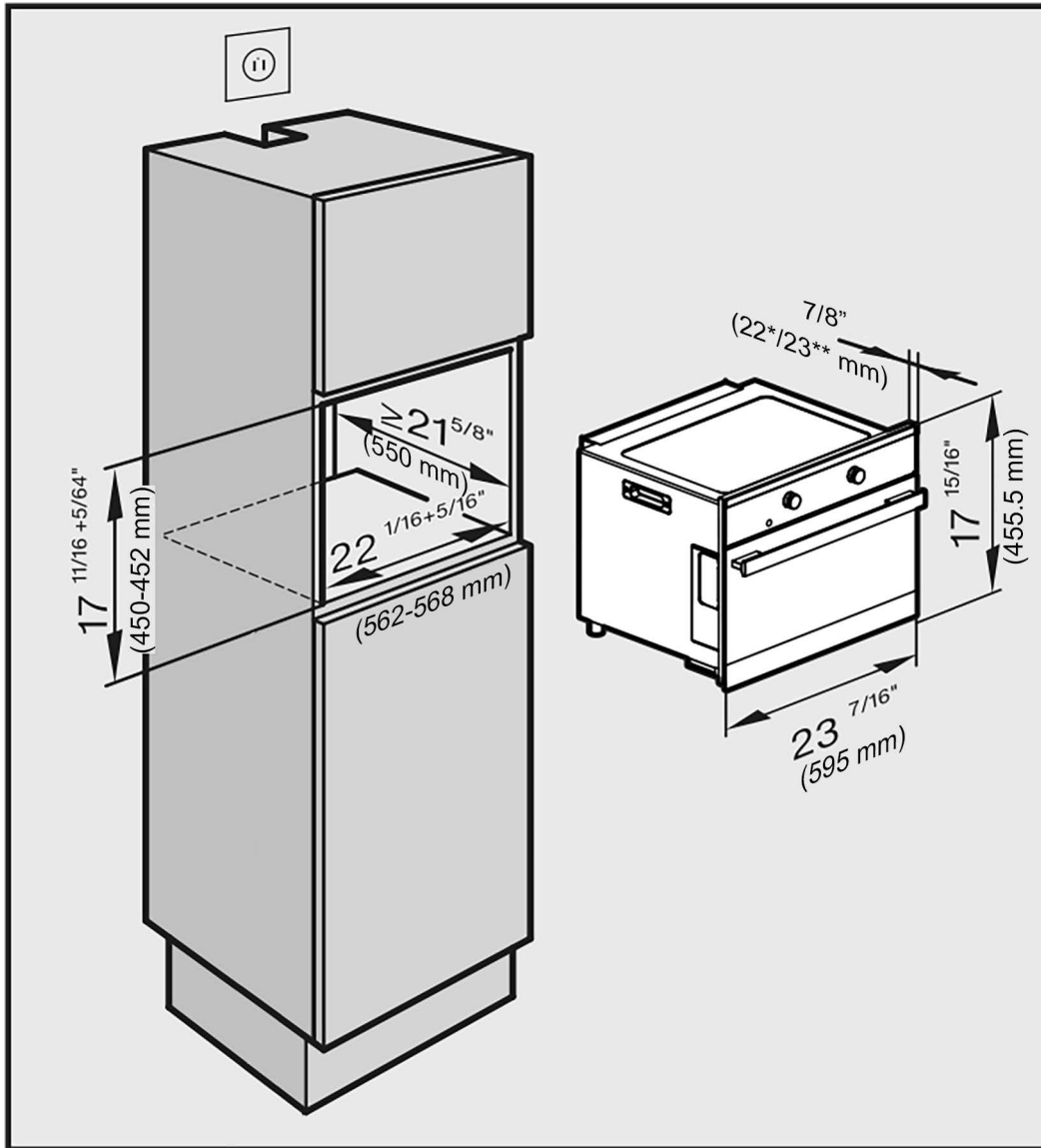
Side proud



# ContourLine 24" Microwave Oven M 6160 TC

## INSTALLATION SPECIFICATIONS

Install in Tall Cabinet



\* Oven with glass front  
\*\* Oven with metal front

30" 4-Burner Gas Cooktop

KM 3464 G/LP



# 30" 4-Burner Gas Cooktop

## KM 3464 G/LP

**Miele**


### KM 3464 G/LP

#### Features:

- 4 completely sealed burners:
  - (1) 15,300 BTU Double inset super (wok) burner
  - (1) 12,000 BTU Super burner
  - (2) 9,000 BTU High-speed burners
- Side control panel
- Stainless steel knobs
- Fast ignition system
- Ignition safety control
- Wok ring included

#### SPECIFICATIONS

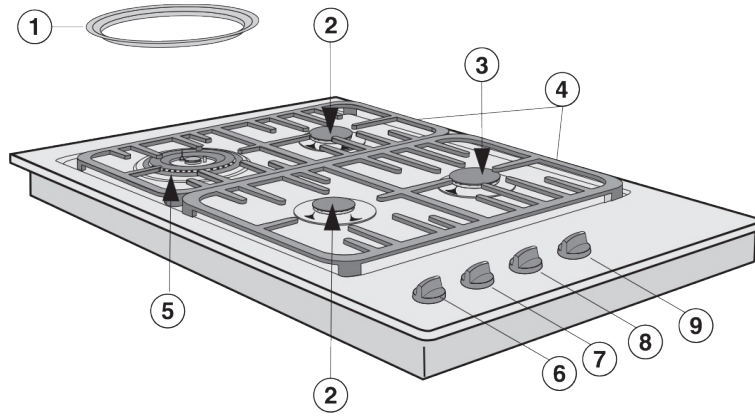
**KM 3464 G - Item# 26346450USA**

KM 3464 LP - Item# 26346451USA

Unit Width	30" (762 mm)
Unit Height (To Gas Connection)	3 <sup>1</sup> / <sub>4</sub> " (83 mm)
Unit Depth	21 <sup>5</sup> / <sub>16</sub> " (542 mm)
<b>Niche Dimensions</b>	
Cut-Out Dimensions	28 <sup>3</sup> / <sub>8</sub> " (720 mm) W x 20 <sup>3</sup> / <sub>8</sub> " (518 mm) D
Minimum Back Spacing From Wall	2 <sup>3</sup> / <sub>4</sub> " (70 mm)
Minimum Countertop Thickness	1 <sup>3</sup> / <sub>16</sub> " (20 mm)
Minimum Recommended Distance to Ventilation Hood	30" (760 mm)
<b>Gas Burners</b>	
High-Speed Burner	(2) 9,000 BTU (G/LP)
Super Burner	(1) 12,000 BTU (G/LP)
Wok Burner (Front Left)	(1) 15,300 BTU (G/LP)
Total Maximum BTU Output	45,300 BTU (G/LP)
<b>Gas</b>	
Gas Connection	1/2" NPT
Maximum Gas Supply Pressure	Natural Gas - 14" WC (34.9 mb), 1/2 psi (3.5 kPa) LP Gas - 14" WC (34.9 mb), 1/2 psi (3.5 kPa)
Minimum Gas Supply Pressure	Natural Gas - 6" WC (15 mb) LP Gas - 10" WC (25 mb)
<b>Electrical</b>	
Electrical Requirements	120 V, 60 Hz, 15 A
Power Cord	NEMA 5-15P, 4 ft (1.2 m)
<b>Shipping</b>	
Shipping Weight	50 lbs (22.7 kg)
Shipping Dimensions	23 <sup>5</sup> / <sub>8</sub> " W x 7 <sup>7</sup> / <sub>8</sub> " H x 32 <sup>5</sup> / <sub>16</sub> " D
<b>Support</b>	
Call	800.843.7231
Miele Website	🌐www.mieleusa.com
20/20 Link	🌐2020technologies.com

# 30" 4-Burner Gas Cooktop KM 3464 G/LP

## PRODUCT OVERVIEW



- ① Wok ring
- ② Normal burners
- ③ Fast burner
- ④ Grates  
(Design depends on model)
- ⑤ Wok burner

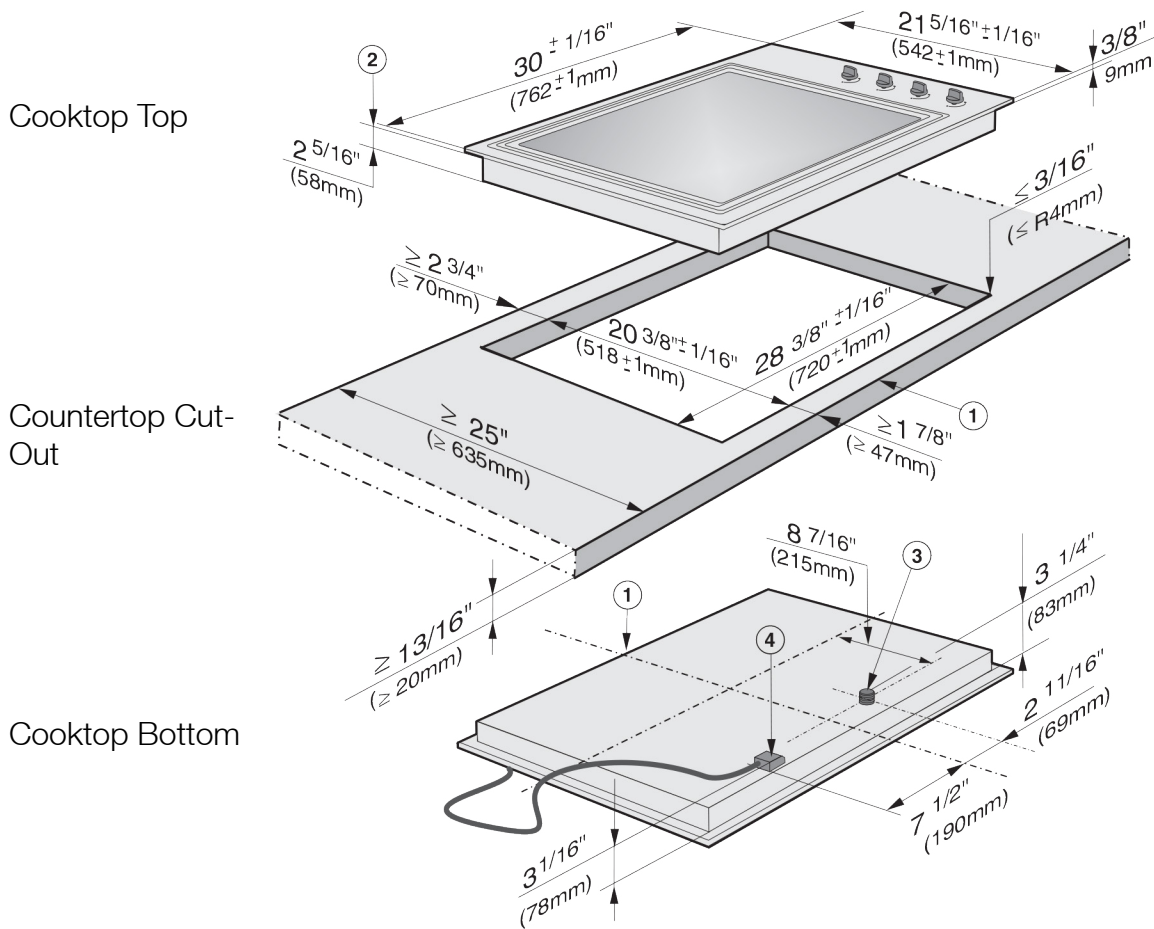
Control knobs:

- ⑥ Front left burner
- ⑦ Front right burner
- ⑧ Right rear burner
- ⑨ Left rear burner



# 30" 4-Burner Gas Cooktop KM 3464 G/LP

## INSTALLATION DIMENSIONS



- ① Front
- ② Built-in depth
- ③ Gas connection R  $\frac{1}{2}$ " NPT
- ④ Mains connection box

# 30" 4-Burner Gas Cooktop KM 3464 G/LP

## KM 3464 G/LP GAS COOKTOP INSTALLATION IN COMBINATION WITH UNDERCOUNTER 30" MIELE OVEN H6x80BP

### Countertop Thickness vs. Toekick Height

Taken into consideration:

- 35" tall cabinetry
- Gas pressure regulator mounted on back wall or in adjacent cabinetry
- 90 degree street elbow used on bottom of cooktop
- $\frac{3}{8}$ " of cooktop above countertop (proud)
- $\frac{3}{4}$ " (exact) platform thickness under oven/above toekick

		Toekick Height (Inches)										
		$3\frac{1}{2}$	$3\frac{3}{4}$	4	$4\frac{1}{4}$	$4\frac{1}{2}$	$4\frac{3}{4}$	5	$5\frac{1}{4}$	$5\frac{3}{4}$	6	
Countertop Thickness (Inches)	$\frac{13}{16}$	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	1	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	$1\frac{1}{4}$	OK	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	$1\frac{1}{2}$	OK	OK	NA	NA	NA	NA	NA	NA	NA	NA	NA
	$1\frac{3}{4}$	OK	OK	OK	NA	NA	NA	NA	NA	NA	NA	NA
	2	OK	OK	OK	OK	NA	NA	NA	NA	NA	NA	NA

= Standard Kitchen

# 30" Built-In Wall Cabinet Hood

DA 3486





# 30" Built-In Wall Cabinet Hood

## DA 3486

**Miele**

#6



### DA 3486

#### Features:

- Straight stainless steel canopy
- Updated backlit controls
- Sound improved runners
- Designed for vented or recirculated use
- For wall cabinet installation
- Removable, dishwasher-safe stainless steel filters
- Expandable fume deflector
- Front mounted controls for lights and 4 fan speeds
- Polished stainless steel logo
- Automatic shut-off of intensive level, programmable for 10 minutes
- Automatic activation when fume deflector is expanded
- Integrated LED ClearView Lighting

#### SPECIFICATIONS

DA 3486 — Item 28348655USA

Overall Unit Width	29 <sup>13</sup> / <sub>16</sub> " (757 mm)
Overall Unit Height	15 <sup>1</sup> / <sub>16</sub> " (384 mm)
Unit Depth Retracted	10 <sup>13</sup> / <sub>16</sub> " (275 mm)
Unit Depth Extended	16 <sup>3</sup> / <sub>4</sub> " (425 mm)
<b>Built-In</b>	
Minimum Opening Width	28 <sup>1</sup> / <sub>2</sub> " (724 mm)
Minimum Opening Depth	11 <sup>5</sup> / <sub>8</sub> " (295 mm)
Minimum Opening Height (Vented)	16 <sup>15</sup> / <sub>16</sub> " (430 mm)
Minimum Opening Height (Recirculation)	21 <sup>5</sup> / <sub>8</sub> " (550 mm)
<b>Custom Front Panel (Optional)</b>	<b>DML 400 kit is required</b>
Maximum Panel Thickness	1" (30 mm)
Maximum Panel Weight	2 3/4" lbs (1.3 kg)
<b>Fan</b>	
Fan Speeds	4
Maximum CFM	625 CFM, (Reducing Collar is available to reduce Air flow to less than 400 CFM, more information on page 8)
<b>Duct</b>	
Duct Diameter	6" (150 mm)
<b>Electrical</b>	
Electrical Requirements	120V, 60Hz, 15A
Power Cord	Molded NEMA 5-15 plug, 2.5 ft (0.75 m)
<b>Shipping</b>	
Shipping Weight	29.8 lbs (13.5 kg)
Shipping Dimensions	37 <sup>7</sup> / <sub>16</sub> " W x 20 <sup>1</sup> / <sub>2</sub> " H x 14" D
<b>Support</b>	
Call Miele	800.843.7231
Miele Website	<a href="http://www.mieleusa.com">www.mieleusa.com</a>
20/20 Link	<a href="http://2020technologies.com">2020technologies.com</a>

#### Optional Accessories:



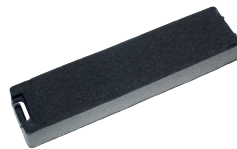
DUU 150

Recirculation kit for straight ductwork



DUU 151

Recirculation kit for curved or bending ductwork



DKF13-1

OdorFree Charcoal filter required accessory for recirculation mode



DML 400

Installation kit for custom cabinetry



Reducing collar

Reducing collar limits air flow to less than 400 CFM



# 30" Built-In Wall Cabinet Hood

## DA 3486



### INSTALLATION SPECIFICATIONS

#### Distance Between Cooktop and Ventilation Hood (S)

Provided a larger distance is not given by the manufacturer of the cooktop, follow the minimum safety distances between a cooktop and the bottom of the hood.

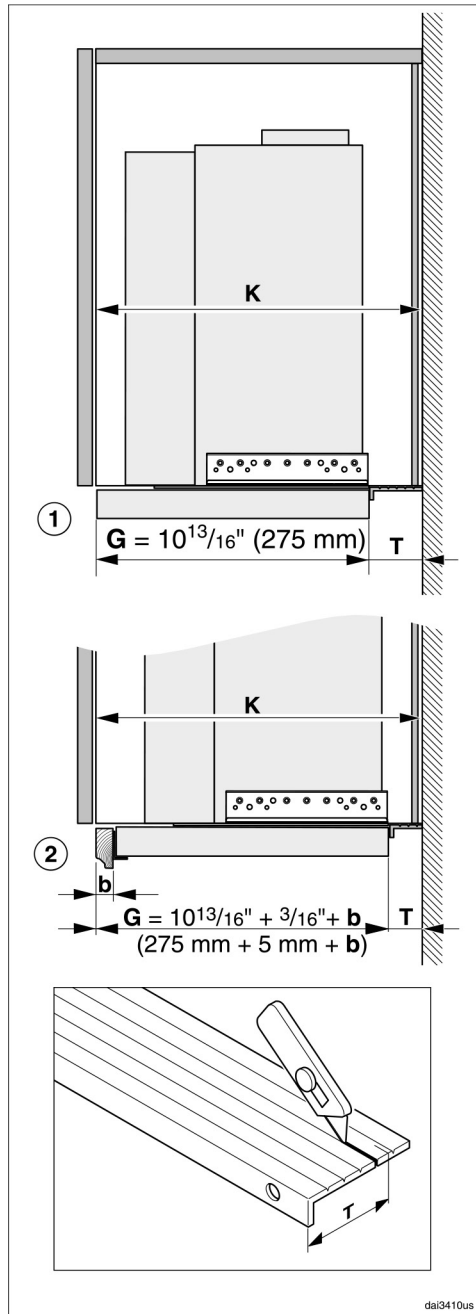
Please also observe the information contained in the "IMPORTANT SAFETY INSTRUCTIONS" section of the manual.

Cooking appliance	Minimum distance S	
	Miele products	Non-Miele products
Electric Cooktops	24" (610 mm)	
Electric Barbeques and Fryers	26" (660 mm)	
Multiburner Gas Cooktops ≤ 43,000 BTU/hr (12.6 W), no burner > 15,000 BTU/hr (4.5 kW).	26" (660 mm)	30" (760 mm)
Multiburner Gas Cooktops ≤ 73,800 BTU/hr (21.6 W), no burner > 16,500 BTU/hr (4.8 kW)	30" (760 mm)	
Multiburner Gas Cooktops > 73,800 BTU/hr (21.6 W), or one of the burners > 16,500 BTU/hr (4.8 kW)	Not possible	
Single Burner Gas Cooktops ≤ 20,500 BTU/hr (6 kW)	26" (660 mm)	30" (760 mm)
Single Burner Gas Cooktops > 20,500 BTU/hr (6 kW) ≤ 27,600 BTU/hr (8.1 kW)	30" (760 mm)	
Single Burner Gas Cooktops > 27,600 BTU/hr (8.1 kW)	Not possible	

If you are installing a front panel made of wood or plastic to the hood, observe the safety distances given by the cooktop manufacturer regarding the use of easily flammable materials.

# 30" Built-In Wall Cabinet Hood DA 3486

## INSTALLATION SPECIFICATIONS Cabinetry Depth Details



① Example: Installation without a front panel installed and with the front edge of the fume deflector flush with the front edge of the cabinetry.

② Example: Installation with a front panel to match the cabinetry This installation requires dimension **b** for the front panel plus  $\frac{3}{16}''$  (5 mm) for the DML 400 fixing bracket to be added to the shelf dimension.

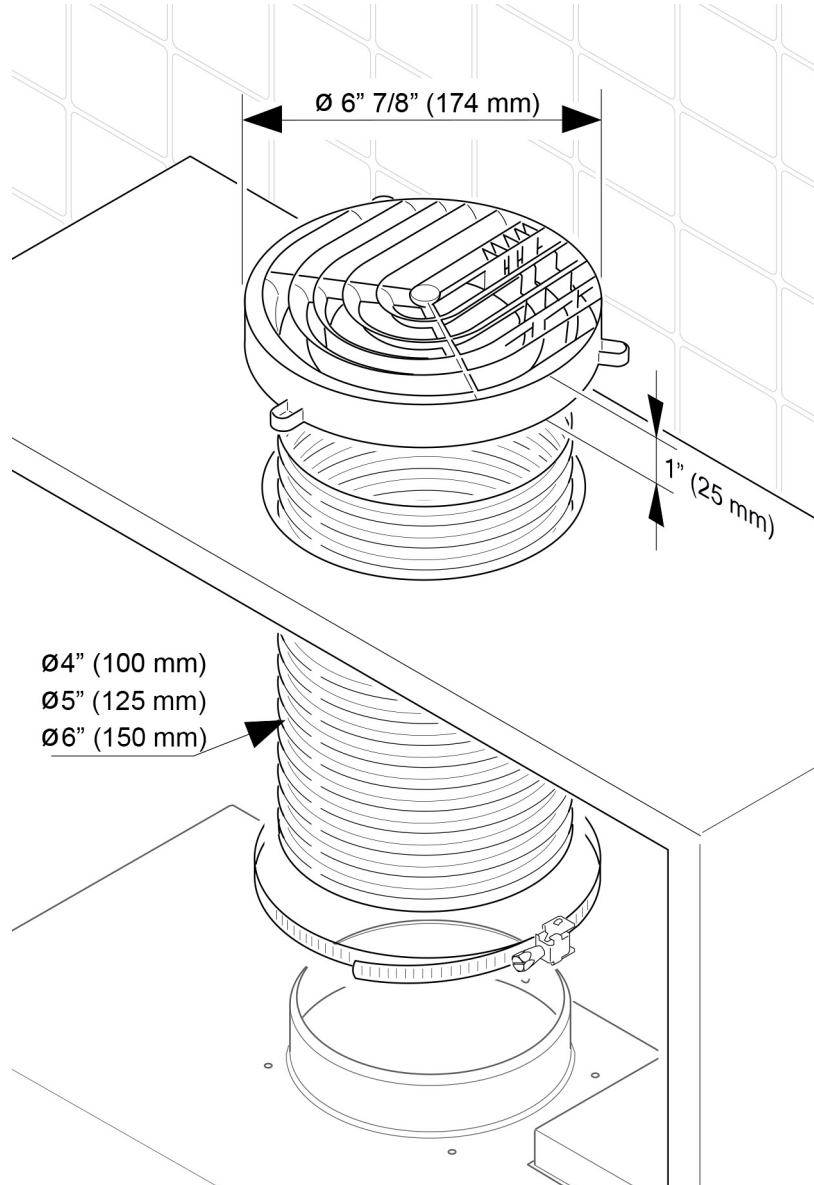
To position the hood correctly, cut the spacer strip to the required depth **T** and then attach it to the back of the appliance:

**T** = Depth of cabinetry **K** minus depth of appliance **G**

■ Cut the spacer strip supplied to measurement **T**. Score along the groove for the **next smaller** measurement as shown, and remove any extra.

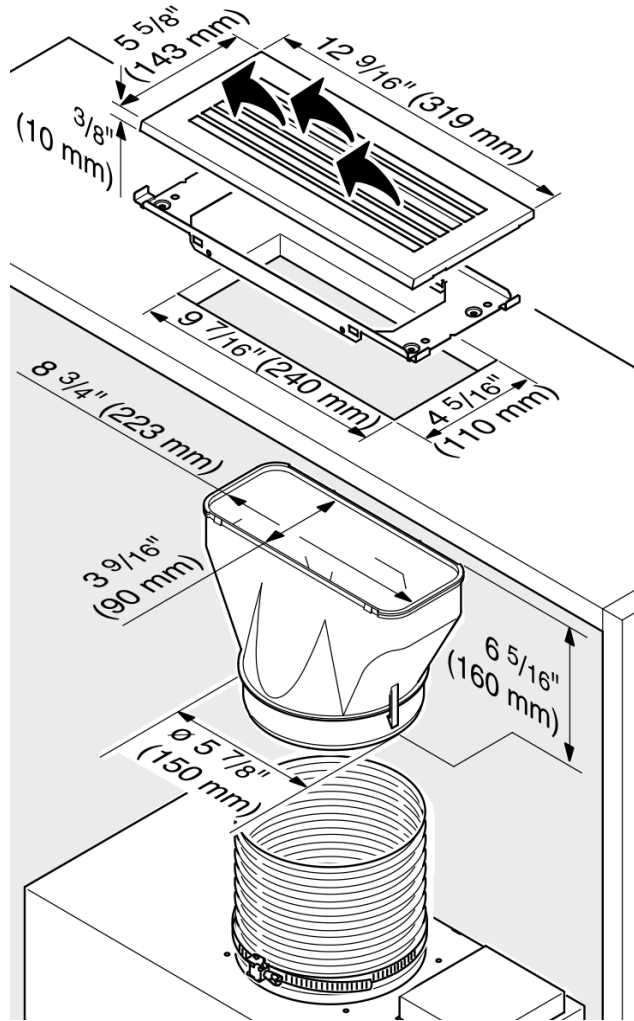
# 30" Built-In Wall Cabinet Hood DA 3486

Recirculation Kit DUU 150  
(Optional accessory)



# 30" Built-In Wall Cabinet Hood DA 3486

Recirculation Kit DUU 151  
(Optional accessory)

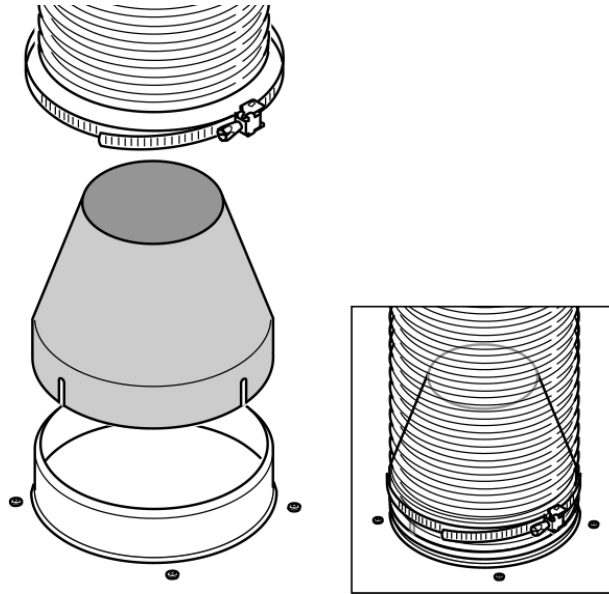


# 30" Built-In Wall Cabinet Hood DA 3486

**Miele**

#6

## Reducing Collar (optional accessory)



If you would like to reduce the environmental impact of your ventilation system by limiting the CFM output the Reducing Collar can be installed. It reduces the air flow to less than 400 CFM. Check local building codes for maximum CFM requirements.



## Classic Plus Fully Integrated Dishwasher

CLASSIC PLUS    G 4976 Vi, G 4976 Vi SF, **G 4976 SCVi**, G 4976 SCVi SF





# Classic Plus

## Fully Integrated Dishwasher

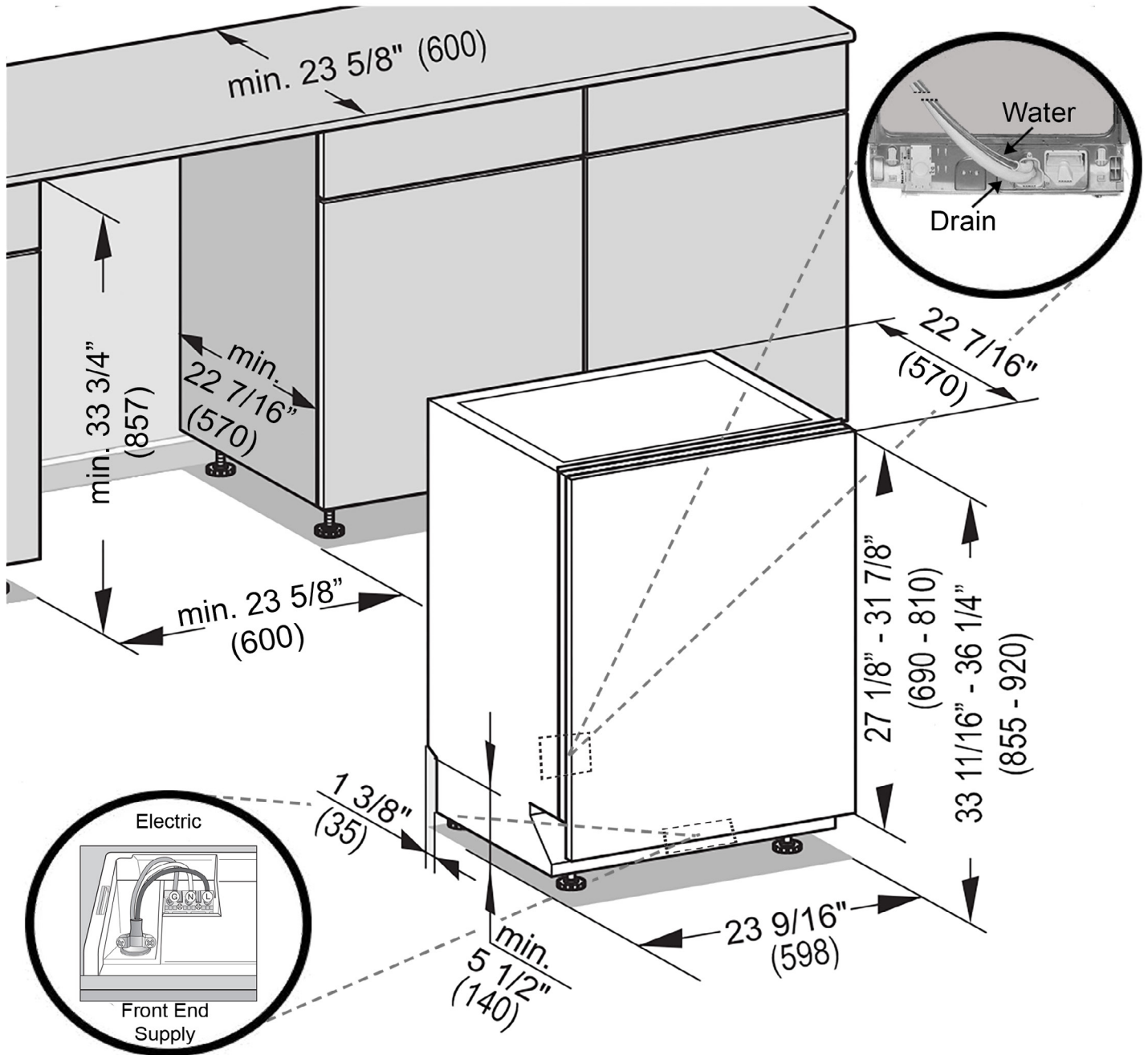


SPECIFICATIONS	
Overall Unit Width	23 <sup>9</sup> / <sub>16</sub> " (598mm)
Overall Unit Height	33 <sup>11</sup> / <sub>16</sub> " - 36 <sup>1</sup> / <sub>4</sub> " (855 - 920mm)
Overall Unit Depth	22 <sup>7</sup> / <sub>16</sub> " (570mm)
Niche	
Minimum Cabinet Opening Width	23 <sup>5</sup> / <sub>8</sub> " (600mm)
Minimum Cabinet Opening Height	33 <sup>3</sup> / <sub>4</sub> " (857mm)
Minimum Cabinet Opening Depth	22 <sup>7</sup> / <sub>16</sub> " (570mm)
Plumbing	
Water Supply Requirements	May be connected to a cold or hot water supply up to a maximum of 140°F/60°C. Must be connected to a shut-off valve with a male 3/8" compression. The water shut-off valve must be accessible after installation. The water pressure must be between 4.35 psi (0.3 bar) and may not exceed 145 psi (10 bar). If the pressure is higher than 145 psi (10 bar), a pressure reducing valve must be installed.
Water Connection Line	4' 11" (1.5m) flexible water intake hose is supplied with a 3/8" compression connection.
Drain Hose	4' 11" (1.5m) flexible drain hose is supplied.
Electrical	
Electrical Requirements - Volts/Amps	110V / 120V, 60Hz, 15 Amps
Power Cord - Plug and length	NEMA 5-15 plug, 3' 11" (1.2m) (Measured from back of unit, Convertible to Hardwire)
Shipping	
Shipping Weight	118 lbs (53.5kg)
Support	
Call Miele	800.843.7231
Miele Website	<a href="http://www.mieleusa.com">www.mieleusa.com</a>
20/20 Link	<a href="http://2020technologies.com">2020technologies.com</a>

# Classic Plus

## Fully Integrated Dishwasher

### INSTALLATION SPECIFICATIONS



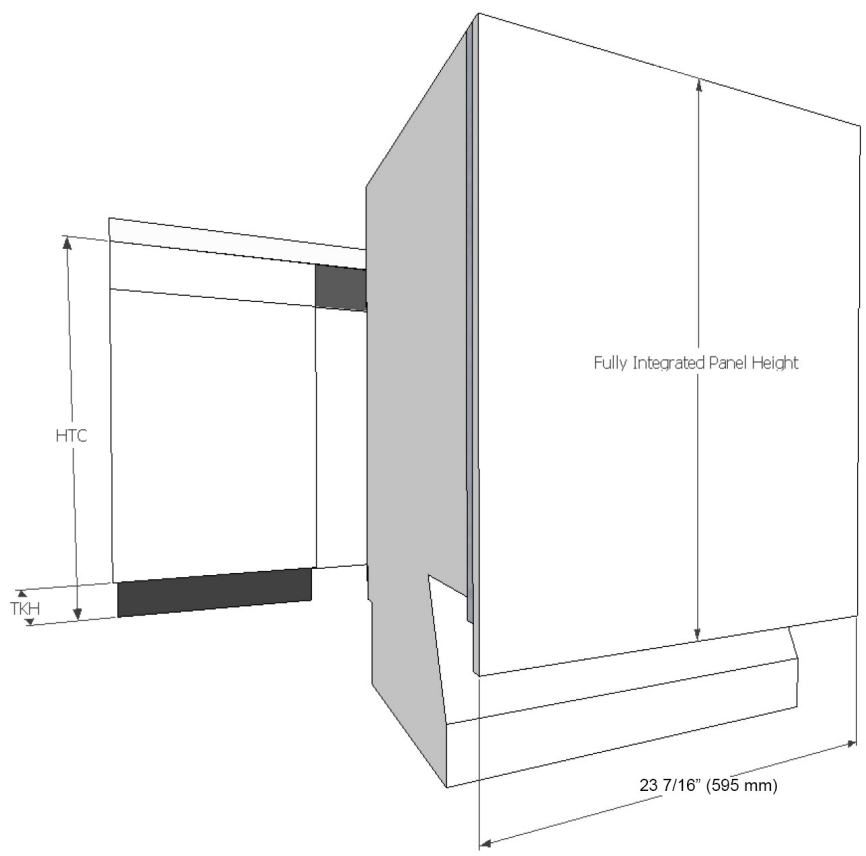
- Drain** - 4 ft 11 in (1.5 m) flexible drain hose. (Connects from lower center rear)
- Water** - 4 ft 11 in (1.5 m) flexible water intake hose with  $\frac{3}{8}''$  compression fitting. (Connects from lower center rear)
- Electric** - 4 ft 11 in (1.5 m) 120V 15 A 3 wire molded NEMA 5-15 plug power supply. (Connects via Front End Supply or may be hardwired)

# Classic Plus Fully Integrated Dishwasher



## Custom Panel Installation

Some Miele dishwashers do not come equipped with a front panel. These dishwashers are designed to accept a custom door panel supplied by a cabinet maker. Miele has a unique panel integration system which allows the dishwasher to align with the surrounding cabinets.



**Width:** 23 7/16" (595 mm) in all Cases  
**Thickness:** 3/4" (19 mm) in all Cases  
**Height:** Determined using the following calculation:

**Panel Height = HTC – TKH**

**HTC** = Height to the underside of countertop  
**TKH** = Toe kick height

**Note:** Control panel is along the top edge of the unit. It is not visible when the unit is closed. A handle **MUST** be located on front of panel in order to open unit. (Except K2o models).

- Maximum panel height: 31 7/8" (810 mm)
- Minimum panel height: 27 1/8" (690 mm)
- Maximum panel weight: 21 lbs (9.5 kg)

## GFVI Installations

Miele offers pre-fabricated stainless steel panels for all fully integrated units. These panels are designed for various toe-kick heights and offer a choice of handle options. See Miele Product Brochure for more info.

For Knock2open (K2o) models, an additional kit is required for use with stainless steel panel. Please contact Miele for further details.

# Classic Plus Fully Integrated Dishwasher



## Acceptable Height Installation

Height to underside of countertop

	33 3/4	34	34 1/4	34 1/2	34 3/4	35	35 1/4	35 1/2	35 3/4	36
2 1/2	Acceptable	Acceptable	Acceptable	Acceptable	Acceptable	Not Acceptable	Not Acceptable	Not Acceptable	Not Acceptable	Not Acceptable
3	Acceptable	Acceptable	Acceptable	Acceptable	Acceptable	Acceptable	Acceptable	Acceptable	Not Acceptable	Not Acceptable
3 1/2	Acceptable	Acceptable	Acceptable	Acceptable	Acceptable	Acceptable	Acceptable	Acceptable	Acceptable	Acceptable
4	Acceptable	Acceptable	Acceptable	Typical American	Acceptable	Acceptable	Acceptable	Acceptable	Acceptable	Acceptable
4 1/2	Acceptable	Acceptable	Acceptable	Acceptable	Acceptable	Acceptable	Acceptable	Acceptable	Acceptable	Acceptable
5	Acceptable	Acceptable	Acceptable	Acceptable	Acceptable	Acceptable	Acceptable	Acceptable	Acceptable	Acceptable
5 1/2	Acceptable	Acceptable	Acceptable	Acceptable	Acceptable	Acceptable	Acceptable	Acceptable	Acceptable	Acceptable
6	Acceptable	Acceptable	Acceptable	Acceptable	Acceptable	Acceptable	Acceptable	Acceptable	Acceptable	Acceptable
6 1/2	Acceptable	Acceptable	Acceptable	Acceptable	Acceptable	Acceptable	Acceptable	Acceptable	Acceptable	Acceptable
7	Not Acceptable	Not Acceptable	Acceptable	Acceptable	Acceptable	Acceptable	Acceptable	Acceptable	Acceptable	Acceptable
7 1/2	Not Acceptable	Not Acceptable	Not Acceptable	Not Acceptable	Not Acceptable	Acceptable	Acceptable	Acceptable	Acceptable	Acceptable
8	Not Acceptable	Not Acceptable	Not Acceptable	Not Acceptable	Not Acceptable	Not Acceptable	Not Acceptable	Not Acceptable	Acceptable	Acceptable
8 1/2	Not Acceptable	Not Acceptable	Not Acceptable	Not Acceptable	Not Acceptable	Not Acceptable	Not Acceptable	Not Acceptable	Not Acceptable	Not Acceptable

- Acceptable combinations
- Typical American installation

#### Features

- Single bowl.
- Squared bowl.
- Includes a sink bridge utility shelf with dishcloth bar and a bottom basin rack.
- 24" (610 mm) x 18-1/4" (464 mm)
- SilentShield® sound-absorption technology offers quieter performance.

#### Material

- 16-gauge stainless steel.

#### Installation

- Under-mount.
- Includes installation hardware.

#### Components

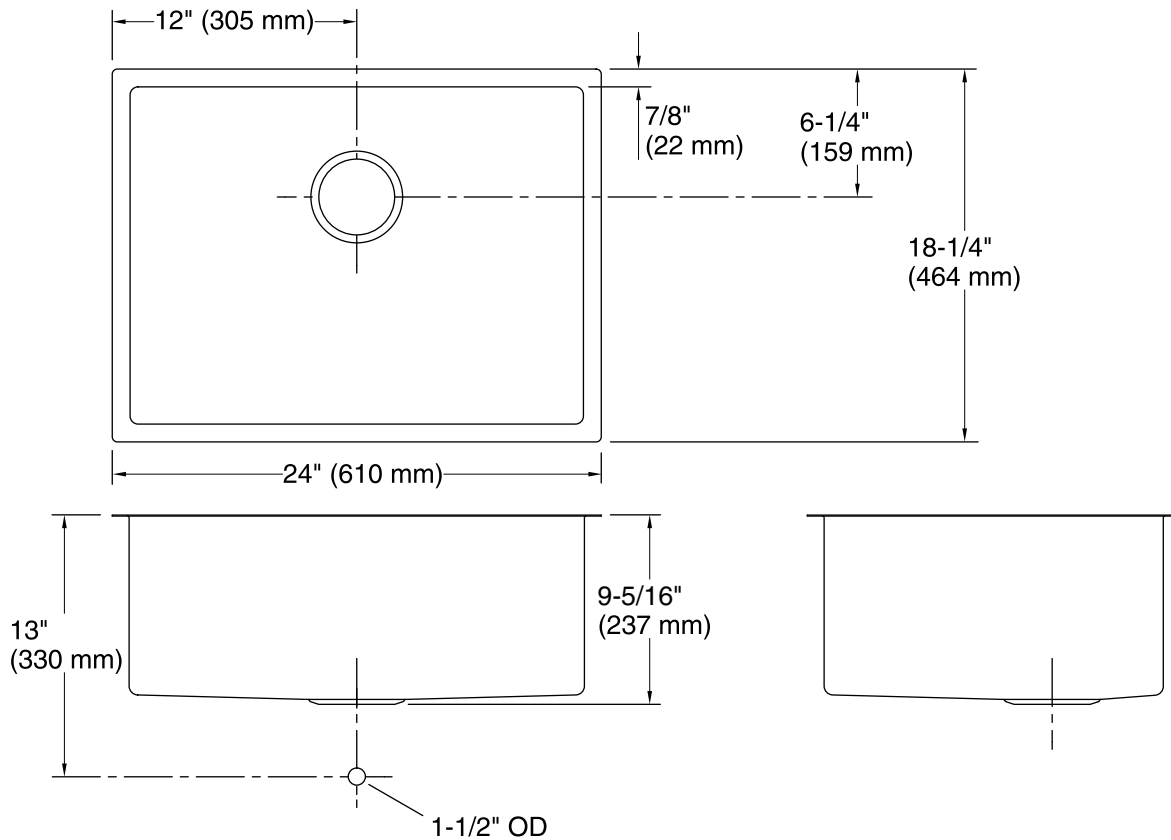
Additional included component/s: Hardware kit, and Cut-out template.



#### Codes/Standards

ASME A112.19.3/CSA B45.4

See website for detailed warranty information.



### Technical Information

All product dimensions are nominal.

Bowl configuration: Single

Installation: Under-mount

Min. base cabinet width: 27" (686 mm)

Bowl area

- Length: 22-1/4" (565 mm)
- Width: 16-1/2" (419 mm)
- Bowl depth: 9-5/16" (237 mm)
- Water depth: 9" (229 mm)

Template: 1207218-7, not required, not included

### Notes

Install this product according to the installation instructions.

Kitchen

**eno Single-lever mixer with pull-out spout with spray function**

Article number: 33 875 760

DORN  
BRACHT**Product specifications**

- **8-7/8" Projection**

- Swivel spout 130°
- Aerated stream and spray mode
- Total height 10"
- Height to aerator/spout outlet 7"
- 1-3/8" hole diameter
- 2x 10 mm flexible supply lines including 3/8" US adapters
- 63" metal shower hose
- Water flow rate limited to max. 1.5 gpm
- low lead compliant

**(ADA)****Internal backflow preventer.****Surfaces**

- |                 |                 |
|-----------------|-----------------|
| • chrome        | 33875760-000010 |
| • matt platinum | 33875760-060010 |

**KOHLER**<sup>®</sup>**Prolific**Prolific™ Under-mount Kitchen Sink  
**K-5540****Features**

- 36-inch minimum base cabinet width.
- Large Single bowl.
- 10-inch depth provides generous workspace.
- No faucet holes.
- SilentShield<sup>®</sup> sound-absorption technology offers quieter performance.
- Three graduated ledges in basin allow you to place accessories at your preferred height.
- Beveled cone-shape slopes into the drain, easily disposing debris.
- Includes a bamboo cutting board that fits securely on the sink levels providing an easy-to-clean work surface.
- Includes two durable dishwasher-safe grated racks that provide a convenient shelf for drying, rinsing, and defrosting.
- Includes a durable dishwasher safe wash bin and colander for draining pasta, washing dishes, or defrosting meat.
- Includes installation hardware.

**Material**

- Handcrafted from 18-gauge stainless steel.

**Installation**

- Under-mount

**Components**

Product includes:

K-5542 Multipurpose Grated Rack  
 K-5542 Multipurpose Grated Rack  
 K-5541 Hardwood Cutting Board  
 K-5544 Colander and Washbin

**Codes/Standards**

ASME A112.19.3/CSA B45.4

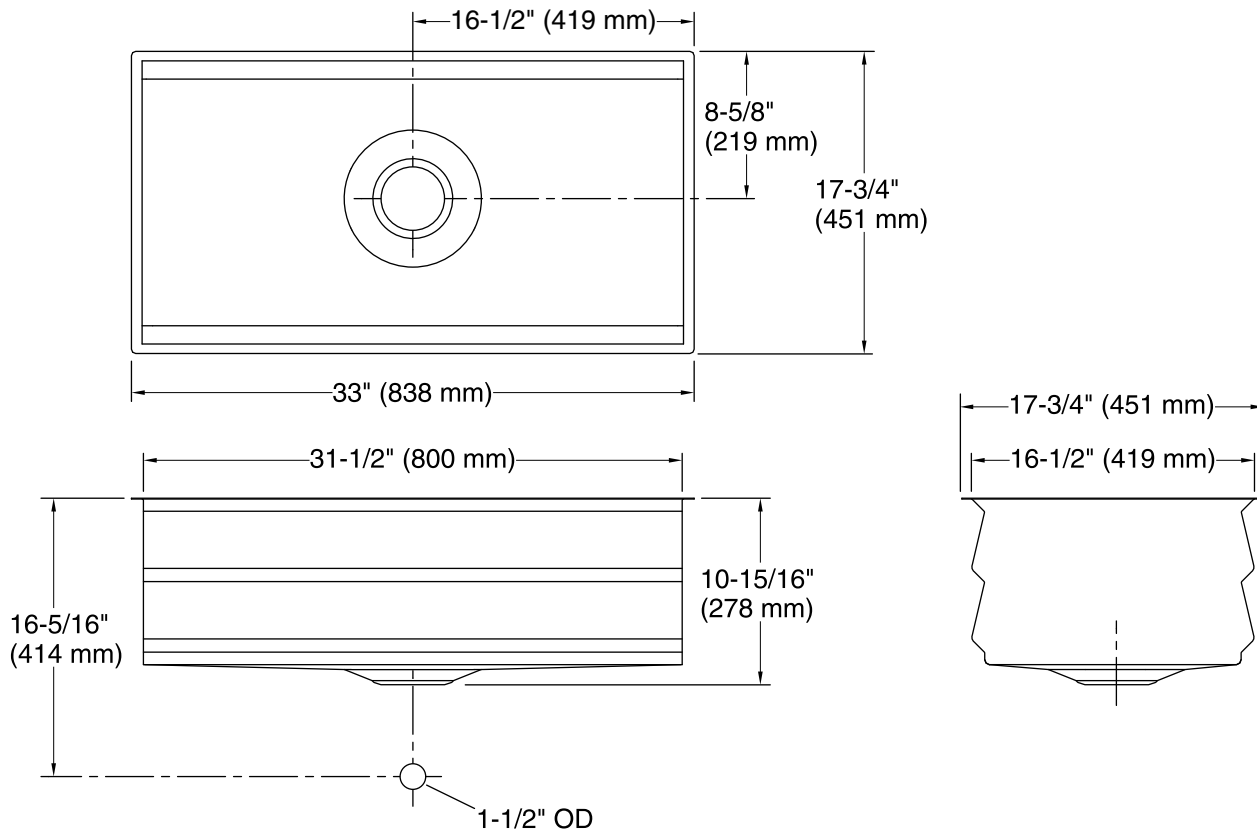
See website for detailed warranty information.



**KOHLER**<sup>®</sup>

# Prolific

Prolific™ Under-mount Kitchen Sink  
K-5540



### Technical Information

All product dimensions are nominal.

Bowl configuration:	Single
Installation:	Under-mount
Bowl area (Only)	Length: 31-1/2" (800 mm) Width: 16-1/2" (419 mm) Bowl depth: 10" (254 mm) Water depth: 10" (254 mm)
Drain hole:	3-3/4" (94 mm)
Template:	1093327-7, required, included

### Notes

Install this product according to the installation instructions.

Kitchen

**Tara Ultra Single-lever mixer pull-down with spray function**

Article number: 33 870 875



**Product specifications**

• **9-1/2" Projection**

- Swivel spout 360°
- Optional restriction, swivels 150°
- Laminar and spray function
- Total height 19-5/8"
- 7-1/8" height to aerator/spout outlet
- 1-3/8" hole diameter
- 2x 10 mm flexible supply lines including 3/8" US adapters
- 59" metal shower hose
- Hand spray with descaling system
- Water flow rate limited to max. 1.5 gpm
- low lead compliant

**(ADA)**

**Internal backflow preventer.**

Kitchen

**Tara Ultra Single-lever mixer pull-down with spray function**

Article number: 33 870 875



#11

**Surfaces**

- chrome 33870875-000010
- matt platinum 33870875-060010

[Search By Category](#)[Search By Material/Finish](#)[Search By Size](#) **Now In:** → [Single Soft-Close w/Tandem Heavy Duty Slides Recycle Centers](#)

## Single Soft-Close w/Tandem Heavy Duty Slides Recycle Centers

This practical solution lets you discard food scraps and easily transfer them to a larger compost bin for future use in flower beds, gardens and lawns. The 4WCSC-CP reduced depth is designed for a 30" sink base or 15" base cabinets and has rear storage for additional bags. Made from solid maple it comes with a single self-contained compost bin that features Biodegradable liners, a no-mess trash carriage that opens when the lid is raised and seals when the lid is closed, a carbon filter that eliminates odors and air vents to help speed the compost process.

[View larger image](#)**Price: \$404.55**Options:  ▼Quantity: [Add to Cart](#)[Add to Wish List](#)[Special Features](#)[Specifications](#)[Installation Instructions](#)[Videos](#)[Product Reviews](#)

### Physical Specifications

Width (min to max)	Depth (min to max)	Height (min to max)	Weight	Color : Finish
12"	18-5/8"	18-1/2"	24.11 lbs.	Natural : Maple

### Minimum Cabinet Opening

#### Face Frame

Width	Depth	Height
12"	18-3/4"	19"

### 2017/2018 Catalogs



### Products

- [Product List](#)
- [New Products](#)
- [Web Closeouts](#)
- [Retail Products](#)
- [Register Product](#)

### Resources

- [Storage Planner](#)
- [20/20, CAD Users](#)
- [Image Repository](#)
- [Literature](#)
- [In The Media](#)
- [Authorized Dealers](#)
- [Videos](#)

### About Us

- [Our History](#)
- [Our Staff](#)
- [Our Warranty](#)
- [Our Associations](#)
- [Rev-A-Shelf International](#)
- [Terms and Conditions](#)
- [Contact Us](#)
- [Careers](#)

## Trenta Toilet Item #GL58

### Features:

- Porcelain elongated one-piece toilet with composite seat cover
- Floor-standing installation
- Single flush system 1.28 gpf
- Soft-closing seat cover and bolts are included
- Tank included
- Meets and exceeds the following standard:
  - ISO/IEC 17025
  - EPA's WaterSense Specification for Tank-Type Toilets (Version 1.2, 06-02-2014 edition)



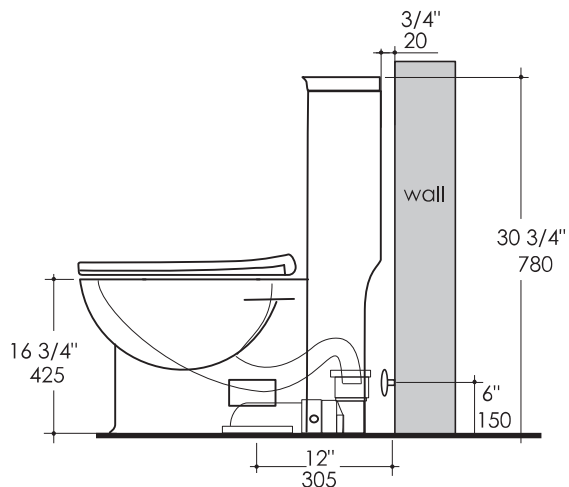
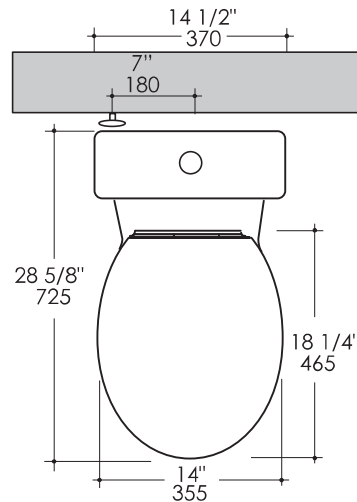
### Finish Options:

001 - White

### Parts:

GL58CW - Replacement seat cover

### Product Specifications:



### Notes:

Drawings provided herein are meant to give the user an idea of the product and are not made to scale. The size in inches is rounded up to the nearest 1/16". Slight variances can often occur with porcelain and woodwork. Therefore, LACAVA will not be held responsible for any cutouts, countertops, or furniture made without the actual product or template from LACAVA. Plumbing specifications are only a guideline and may need to be altered based on the application.

LACAVA is committed to the highest level of customer service. Please feel free to contact us at 1-888-522-2823 (toll free) or by email at [info@lacava.com](mailto:info@lacava.com) for technical assistance or any general inquiries.

Rev. 06-19-2015



### Product specifications

- **7-1/8"-8-1/4" Projection**
- Ball-joint pivotable through 30°
- Standard spray
- Descaling system
- Ø 3-7/8"
- Flange 2-3/8" x 2-3/8"
- 1/2" connection
- Water flow rate limited to max. 1.8 gpm

### Surfaces

- |                 |             |
|-----------------|-------------|
| • chrome        | 28504670-00 |
| • matt platinum | 28504670-06 |

Bath &amp; Spa

**IMO Concealed thermostat with two-way volume control**

Article number: 36 426 670

**Product specifications**

- Diverter with integrated volume control and integrated stops
- Cover plate 5-7/8" x 3-1/2"
- Temperature control handle with safety lock at 100 °F/ 38°C
- Max. temperature can be set on the trim

**(ADA)****Surfaces****Accessories required**

• chrome	36426670-000010	• Concealed thermostat with integrated supply
• matt platinum	36426670-060010	stops; 35 426 970

# STUDIO® 60" x 32" BATHING POOL with BUILT-IN APRON

HIGH GLOSS ACRYLIC

## STUDIO® 60" x 32" BATHING POOL with APRON

**2946.102 BATHING POOL**

Right Drain

**2946.202 BATHING POOL**

Left Drain

**Product Features:**

- High-gloss acrylic with fiberglass reinforcement
- Integral apron with clean, minimalist design
- Integral three-sided, 1" tiling/water retention flange helps prevent water seepage
- Design coordinated to match Studio® bath walls (sold separately)
- For recess installation
- Limited Lifetime warranty
- Pre-leveled tub bottom for easier installation

**Nominal Dimensions:**

60" x 32" x 18"

(1524 x 813 x 457mm)

**For use with:**

- ~~• 2946.BW Studio Bath Wall Set~~
- ~~• Bathing Pool can also be installed without Studio® wall set~~

**Compliance Certifications -  
Meets or Exceeds the Following Specifications:**

- CSA B45.5-11 / IAPMO Z124-2011
- cUPC

**To Be Specified - Required**

- Bath Faucet\*:
- Faucet Finish:
- Drain\*:
- Drain Finish: **CHROME**

**To Be Specified - Optional**

- ~~Studio Bath Walls: 2946.BW~~

\*See American Standard faucet and drain section of Product Selector



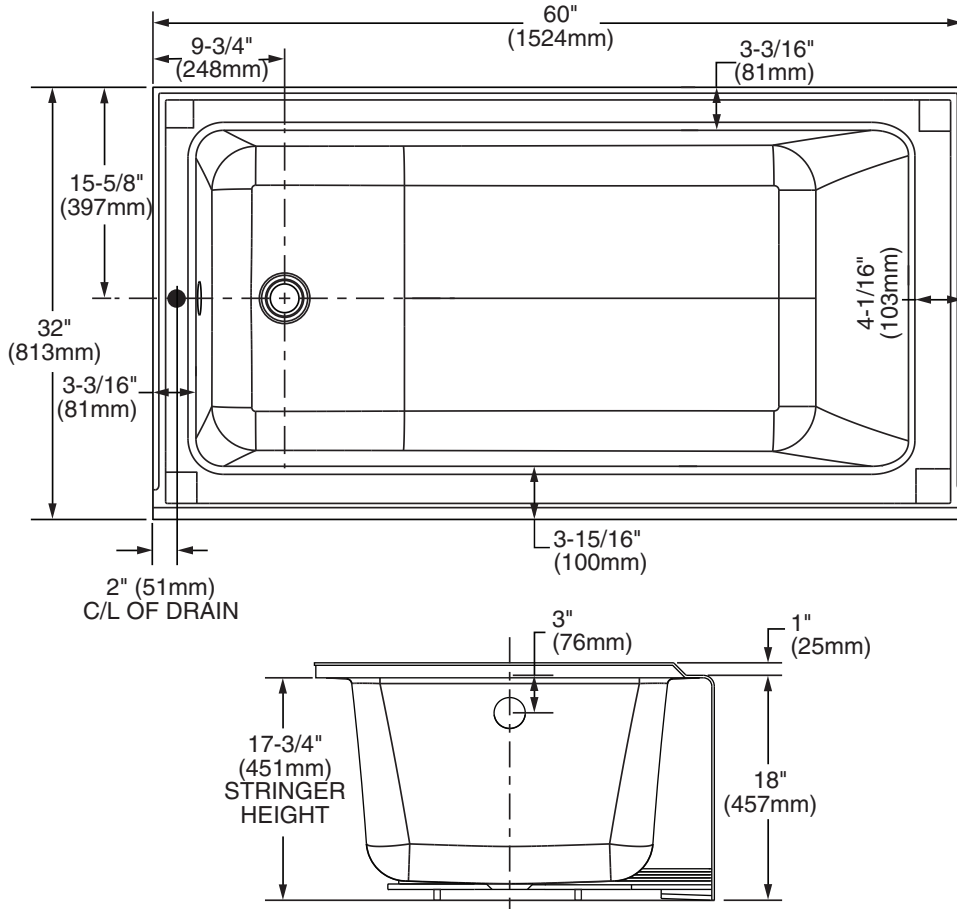
**Studio Bathing Pool shown with  
~~2946.BW Studio wall set~~**

SEE REVERSE FOR ROUGHING-IN DIMENSIONS  
AND PRODUCT SPECIFICATIONS



MEETS THE AMERICANS WITH DISABILITIES ACT GUIDELINES  
AND ANSI A117.1 REQUIREMENTS FOR ACCESSIBLE AND  
USEABLE BUILDING FACILITIES-CHECK LOCAL CODES.  
INSTALL WITH SEAT AT HEAD END.





<b>GENERAL SPECIFICATIONS FOR 2946 TUB</b>	
INSTALLED SIZE	60 x 32 x 18 In. (1524 x 813 x 457mm)
WEIGHT	60 Lbs. (27 Kg)
WEIGHT w/WATER	493 Lbs. (224 Kg)
GAL. TO OVERFLOW	52 Gal. (197 L)
BATHING WELL AT SUMP	22 x 44.5 In. (559 x 1130mm)
BATHING WELL AT RIM	25 X 53 In. (635 x 1346mm)
WATER DEPTH TO OVERFLOW	12 In. (305mm)
FLOOR LOADING	37 Lbs./Sq.Ft. (181 Kgs/Sq.m)
(PROJECTED AREA)	
PTS.	27.5
CUBE (FT <sup>3</sup> )	28.9

**NOTES:**

- BATH TO BE INSTALLED ABOVE FLOOR LINE AS A RECESS INSTALLATION.
- REFER TO INSTALLATION INSTRUCTIONS SUPPLIED WITH TUB FOR ADDITIONAL INFORMATION.
- FITTINGS NOT INCLUDED AND MUST BE ORDERED SEPARATELY.
- PROVIDE SUITABLE REINFORCEMENT FOR ALL SUPPORTS.
- MOUNTING HOLES DRILLED BY INSTALLER.

**IMPORTANT:** Dimensions of fixtures are nominal and may vary within the range of tolerances established by ANSI Standard CSA B45.5-11/IAPMO Z124-2011. These measurements are subject to change or cancellation. No responsibility is assumed for use of superseded or voided pages.

Bath & Spa

## IMO Single-lever lavatory mixer with drain

Article number: 33 500 670

DORN  
BRACHT



### Product specifications

#### • 5-1/8" Projection

- US drain with overflow
- Fixed spout
- Rectangular aerated stream
- Total height 6-1/8"
- Height to aerator/spout outlet 3-1/8"
- 1-3/8" hole diameter
- 2x 3/8" US flexible supply lines
- Water flow rate limited to max. 1.2 gpm
- low lead compliant

#### (ADA)

### Surfaces

- |                 |                 |
|-----------------|-----------------|
| • chrome        | 33500670-000010 |
| • matt platinum | 33500670-060010 |

Bath &amp; Spa

**IMO Tub spout for wall-mounted installation**

Article number: 13 801 670

**DORN  
BRACHT****Product specifications**

- **7-7/8" Projection**
- Recatangular aerator
- 1-1/2" hole diameter
- 1/2" connection
- Water flow rate limited to max. 6.9 gpm

**Surfaces**

- chrome 13801670-00
- matt platinum 13801670-06

**Accessories required**

- Rough-in adapter; 35 080 970

## Aquasei Vanity Item #5231A

### Features:

- Wall-mount wooden vanity
- Two drawers with push-open hardware and metal decorative inserts
- Soft-closing full-extension drawer slides with weight capacity of 100 lbs.
- Wooden mounting cleat
- Drawer organizers
- Drawers have U-shaped notch for plumbing
- Washbasins #5231 or #5211 sold separately
- Handmade in USA
- Manufactured with low VOC finishes and wood from renewable forests



Shown in 38-Hebbia

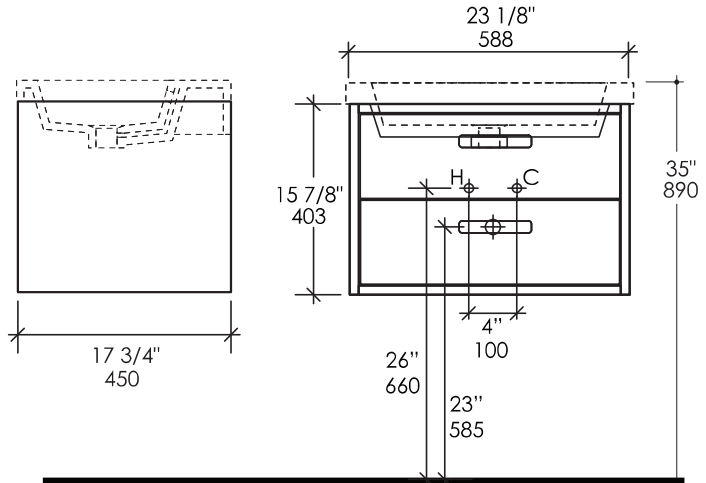
### Recommended Accesories:

- Item #5231 or #5211: Porcelain washbasin with overflow
- Requires oversized European drain (i.e. item #7100-16OF or 7100-12)
- Available in White (-001) only
- Faucet hole options available: None, One, Two, or Three in 8" spread

### Finish Options:

- 02 - Natural Cherry
- 06 - Wenge
- 07 - Natural Walnut
- 08 - Matte White (TEX1 - fine texture)
- 16 - Matte Black (TEX1 - fine texture)
- 18 - Ebony
- 20 - Ash Gray
- 22 - Gray Zebra
- 24 - Classic Walnut
- 31 - White Oak
- 33 - African Mahogany
- 34 - Matte Mocha (TEX1 - fine texture)
- 35 - Matte Ardesia (TEX1 - fine texture)
- 36 - Espresso
- 37 - Weathered Oak
- 52 - Silver Oak
- 85 - Gloss White
- 86 - Gloss Black
- 87 - Gloss Mocha
- 88 - Gloss Ardesia

### Product Specifications:



#### Notes:

Drawings provided herein are meant to give the user an idea of the product and are not made to scale. The size in inches is rounded up to the nearest 1/16". Slight variances can often occur with porcelain and woodwork. Therefore, LACAVA will not be held responsible for any cutouts, countertops, or furniture made without the actual product or template from LACAVA. Differences in color, grain, appearance and texture are inherent in all natural woodwork, and should be expected. Variances in these qualities are not deemed manufacturing defects, and will not be accepted as valid reasons to return or exchange any LACAVA woodwork. Plumbing specifications are only a guideline and may need to be altered based on the application.

Product specifications are not binding to the manufacturer and can be changed without notice at any time. Please refer to your shipment for product final sizes.

LACAVA is committed to the highest level of customer service. Please feel free to contact us at 1-888-522-2823 (toll free) or by email at info@lacava.com for technical assistance or any general inquiries.

Rev. 06-07-2017

## Kubista Vanity Item #H263L/R

**ITEM #H263LNT**

### Features:

- Wall-mount wooden vanity
- Three drawers with routed finger pulls
- Soft-closing full-extension drawer slides with weight capacity of 100 lbs.
- Wooden mounting cleat
- ~~-Metal trims between each drawer~~
- Large drawers has lower back for plumbing
- Washbasin #H263LT, H263RT sold separately
- Customizable (please request a quote)
- Handmade in USA
- Manufactured with low VOC finishes and wood from renewable forests

### Recommended Accesories:

- Item #H263LT: solid surface washbasin with overflow
- Requires standard American grid drain with overflow (i.e. 7100-18OF)
- Available in Gloss White (-001G) or **Matte White (-001M)**
- Faucet hole options available: None, One, or **Three in 8" spread**

### Options:

- Item #H263L: large drawer on the left (shown), pairs with lavatory #H263LT
- Item #H263R: large drawer on the right, pairs with lavatory #H263RT

### Finish Options:

- 01 - Natural Maple
- 02 - Natural Cherry
- 03 - Mahogany
- 06 - Wenge
- 07 - Natural Walnut**
- 08 - White (TEX1 - fine texture, TEX2 - medium texture)
- 15 - Natural Zebra
- 16 - Black (TEX1 - fine texture, TEX2 - medium texture)
- 17 - Caramel Bamboo
- 18 - Ebony
- 20 - Ash Gray
- 22 - Gray Zebra
- 23 - Gray Ebony
- 24 - Classic Walnut
- 25 - Honey Oak
- 26 - Chocolate Bamboo
- 32 - Maron
- 34 - Mocha
- 35 - Ardesia
- 38 - Nebbia
- 45 - Sapele
- 52 - Silver Oak
- 85 - Gloss White

### Notes:

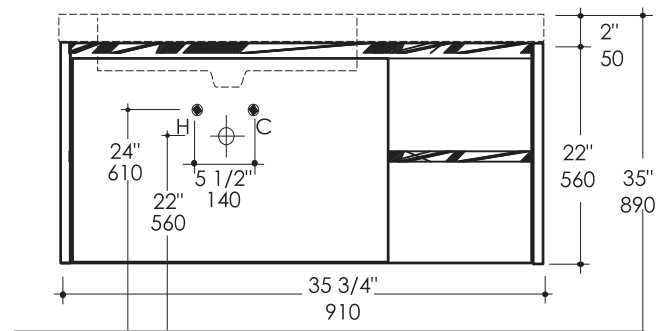
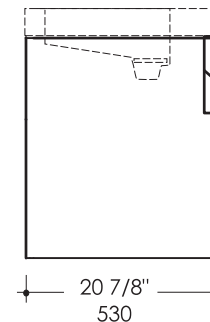
Drawings provided herein are meant to give the user an idea of the product and are not made to scale. The size in inches is rounded up to the nearest 1/16". Slight variances can often occur with porcelain and woodwork. Therefore, LACAVA will not be held responsible for any cutouts, countertops, or furniture made without the actual product or template from LACAVA. Differences in color, grain, appearance and texture are inherent in all natural woodwork, and should be expected. Variances in these qualities are not deemed manufacturing defects, and will not be accepted as valid reasons to return or exchange any LACAVA woodwork. Plumbing specifications are only a guideline and may need to be altered based on the application.

LACAVA is committed to the highest level of customer service. Please feel free to contact us at 1-888-522-2823 (toll free) or by email at info@lacava.com for technical assistance or any general inquiries.

Rev. 9-18-2015



### Product Specifications:



## Kubista Vanity Item #H264

**ITEM #H264NT**

### Features:

- Wall-mount wooden vanity
- Five drawers with routed finger pulls
- Soft-closing full-extension drawer slides with weight capacity of 100 lbs.
- Wooden mounting cleat
- ~~-Metal trims between each drawer~~
- Large drawer has lower back for plumbing
- Washbasin #H264T sold separately
- Customizable (please request a quote)
- Handmade in USA
- Manufactured with low VOC finishes and wood from renewable forests



### Recommended Accesories:

- Item #H264T: Solid surface washbasin with overflow
- Requires standard American grid drain with overflow (i.e. 7100-18OF)
- Available in Gloss White (-001G) or Matte White (-001M)
- Faucet hole options available: None, One, or Three in 8" spread

### Other Options with 3 Drawers:

- Item #H264L: large drawer on the left (shown), pairs with lavatory #H264LT
- Item #H264R: large drawer on the right, pairs with lavatory #H264RT

### Finish Options:

- 01 - Natural Maple
- 02 - Natural Cherry
- 03 - Mahogany
- 06 - Wenge
- 07 - Natural Walnut
- 08 - White (TEX1 - fine texture, TEX2 - medium texture)
- 15 - Natural Zebra
- 16 - Black (TEX1 - fine texture, TEX2 - medium texture)
- 17 - Caramel Bamboo
- 18 - Ebony
- 20 - Ash Gray
- 22 - Gray Zebra
- 23 - Gray Ebony
- 24 - Classic Walnut
- 25 - Honey Oak
- 26 - Chocolate Bamboo
- 32 - Maron
- 34 - Mocha
- 35 - Ardesia
- 38 - Nebbia
- 45 - Sapele
- 52 - Silver Oak
- 85 - Gloss White

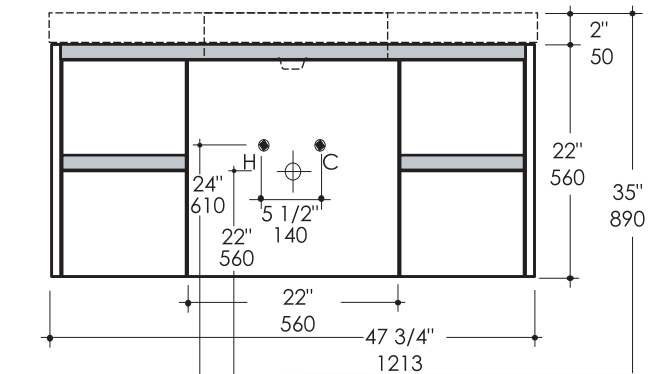
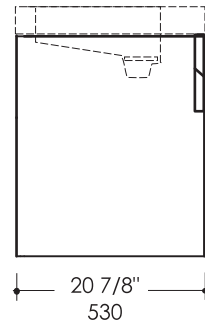
### Notes:

Drawings provided herein are meant to give the user an idea of the product and are not made to scale. The size in inches is rounded up to the nearest 1/16". Slight variances can often occur with porcelain and woodwork. Therefore, LACAVA will not be held responsible for any cutouts, countertops, or furniture made without the actual product or template from LACAVA. Differences in color, grain, appearance and texture are inherent in all natural woodwork, and should be expected. Variances in these qualities are not deemed manufacturing defects, and will not be accepted as valid reasons to return or exchange any LACAVA woodwork. Plumbing specifications are only a guideline and may need to be altered based on the application.

LACAVA is committed to the highest level of customer service. Please feel free to contact us at 1-888-522-2823 (toll free) or by email at info@lacava.com for technical assistance or any general inquiries.

Rev. 11-30-2015

### Product Specifications:



## Aquasei Vanity Item #5232A

### Features:

- Wall-mount wooden vanity
- Two drawers with push-open hardware and metal decorative inserts
- Soft-closing full-extension drawer slides with weight capacity of 100 lbs.
- Wooden mounting cleat
- Drawer organizers
- Drawers have U-shaped notch for plumbing
- Washbasins #5232 or #5212 sold separately
- Handmade in USA
- Manufactured with low VOC finishes and wood from renewable forests



Shown in 19-Rosewood

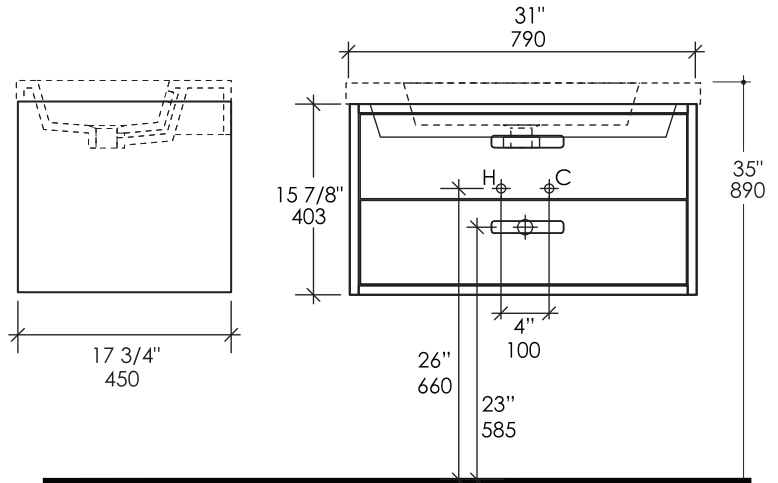
### Recommended Accesories:

- Item #5232 or #5212: Porcelain double-bowl washbasin with overflow
- Requires oversized European drain (i.e. item #7100-16OF or 7100-12)
- Available in White (-001) only
- Faucet hole options available: None, One, Two, or Three in 8" spread

### Finish Options:

- 02 - Natural Cherry
- 06 - Wenge
- 07 - Natural Walnut
- 08 - Matte White (TEX1 - fine texture)
- 16 - Matte Black (TEX1 - fine texture)
- 18 - Ebony
- 20 - Ash Gray
- 22 - Gray Zebra
- 24 - Classic Walnut
- 31 - White Oak
- 33 - African Mahogany
- 34 - Matte Mocha (TEX1 - fine texture)
- 35 - Matte Ardesia (TEX1 - fine texture)
- 36 - Espresso
- 37 - Weathered Oak
- 52 - Silver Oak
- 85 - Gloss White
- 86 - Gloss Black
- 87 - Gloss Mocha
- 88 - Gloss Ardesia

### Product Specifications:



#### Notes:

Drawings provided herein are meant to give the user an idea of the product and are not made to scale. The size in inches is rounded up to the nearest 1/16". Slight variances can often occur with porcelain and woodwork. Therefore, LACAVA will not be held responsible for any cutouts, countertops, or furniture made without the actual product or template from LACAVA. Differences in color, grain, appearance and texture are inherent in all natural woodwork, and should be expected. Variances in these qualities are not deemed manufacturing defects, and will not be accepted as valid reasons to return or exchange any LACAVA woodwork. Plumbing specifications are only a guideline and may need to be altered based on the application.

Product specifications are not binding to the manufacturer and can be changed without notice at any time. Please refer to your shipment for product final sizes.

LACAVA is committed to the highest level of customer service. Please feel free to contact us at 1-888-522-2823 (toll free) or by email at info@lacava.com for technical assistance or any general inquiries.

Rev. 06-07-2017

# # M061



Click to open image

## # M061

[Add to my folder](#)

Surface-mount medicine cabinet with mirrored door, two adjustable glass shelves and LED lights in cubby.

**STANDARD** \$1,330.00

W: 15"

<http://www.lacava.com/finish.html#STANDARD>

D: 5"

**PREMIUM** \$1,600.00

H: 34"

<http://www.lacava.com/finish.html#PREMIUM>

**LUXURY**

<http://www.lacava.com/finish.html#LUXURY>

**FINISH: 07-NATURAL WALNUT**



## # M062



Click to open image

## # M062

Add to my folder

Surface-mount medicine cabinet with mirrored door, two adjustable glass shelves and LED lights in cubby.

**STANDARD**

\$1,550.00

W: 19"

(//www.lacava.com/finish.html#STANDARD)

D: 5"

**PREMIUM**

\$1,880.00

H: 34"

(//www.lacava.com/finish.html#PREMIUM)

**LUXURY**

(//www.lacava.com/finish.html#LUXURY)

**FINISH: 07-NATURAL WALNUT**

Bath & Spa

## IMO Three-hole lavatory mixer with drain

Article number: 20 713 670



### Product specifications

#### • 6-1/2" Projection

- US drain with overflow
- Fixed spout
- Rectangular aerated stream
- Total height 8-5/8"
- Height to aerator/spout outlet 6-3/4"
- Valve hole diameter 1-1/4"
- Spout hole diameter 1-3/8"
- Flange 2-3/8" x 2-3/8"
- Water flow rate limited to max. 1.2 gpm
- low lead compliant

**(ADA)**

### Surfaces

- |                 |                 |
|-----------------|-----------------|
| • chrome        | 20713670-000010 |
| • matt platinum | 20713670-060010 |

Bath &amp; Spa

**IMO Hand shower set with individual flanges**

Article number: 27 808 980

**DORN  
BRACHT****Product specifications**

- Standard spray
- Descaling system
- 3/8" Shower outlet
- Flange for wall elbow 2-3/8" x 2-3/8"
- Wall bracket with flange 2-3/8" x 2-3/8"
- Metal shower hose 49-1/4" with anti-twist device
- 1/2" wall elbow
- Water flow rate limited to max. 2 gpm

**Internal backflow preventer.****Surfaces**

- chrome 27808980-00
- matt platinum 27808980-06

**Accessories required**

- Rough-in adapter; 35 080 970



**Suggested Uses**

- Shower drain
- Patio drain / Atrium drain
- Other wetted area floor drains

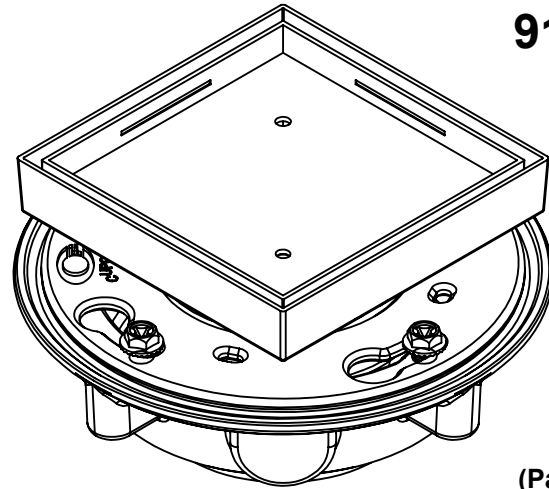
**Features**

- Create "invisible drain" by allowing inlay of tile/stone to drain cover
- to match surrounding tile/stone
- Available in 5 finishes, including 4 PVD finishes
- All brass decorative frame with no visible screws (patent pending)
- Frame surface is foot friendly with no sharp edges
- Rigid frame construction - will not dish or bend
- Square frame design for easy floor design and installation
- Outlet flow rate 10 gpm (38 Lpm) with 1/4" head of water
- Includes removable debris strainer with inner frame removal tool
- Latex coated cast iron body & collar
- 3" FIP outlet

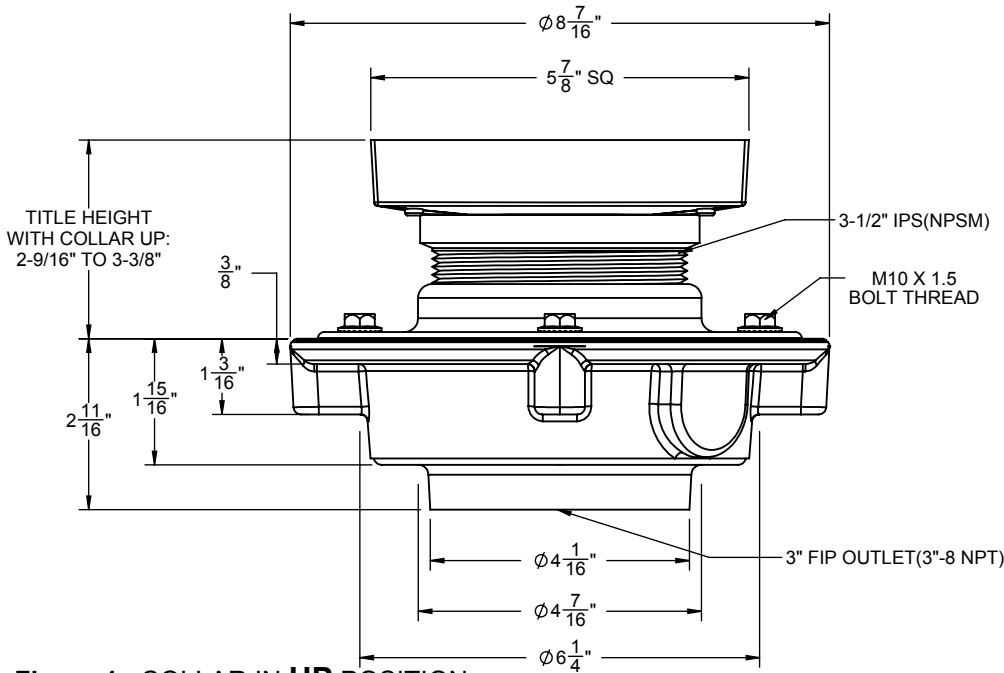
**Codes/Standards Applicable**

- Meets or exceeds the following at date of manufacture:
- ASME A112.18.2/CSA B125.2

**9190-IP-3**



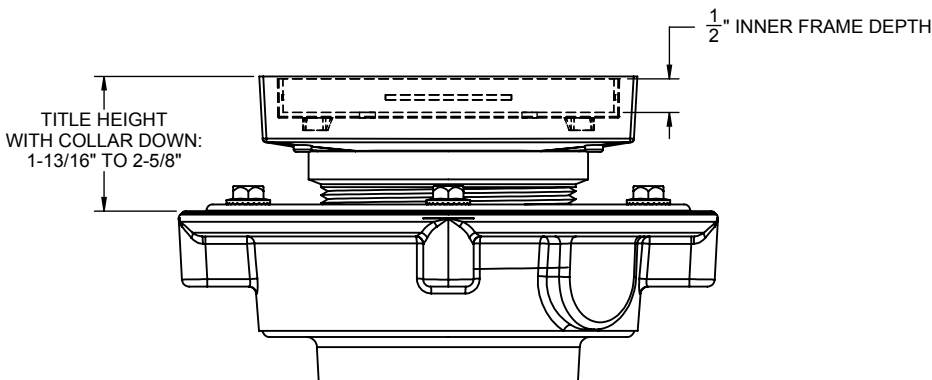
(Patent Pending)



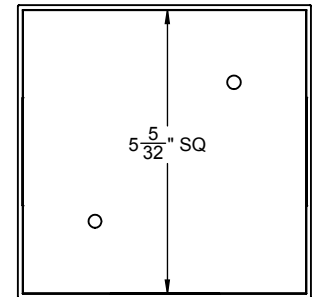
**Figure 1. COLLAR IN UP POSITION**

**Figure 2. COLLAR IN DOWN POSITION**

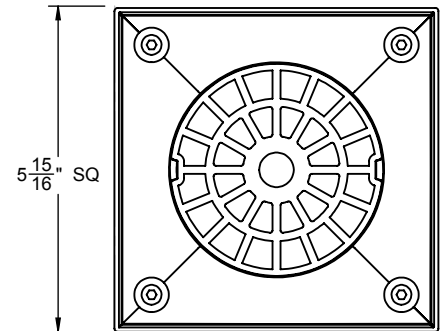
DIMENSIONS SHOWN TO NEAREST 1/16"



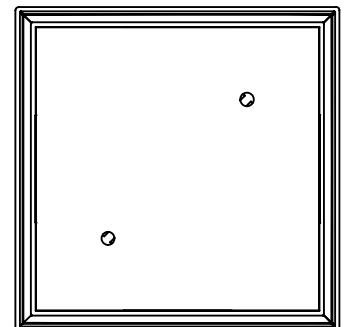
**Figure 3A. INNER FRAME**



**Figure 3B. OUTER FRAME SHOWN WITH DEBRIS STRAINER**



**Figure 3C. OPEN AREA = 4.49 in²**





# SINE

## Single Robe Hook 0210H

### Features

- Solid brass construction
- Complements Sine product series

### Codes / Standards Compliance

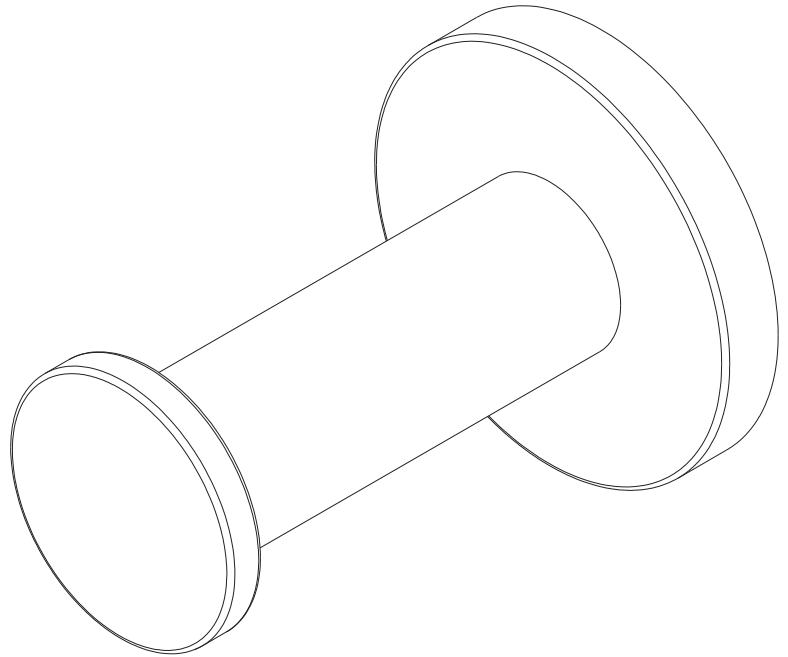
Meets or exceeds the following at date of manufacture:

- All applicable US Federal and State material regulations

### Colors / Finishes

- PC: Satin Nickel
- SN: Satin Nickel

Other: N/A



### Specified Model

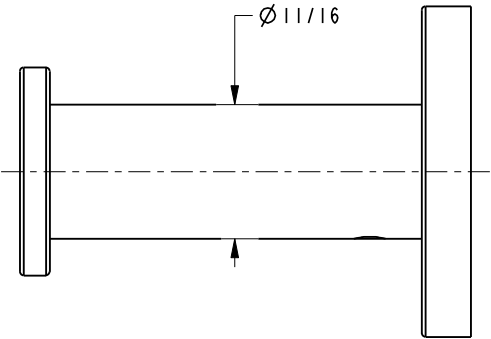
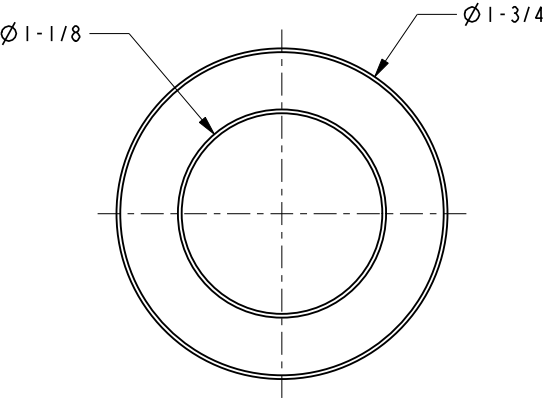
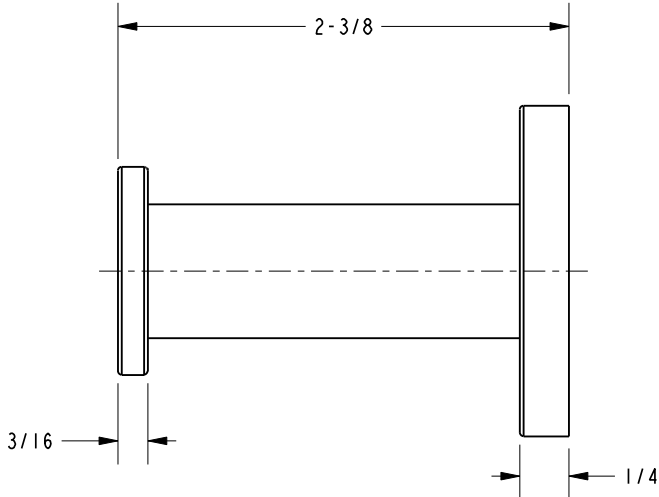
Model	Description	Colors   Finishes
0210H	Single Robe Hook	<input checked="" type="checkbox"/> PC <input type="checkbox"/> SN

### Product Specification: Add "Color / Finish" Suffix to Model Number Below.

The Single Robe Hook shall be made of solid brass construction. Single Robe Hook shall complement motiv Sine product series. Single Robe Hook shall be motiv Model 0210H/\_\_\_\_\_ .

# 0210H

Product Dimensions (units are in inches)



## Toilet Tissue Holder 0206

### Features

- Solid brass construction
- Single-post, open roller design
- Complements Sine product series

### Codes / Standards Compliance

Meets or exceeds the following at date of manufacture:

- All applicable US Federal and State material regulations



### Colors / Finishes

- PC: Polished Chrome
- SN: Satin Nickel

### Specified Model

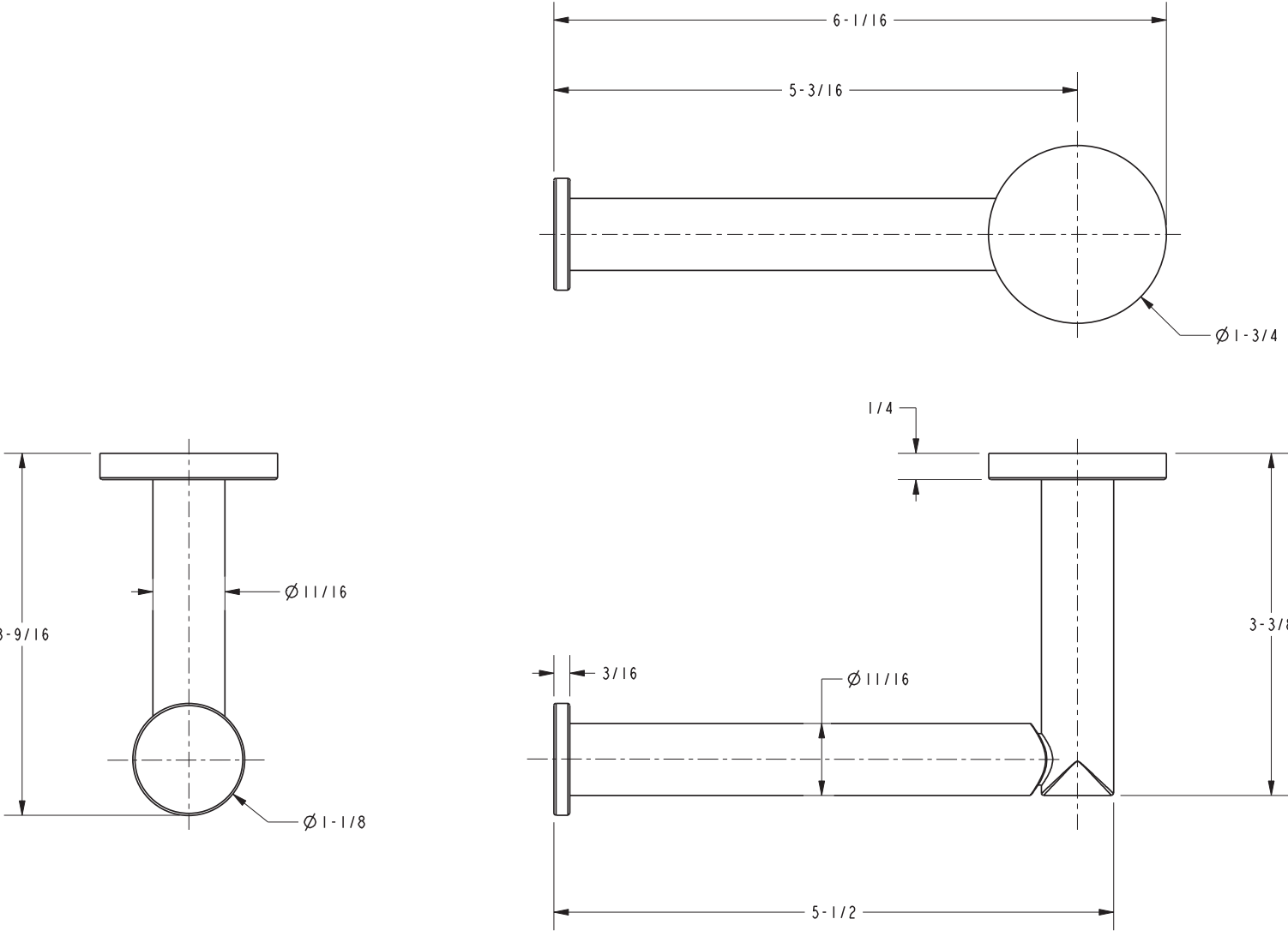
Model	Description	Colors / Finishes
0206	Open Toilet Tissue Holder	<input type="checkbox"/> PC <input type="checkbox"/> SN

### Product Specification: Add "Color / Finish" Suffix to Model Number Below

The Toilet Tissue Holder shall be made of solid brass construction and incorporate a single-post, open roller design. Toilet Tissue Holder shall complement GINGER Sine product series. Toilet Tissue Holder shall be GINGER model 0206\_\_\_\_/\_\_\_\_\_.

# 0206

## Product Dimensions *(units are in inches)*





## SINE

### Features

- Solid brass construction
- Complements Sine product series

Towel Bar  
**0205**  
 Also 0202, 0203

### Codes / Standards Compliance

Meets or exceeds the following at date of manufacture:

- All applicable US Federal and State material regulations



### Colors / Finishes

- PC: Polished Chrome
- SN: Satin Nickel

### Specified Model

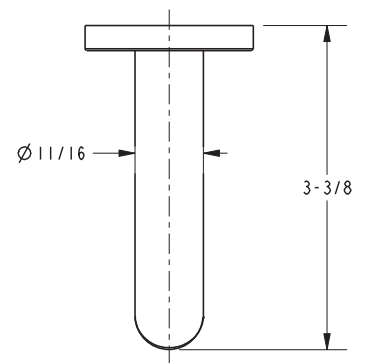
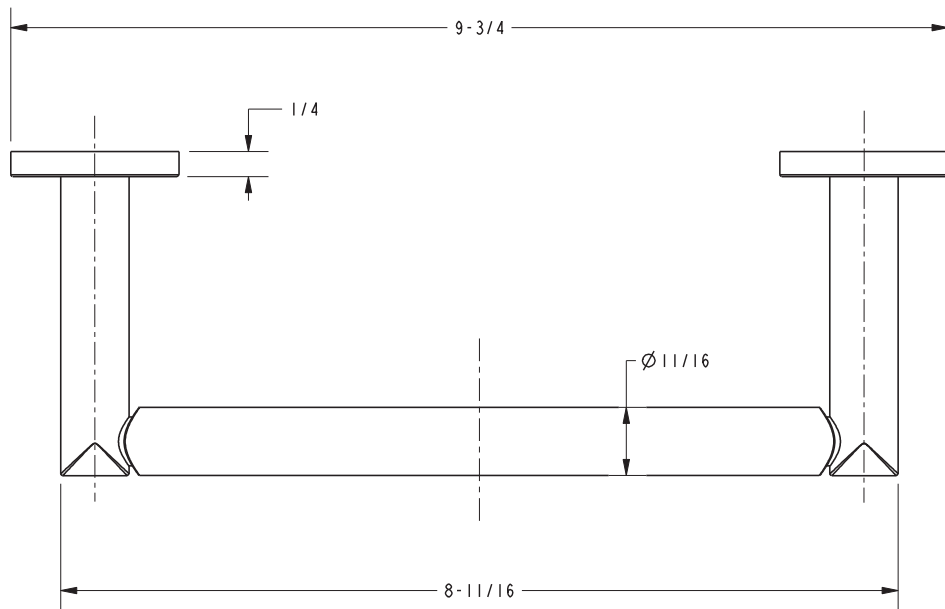
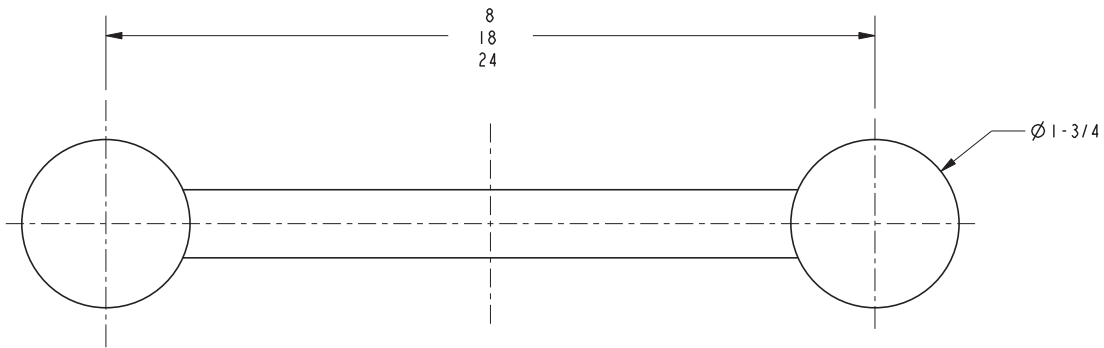
Model	Description	Colors / Finishes
0205	8" Towel Bar	<input type="checkbox"/> PC <input type="checkbox"/> SN
0202	18" Towel Bar	<input type="checkbox"/> PC <input type="checkbox"/> SN
0203	24" Towel Bar	<input type="checkbox"/> PC <input type="checkbox"/> SN

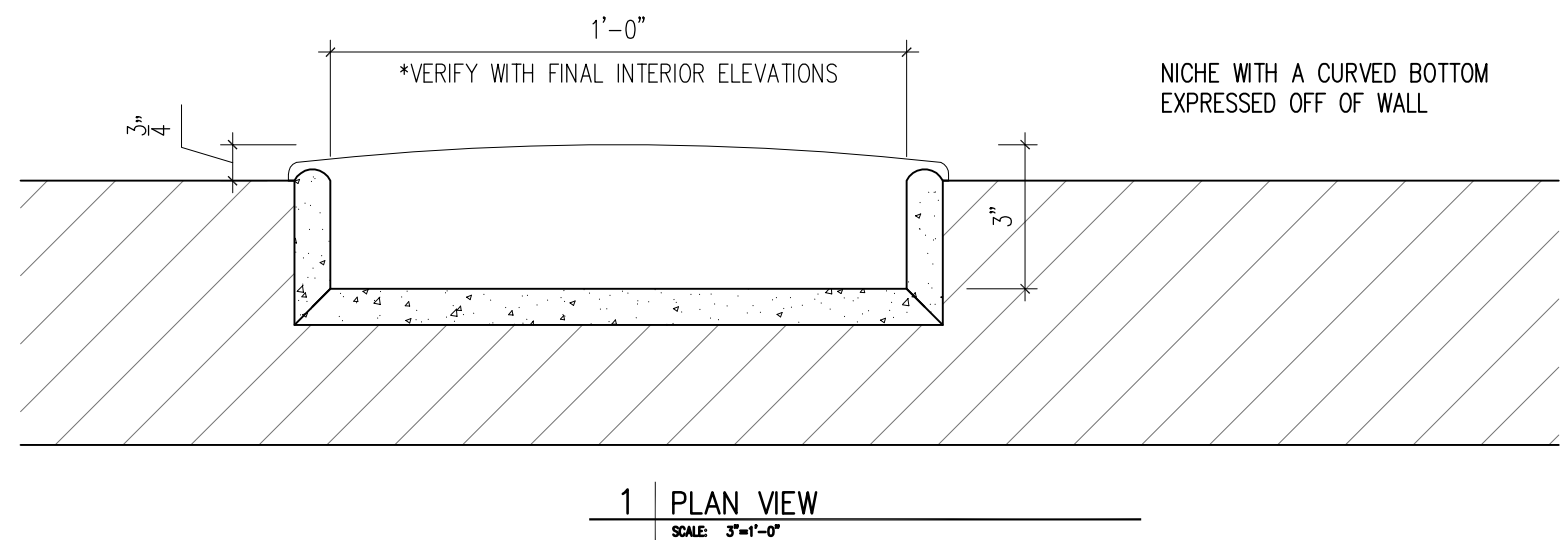
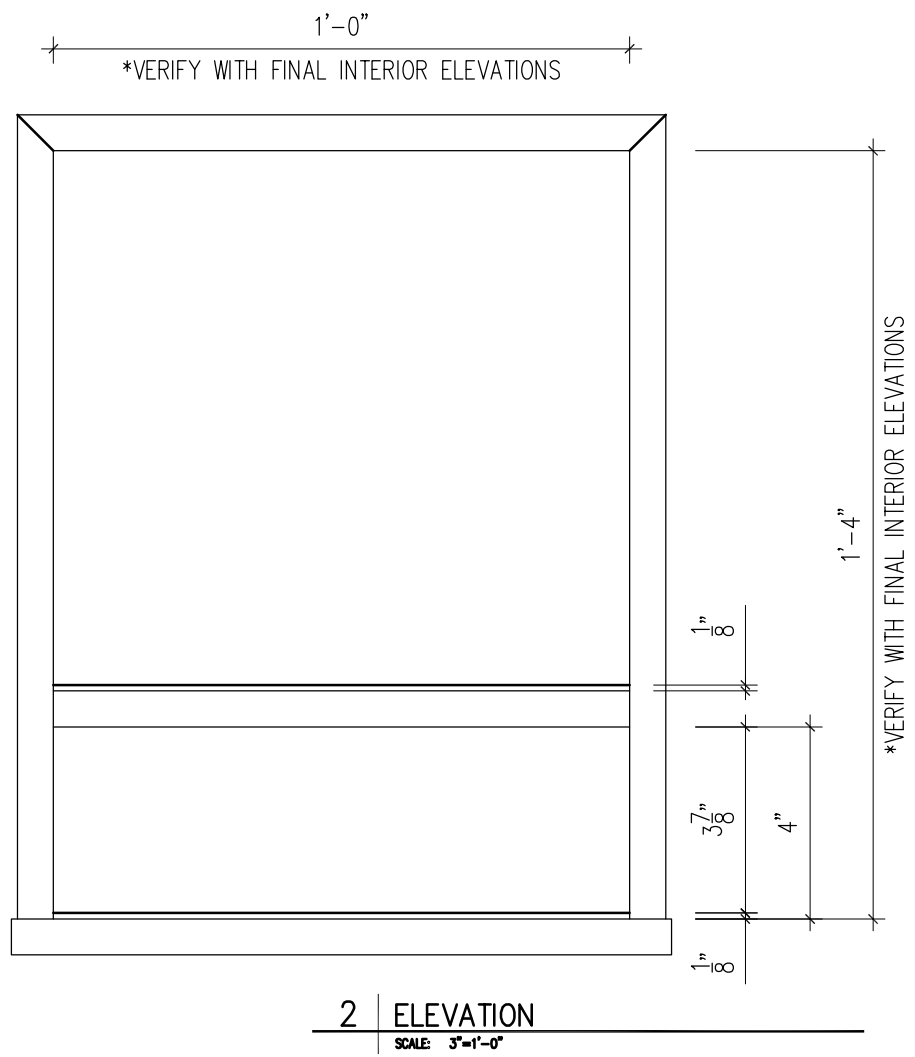
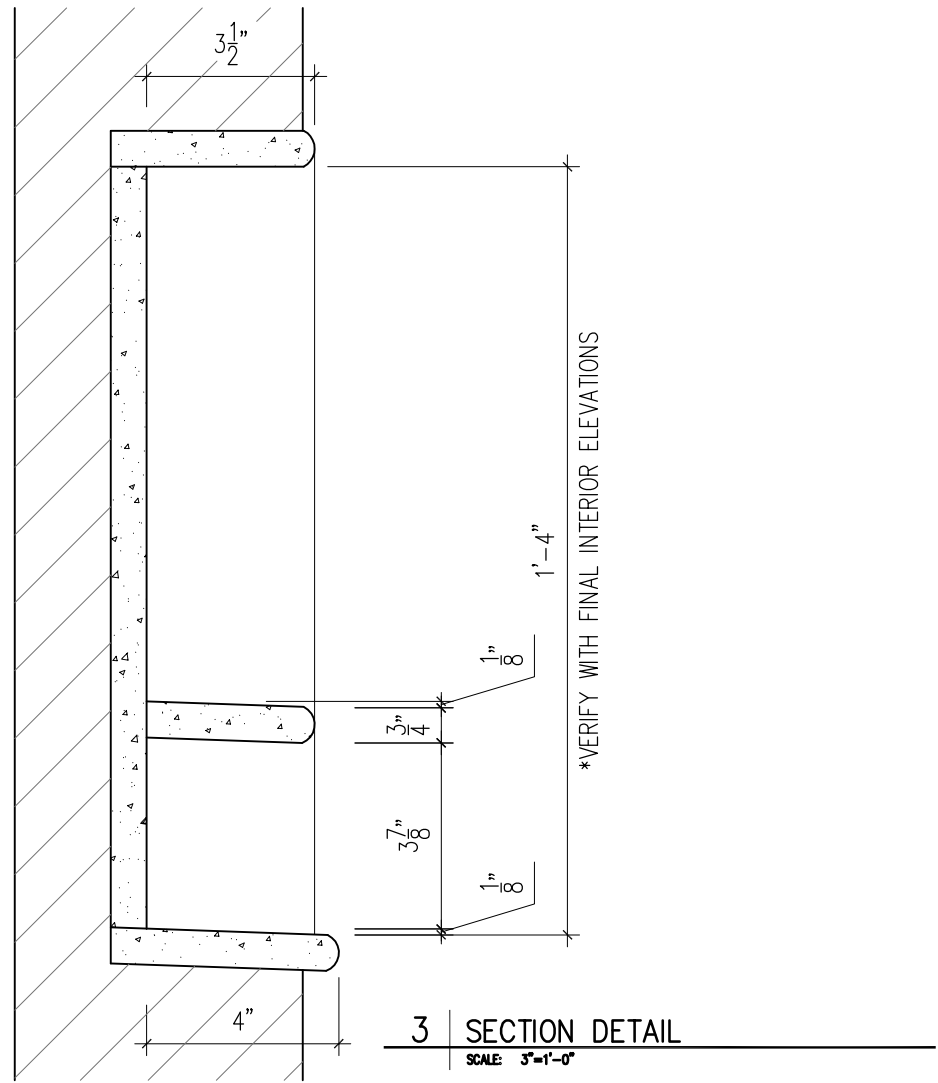
### Product Specification: Add "Length Indicator and Color / Finish" suffix to Model number, below.

The Towel Bar shall be made of solid brass construction. Towel Bar shall complement GINGER Sine product series. Towel Bar shall be GINGER Model 020\_/\_\_\_\_\_ .

# 0205

## Product Dimensions *(units are in inches)*





Interior Architectural Services:  
TRACY DAVIS  
**urban dwellings™**  
INTERIORS • DESIGN • OBJECTS  
PORTLAND, ME • NEW YORK, NY • WASHINGTON, DC

Revisions and Notes:	Architect:	Client:	Date:	Drawing:

Scale:  
Designed By:  
Drawn By:  
Set:  
QUARTZ SHOWER NICHE

# MY FOLDER

Enter Your Email

Send email

## KUBISTA # H261/H261NT

remove



Shown in 52-Silver Oak  
(product/1280)

Wall-mount under-counter vanity with optional metal trims (no additional cost) and a drawer with notch in back. Vanity top # H261T sold separately.

H261- with metal trims

H261NT- no metal trims

- STANDARD** \$1,590.00  
(//www.lacava.com/finish.html#STANDARD)
- PREMIUM** \$1,930.00  
(//www.lacava.com/finish.html#PREMIUM)
- LUXURY**  
(//www.lacava.com/finish.html#LUXURY)

W: 23 3/4"  
D: 20 7/8"  
H: 22"

**FINISH: 07-NATURAL WALNUT  
COORDINATE WITH H261T-03-001M SINK**

## Aquasei Vanity Item #5235A

### Features:

- Wall-mount wooden vanity
- Four drawers with push-open hardware and metal decorative inserts
- Soft-closing full-extension drawer slides with weight capacity of 100 lbs.
- Wooden mounting cleat
- Drawer organizers
- Drawers have U-shaped notch for plumbing
- Washbasins #5235 or #5215 sold separately
- Handmade in USA
- Manufactured with low VOC finishes and wood from renewable forests

### Recommended Accesories:

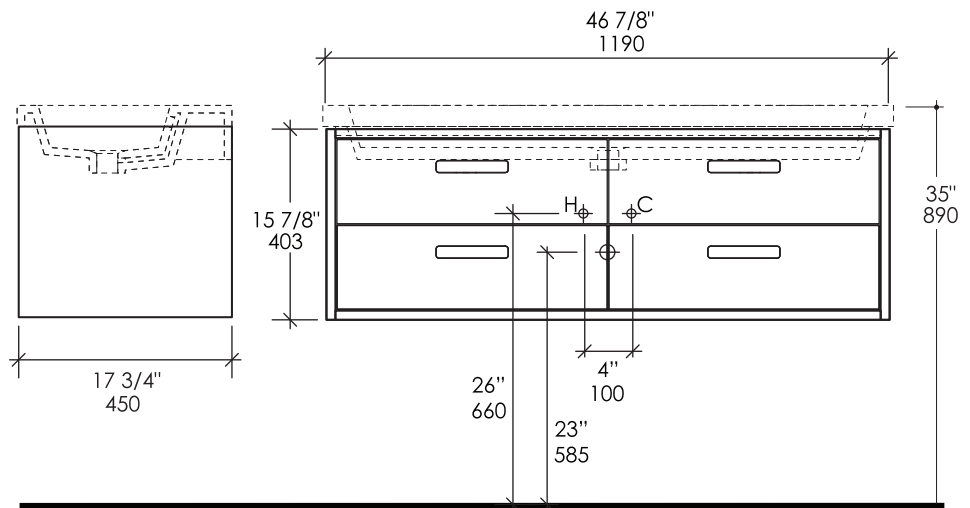
- Item #5235 or #5215: Porcelain wide-bowl washbasin with overflow
- Requires oversized European drain (i.e. item #7100-16OF or 7100-12)
- Available in White (-001) only
- Faucet hole options available: None, One, Two, or Three in 8" spread



### Finish Options:

- 02 - Natural Cherry
- 06 - Wenge
- 07 - Natural Walnut
- 08 - Matte White (TEX1 - fine texture)
- 16 - Matte Black (TEX1 - fine texture)
- 18 - Ebony
- 20 - Ash Gray
- 22 - Gray Zebra
- 24 - Classic Walnut
- 31 - White Oak
- 33 - African Mahogany
- 34 - Matte Mocha (TEX1 - fine texture)
- 35 - Matte Ardesia (TEX1 - fine texture)
- 36 - Espresso
- 37 - Weathered Oak
- 52 - Silver Oak
- 85 - Gloss White
- 86 - Gloss Black
- 87 - Gloss Mocha
- 88 - Gloss Ardesia

### Product Specifications:



#### Notes:

Drawings provided herein are meant to give the user an idea of the product and are not made to scale. The size in inches is rounded up to the nearest 1/16". Slight variances can often occur with porcelain and woodwork. Therefore, LACAVA will not be held responsible for any cutouts, countertops, or furniture made without the actual product or template from LACAVA. Differences in color, grain, appearance and texture are inherent in all natural woodwork, and should be expected. Variances in these qualities are not deemed manufacturing defects, and will not be accepted as valid reasons to return or exchange any LACAVA woodwork. Plumbing specifications are only a guideline and may need to be altered based on the application.

Product specifications are not binding to the manufacturer and can be changed without notice at any time. Please refer to your shipment for product final sizes.

LACAVA is committed to the highest level of customer service. Please feel free to contact us at 1-888-522-2823 (toll free) or by email at info@lacava.com for technical assistance or any general inquiries.

Rev. 07-03-2017

# # M063



Click to open image

## # M063

Add to my folder

Surface-mount medicine cabinet with mirrored door, two adjustable glass shelves and LED lights in cubby.

<b>STANDARD</b>	\$1,750.00	W: 23"
(//www.lacava.com/finish.html#STANDARD)		D: 5"
<b>PREMIUM</b>	\$2,120.00	H: 34"
(//www.lacava.com/finish.html#PREMIUM)		
<b>LUXURY</b>		
(//www.lacava.com/pdfs/M063.pdf)		
(//www.lacava.com/finish.html#LUXURY)		

SPECS (pdf)

**FINISH: 07-NATURAL WALNUT**



36" Flush-Mounted  
Gas Cooktop

KM 2355



# 36" Flush-Mounted Gas Cooktop

## KM 2355



### KM 2355 FEATURES

- 5 completely sealed burners:
  - (1) 650 – 3,900 BTU Auxiliary burner
  - (2) 1,100 – 6,000 BTU Normal burner
  - (1) 1,800 – 9,500 BTU High Speed burner
  - (1) 700 – 15,000 BTU Double-inset super burner
- Flush mounted gas cooktop
- Dishwasher-safe ComfortClean grates
- Center controlled with stainless steel knobs
- Ignition safety control

### SPECIFICATIONS

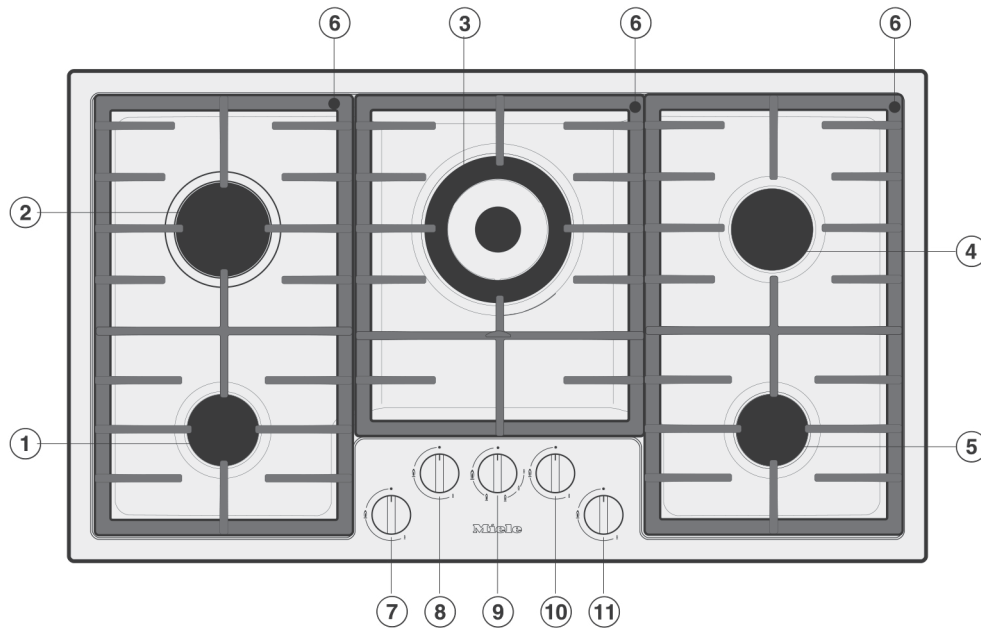
<b>KM 2355 G Cooktop</b>	<b>Item #26235560USA</b>
<b>KM 2355 LP Cooktop</b>	<b>Item #26235561USA</b>
Unit Width	35 <sup>1</sup> / <sub>8</sub> " (892 mm)
Unit Height (To Gas Connection)	4 <sup>1</sup> / <sub>16</sub> " (102 mm)
Unit Depth	20 <sup>3</sup> / <sub>16</sub> " (512 mm)
<b>Niche Dimensions</b>	
Cut-out Dimensions	22 <sup>1</sup> / <sub>16</sub> " (560 mm) W x 19 <sup>5</sup> / <sub>16</sub> " (490 mm) D
Minimum Back Spacing From Wall	2" (50 mm)
Minimum Countertop Thickness	1 <sup>1</sup> / <sub>8</sub> " (29 mm)
Minimum Recommended Distance to Ventilation Hood	30" (760 mm)
<b>Gas Burners</b>	
Auxiliary Burner	3,900 BTU (G), 3,000 BTU (LP)
Normal Burner	5,900 BTU (G), 6,000 BTU (LP)
High-Speed Burner	9,800 BTU (G), 9,500 BTU (LP)
Double-Insert Super Burner	13,000 BTU (G), 15,000 BTU (LP)
Total Maximum BTU Output	38,500 BTU (G), 39,500 BTU (LP)
<b>Gas</b>	
Gas Connection	1/2" NPT
Maximum Gas Supply Pressure	Natural Gas - 14" WC (34.9 mb), 1/2 psi (3.5 kPa) LP Gas - 14" WC (34.9 mb), 1/2 psi (3.5 kPa)
Minimum Gas Supply Pressure	Natural Gas - 6" WC (15 mb) LP Gas - 10" WC (25 mb)
<b>Shipping</b>	
Shipping Weight	51.8 lbs (23.5 kg)
Shipping Dimensions	41 <sup>5</sup> / <sub>16</sub> " W x 9" H x 25 <sup>5</sup> / <sub>8</sub> " L
<b>Notes</b>	
Not intended for use with Miele DA 6480 and DA 6490 Downdraft hoods.	
<b>Support</b>	
Call Miele	800.843.7231
Miele Website	<a href="http://www.mieleusa.com">www.mieleusa.com</a>
20/20 Link	<a href="http://2020technologies.com">2020technologies.com</a>



# 36" Flush-Mounted Gas Cooktop KM 2355

## PRODUCT LAYOUT

Top View



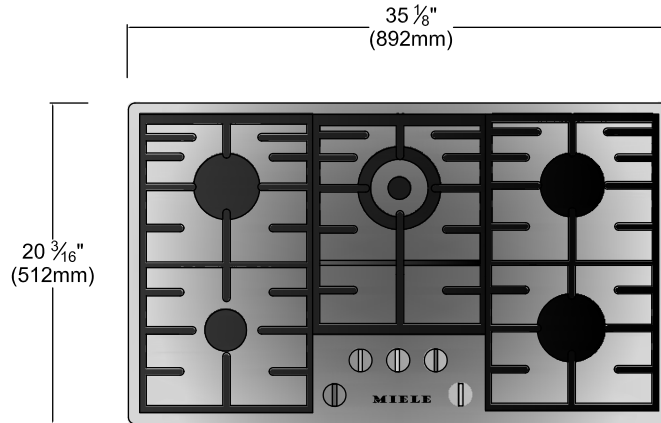
- ① Auxiliary burner
- ② High-speed burner
- ③ Double-insert super burner
- ④ Normal burner
- ⑤ Normal burner
- ⑥ Grate (three pieces)

- Controls:
- ⑦ Front left
  - ⑧ Back left
  - ⑨ Middle
  - ⑩ Back right
  - ⑪ Front right

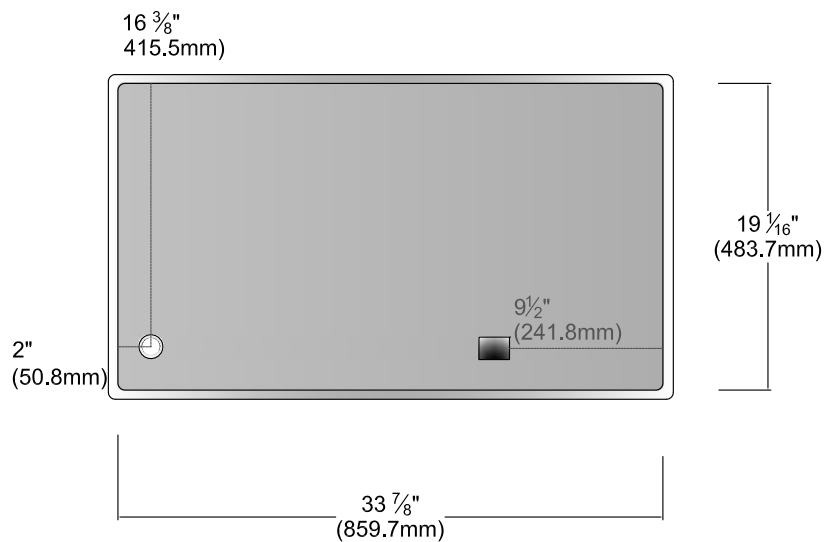
# 36" Flush-Mounted Gas Cooktop KM 2355

## PRODUCT VIEWS

Top View



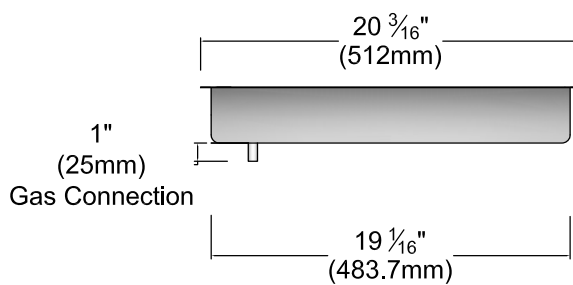
Bottom View



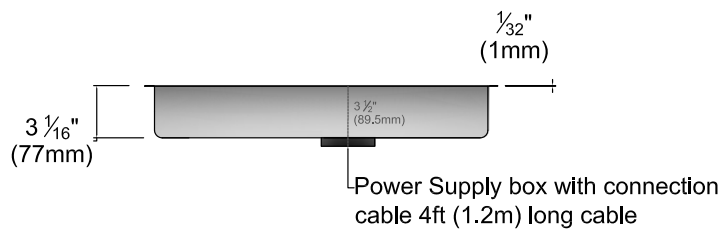
# 36" Flush-Mounted Gas Cooktop KM 2355

## PRODUCT VIEWS

Left View

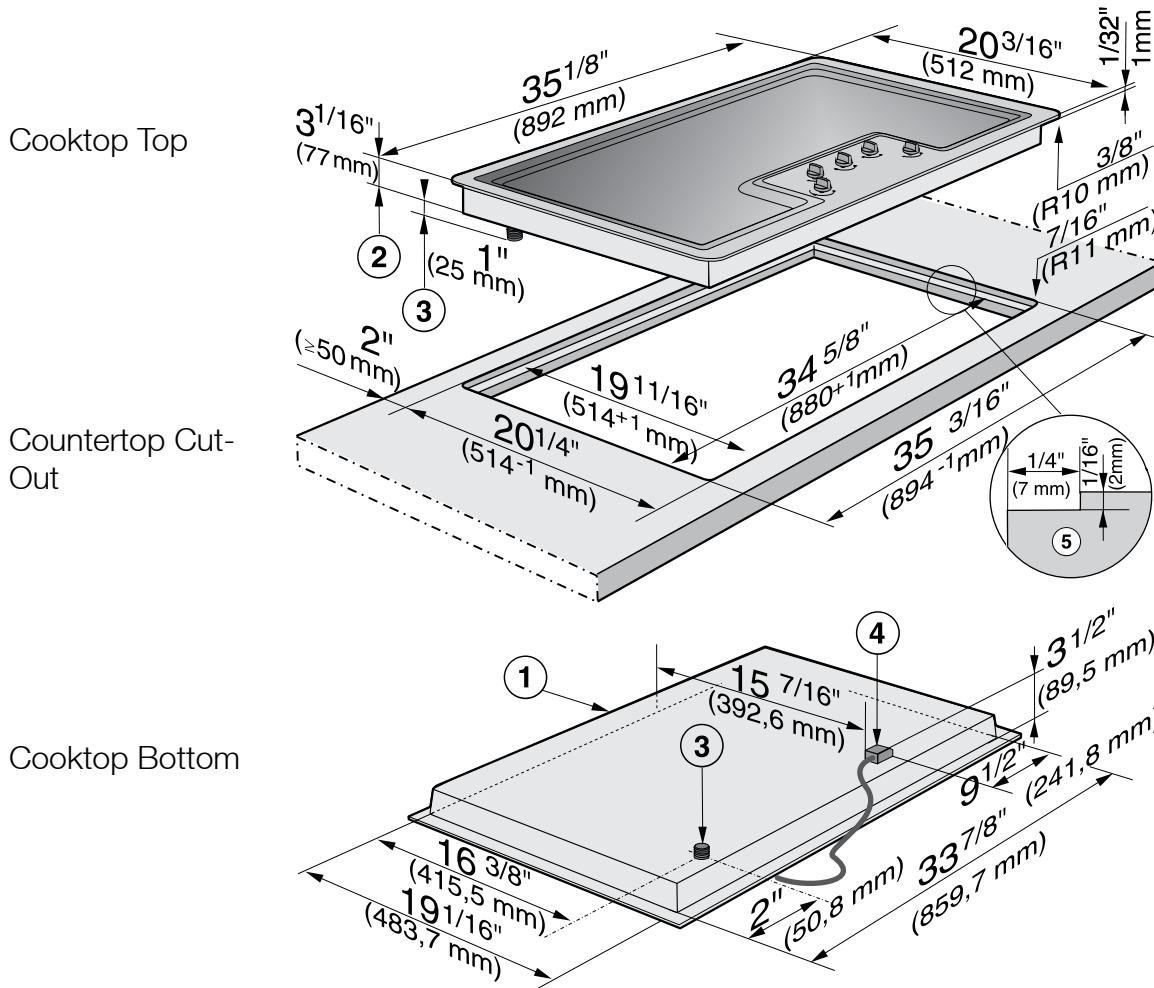


Right View



# 36" Flush-Mounted Gas Cooktop KM 2355

## INSTALLATION DIMENSIONS

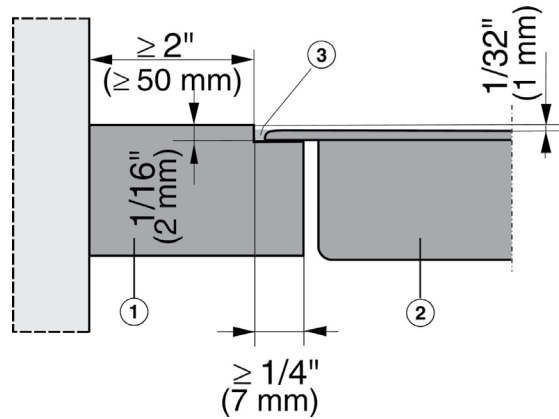


- ① Appliance front
- ② Installation height
- ③ Gas connection
- ④ Power supply box with connection cable, L = 4 ft (1.2 m)

# 36" Flush-Mounted Gas Cooktop KM 2355

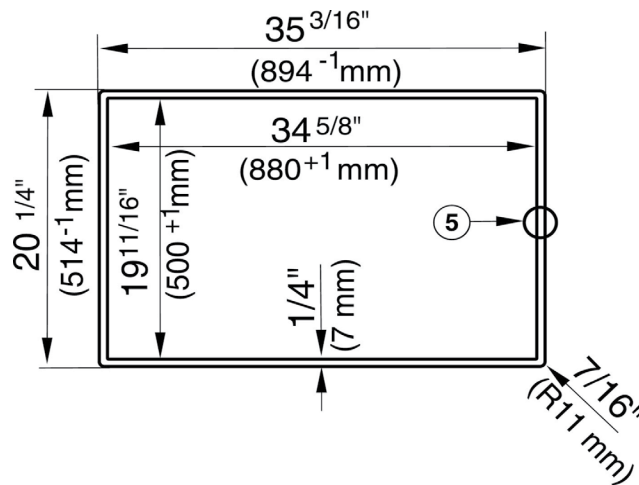
## INSTALLATION SAFETY CLEARANCE

Front Side View Of Flush Mount  
Installation With Granite, Marble,  
Or Solid Surface Countertops



- ① Countertop
- ② Cooktop
- ③ Gap

As the ceramic glass and the countertop cut-out have a certain dimensional tolerances, the size of gap ③ can vary.

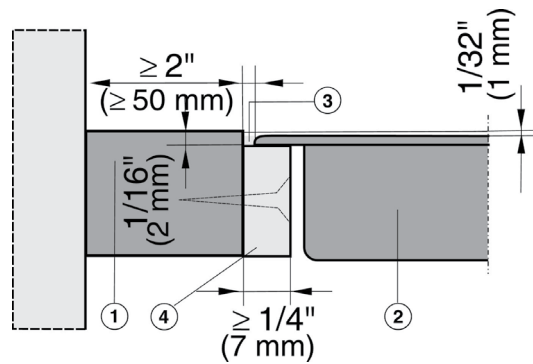


- ⑤ Stepped cut-out for granite or marble worktops

# 36" Flush-Mounted Gas Cooktop KM 2355

## INSTALLATION SAFETY CLEARANCE

Front Side View Of Flush Mount  
Installation for Solid Wood, Tiled, Or  
Glass Countertops



- ① Countertop
- ② Cooktop
- ③ Gap
- ④ Wooden frame 1/4" (7 mm)  
(to be provided on site)

As the ceramic glass and the countertop cut-out have a certain dimensional tolerance, the size of gap ③ can vary.

# 36" Flush-Mounted Gas Cooktop KM 2355

## KM 2355 G/LP GAS COOKTOP INSTALLATION IN COMBINATION WITH UNDERCOUNTER 30" MIELE OVEN H6x80BP

### Countertop Thickness vs. Toekick Height

Taken into consideration:

- 35" tall cabinetry
- Gas pressure regulator mounted on back wall or in adjacent cabinetry
- 90 degree street elbow used on bottom of cooktop
- Cooktop is flush mounted
- 3/4" (exact) platform thickness under oven/above toekick

		Toekick Height										
		3 1/2	3 3/4	4	4 1/4	4 1/2	4 3/4	5	5 1/4	5 3/4	6	
Countertop Thickness	1 1/8	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	1 1/4	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	1 1/2	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	1 3/4	OK	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	2	OK	OK	NA	NA	NA	NA	NA	NA	NA	NA	NA
	2 1/4	OK	OK	OK	NA	NA	NA	NA	NA	NA	NA	NA

= Typical Installation

# 36" Built-In Wall Cabinet Hood

DA 3496





# 36" Built-In Wall Cabinet Hood

## DA 3496



### Features:

- Straight stainless steel canopy
- Updated backlit controls
- Sound improved runners
- Designed for vented or recirculated use
- For wall cabinet installation
- Removable, dishwasher-safe stainless steel filters
- Expandable fume deflector
- Front mounted controls for lights and 4 fan speeds
- Polished stainless steel logo
- Automatic shut-off of intensive level, programmable for 10 minutes
- Automatic activation when fume deflector is expanded
- Integrated LED ClearView lighting

### SPECIFICATIONS

DA 3496 — Item 28349655USA

Overall Unit Width	35 <sup>1</sup> / <sub>4</sub> " (895 mm)
Overall Unit Height	15 <sup>1</sup> / <sub>16</sub> " (384 mm)
Unit Depth Retracted	10 <sup>13</sup> / <sub>16</sub> " (275 mm)
Unit Depth Extended	16 <sup>3</sup> / <sub>4</sub> " (425 mm)
<b>Built-In</b>	
Minimum Opening Width	33 <sup>5</sup> / <sub>16</sub> " (862 mm)
Minimum Opening Depth	11 <sup>5</sup> / <sub>8</sub> " (295 mm)
Minimum Opening Height (Vented)	16 <sup>15</sup> / <sub>16</sub> " (430 mm)
Minimum Opening Height (Recirculation)	21 <sup>5</sup> / <sub>8</sub> " (550 mm)
<b>Custom Front Panel (Optional)</b>	<b>DML 400 kit is required</b>
Maximum Panel Thickness	1" (30 mm)
Maximum Panel Weight	2 3/4" lbs (1.3 kg)
<b>Fan</b>	
Fan Speeds	4
Maximum CFM	625 CFM, (Reducing Collar is available to reduce Air flow to less than 400 CFM, more information on page 8)
<b>Duct</b>	
Duct Diameter	6" (150 mm)
<b>Electrical</b>	
Electrical Requirements	120V, 60Hz, 15A
Power Cord	Molded NEMA 5-15 plug, 2.5 ft (0.75 m)
<b>Shipping</b>	
Shipping Weight	37 lbs
Shipping Dimensions	37 <sup>7</sup> / <sub>16</sub> " W x 20 <sup>1</sup> / <sub>2</sub> " H x 14" D
<b>Support</b>	
Call Miele	800.843.7231
Miele Website	<a href="http://www.mieleusa.com">www.mieleusa.com</a>
20/20 Link	<a href="http://2020technologies.com">2020technologies.com</a>

### Optional Accessories:



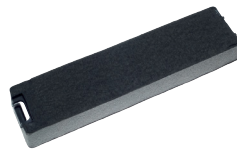
DUU 150

Recirculation kit for straight ductwork



DUU 151

Recirculation kit for curved or bending ductwork



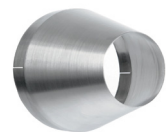
DKF13-1

OdorFree Charcoal filter required accessory for recirculation mode



DML 400

Installation kit for custom cabinetry

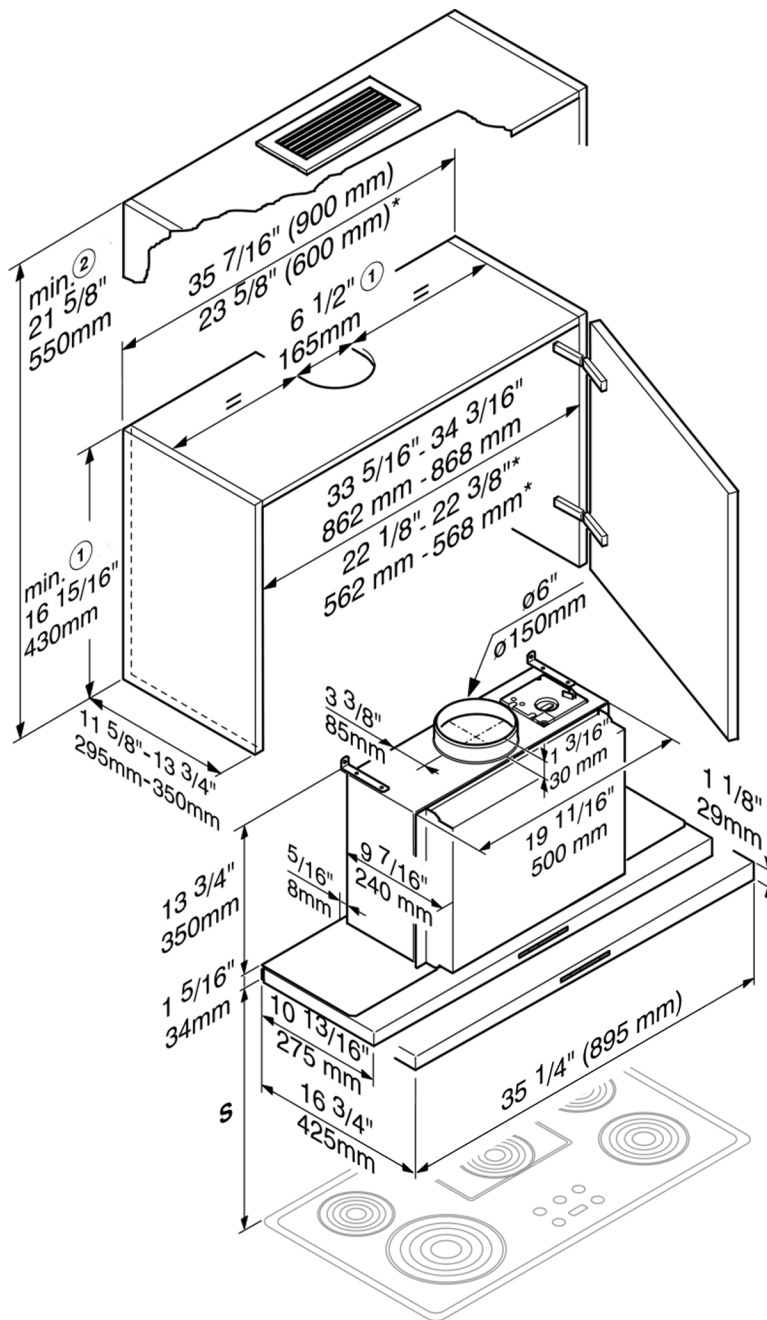


Reducing collar

Reducing collar limits air flow to less than 400 CFM

# 36" Built-In Wall Cabinet Hood DA 3496

## INSTALLATION SPECIFICATIONS



① Vented mode; consider accessories when measuring cabinet height and cut-outs (e.g. muffler).

② Recirculation mode with conversion kit DUU 151. (More information on page 7)

\* The ventilation hood can also be installed in a 23 5/8" (600 mm) wide unit

\* The front of the fume deflector can be fitted with a front panel to match existing cabinetry. A DML 400 installation kit is required to install front panel to hide control panel.

# 36" Built-In Wall Cabinet Hood

## DA 3496



### INSTALLATION SPECIFICATIONS

#### Distance Between Cooktop and Ventilation Hood (S)

Provided a larger distance is not given by the manufacturer of the cooktop, follow the minimum safety distances between a cooktop and the bottom of the hood.

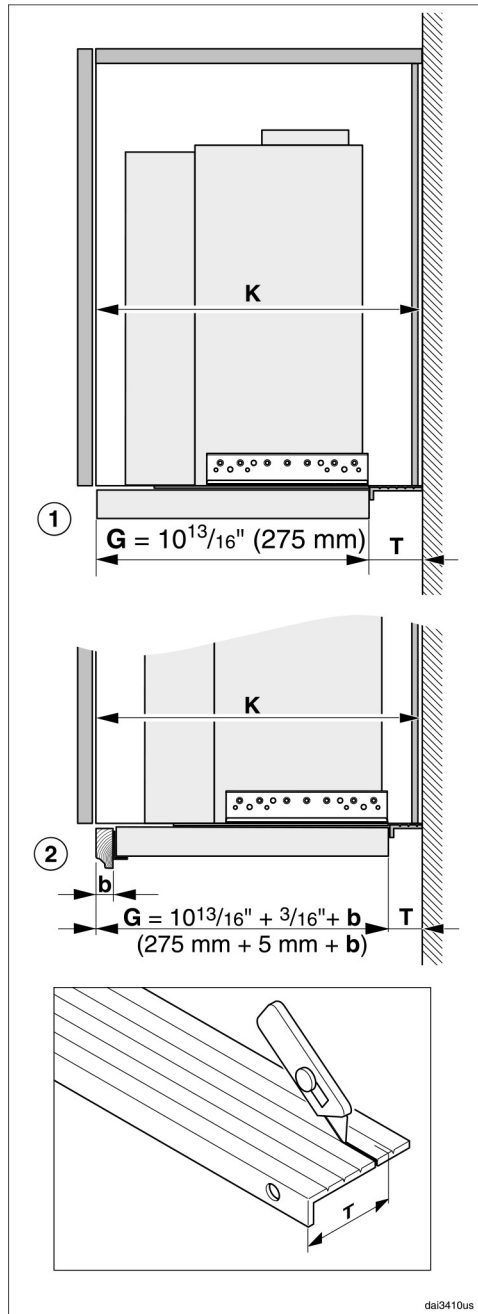
Please also observe the information contained in the "IMPORTANT SAFETY INSTRUCTIONS" section of the manual.

Cooking appliance	Minimum distance S	
	Miele products	Non-Miele products
Electric Cooktops	24" (610 mm)	
Electric Barbeques and Fryers	26" (660 mm)	
Multiburner Gas Cooktops ≤ 43,000 BTU/hr (12.6 W), no burner > 15,000 BTU/hr (4.5 kW).	26" (660 mm)	30" (760 mm)
Multiburner Gas Cooktops ≤ 73,800 BTU/hr (21.6 W), no burner > 16,500 BTU/hr (4.8 kW)	30" (760 mm)	
Multiburner Gas Cooktops > 73,800 BTU/hr (21.6 W), or one of the burners > 16,500 BTU/hr (4.8 kW)	Not possible	
Single Burner Gas Cooktops ≤ 20,500 BTU/hr (6 kW)	26" (660 mm)	30" (760 mm)
Single Burner Gas Cooktops > 20,500 BTU/hr (6 kW) ≤ 27,600 BTU/hr (8.1 kW)	30" (760 mm)	
Single Burner Gas Cooktops > 27,600 BTU/hr (8.1 kW)	Not possible	

If you are installing a front panel made of wood or plastic to the hood, observe the safety distances given by the cooktop manufacturer regarding the use of easily flammable materials.

# 36" Built-In Wall Cabinet Hood DA 3496

## INSTALLATION SPECIFICATIONS Cabinetry Depth Details



- ① Example: Installation without a front panel installed and with the front edge of the fume deflector flush with the front edge of the cabinetry.
- ② Example: Installation with a front panel to match the cabinetry This installation requires dimension **b** for the front panel plus  $\frac{3}{16}''$  (5 mm) for the DML 400 fixing bracket to be added to the shelf dimension.

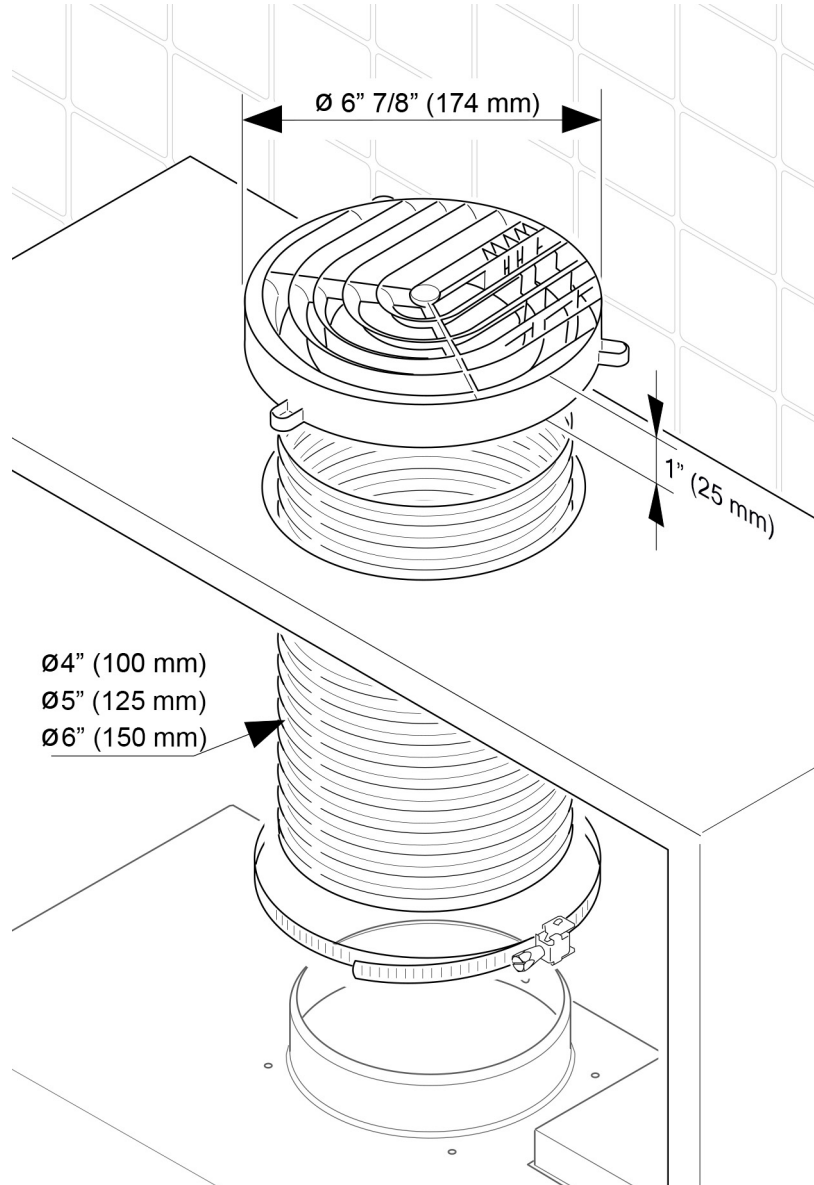
To position the hood correctly, cut the spacer strip to the required depth **T** and then attach it to the back of the appliance:

**T** = Depth of cabinetry **K** minus depth of appliance **G**

- Cut the spacer strip supplied to measurement **T**. Score along the groove for the **next smaller** measurement as shown, and remove any extra.

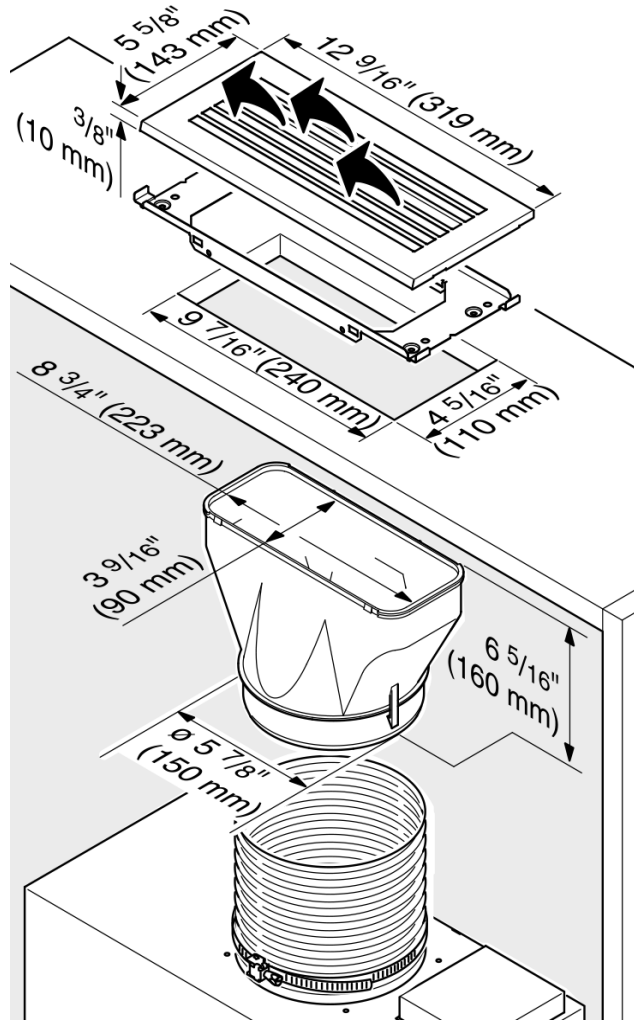
# 36" Built-In Wall Cabinet Hood DA 3496

Recirculation Kit DUU 150  
(Optional accessory)



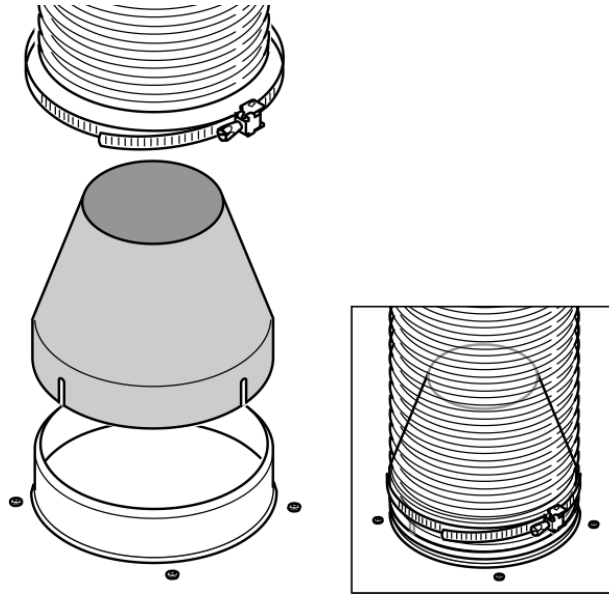
# 36" Built-In Wall Cabinet Hood DA 3496

Recirculation Kit DUU 151  
(Optional accessory)



# 36" Built-In Wall Cabinet Hood DA 3496

## Reducing Collar (optional accessory)



If you would like to reduce the environmental impact of your ventilation system by limiting the CFM output the Reducing Collar can be installed. It reduces the air flow to less than 400 CFM. Check local building codes for maximum CFM requirements.



## Kubista Vanity Item #H263L/R

**ITEM #H263RNT**

### Features:

- Wall-mount wooden vanity
- Three drawers with routed finger pulls
- Soft-closing full-extension drawer slides with weight capacity of 100 lbs.
- Wooden mounting cleat
- ~~-Metal trims between each drawer~~
- Large drawers has lower back for plumbing
- Washbasin #H263LT, **H263RT** sold separately
- Customizable (please request a quote)
- Handmade in USA
- Manufactured with low VOC finishes and wood from renewable forests

### Recommended Accesories:

- Item #H263LT: Solid surface washbasin with overflow
- Requires standard American grid drain with overflow (i.e. 7100-18OF)
- Available in Gloss White (-001G) or **Matte White (-001M)**
- Faucet hole options available: None, One, or Three in 8" spread

### Options:

- Item #H263L: large drawer on the left (shown), pairs with lavatory #H263LT
- Item #H263R: large drawer on the right, pairs with lavatory #H263RT

### Finish Options:

- 01 - Natural Maple
- 02 - Natural Cherry
- 03 - Mahogany
- 06 - Wenge
- 07 - Natural Walnut**
- 08 - White (TEX1 - fine texture, TEX2 - medium texture)
- 15 - Natural Zebra
- 16 - Black (TEX1 - fine texture, TEX2 - medium texture)
- 17 - Caramel Bamboo
- 18 - Ebony
- 20 - Ash Gray
- 22 - Gray Zebra
- 23 - Gray Ebony
- 24 - Classic Walnut
- 25 - Honey Oak
- 26 - Chocolate Bamboo
- 32 - Maron
- 34 - Mocha
- 35 - Ardesia
- 38 - Nebbia
- 45 - Sapele
- 52 - Silver Oak
- 85 - Gloss White

### Notes:

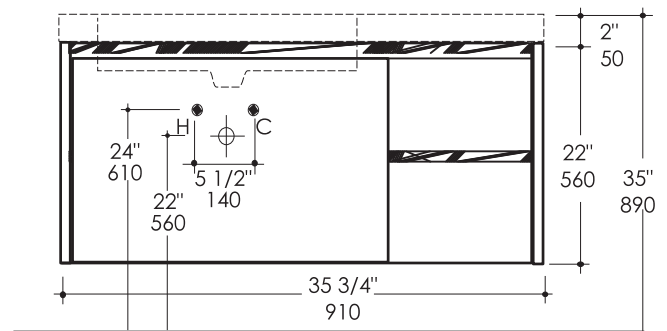
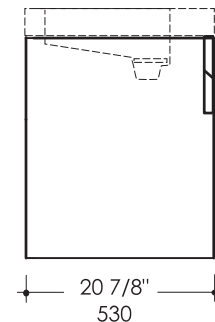
Drawings provided herein are meant to give the user an idea of the product and are not made to scale. The size in inches is rounded up to the nearest 1/16". Slight variances can often occur with porcelain and woodwork. Therefore, LACAVA will not be held responsible for any cutouts, countertops, or furniture made without the actual product or template from LACAVA. Differences in color, grain, appearance and texture are inherent in all natural woodwork, and should be expected. Variances in these qualities are not deemed manufacturing defects, and will not be accepted as valid reasons to return or exchange any LACAVA woodwork. Plumbing specifications are only a guideline and may need to be altered based on the application.

LACAVA is committed to the highest level of customer service. Please feel free to contact us at 1-888-522-2823 (toll free) or by email at info@lacava.com for technical assistance or any general inquiries.

Rev. 9-18-2015



### Product Specifications:





## Nuda Storage Cabinet Item #5075

### Features:

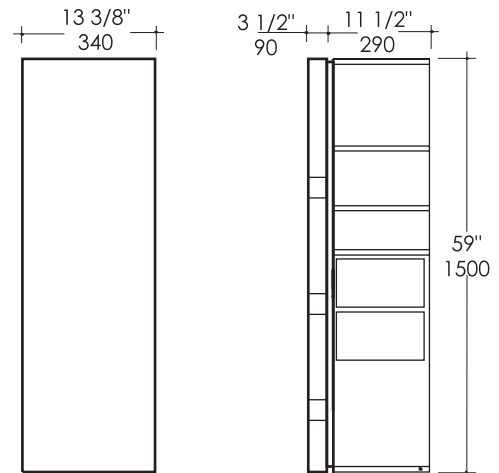
- Wall-mounted tall wooden storage cabinet
- One door with three stainless steel pocket shelves.
- Three adjustable shelves, two internal drawers, and one fixed shelf
- Soft close drawer slides and wooden mounting cleat
- Concealed European hinges, specify R for hinges on right and L for hinges on left
- Door must have 5" clearance on hinge side to open properly
- Customizable (please request a quote)
- Handmade in USA
- Manufactured with low VOC finishes and wood from renewable forests



### Finish Options:

- 01 - Natural Maple
- 02 - Natural Cherry
- 03 - Mahogany
- 04 - Wenge
- 07 - Natural Walnut
- 08 - White (TEX1 - fine texture, TEX2 - medium texture)
- 15 - Natural Zebra
- 16 - Black (TEX1 - fine texture, TEX2 - medium texture)
- 17 - Caramel Bamboo
- 18 - Ebony
- 20 - Ash Gray
- 22 - Gray Zebra
- 23 - Gray Ebony
- 24 - Classic Walnut
- 25 - Honey Oak
- 26 - Chocolate Bamboo
- 45 - Sapele
- 52 - Silver Oak
- 85 - Gloss White
- 86 - Gloss Black

### Product Specifications:



### Notes:

Drawings provided herein are meant to give the user an idea of the product and are not made to scale. The size in inches is rounded up to the nearest 1/16". Slight variances can often occur with porcelain and woodwork. Therefore, LACAVA will not be held responsible for any cutouts, countertops, or furniture made without the actual product or template from LACAVA. Differences in color, grain, appearance and texture are inherent in all natural woodwork, and should be expected. Variances in these qualities are not deemed manufacturing defects, and will not be accepted as valid reasons to return or exchange any LACAVA woodwork. Plumbing specifications are only a guideline and may need to be altered based on the application.

LACAVA is committed to the highest level of customer service. Please feel free to contact us at 1-888-522-2827 (toll free) or by email at [info@lacava.com](mailto:info@lacava.com) for technical assistance or any general inquiries.

**Fully Integrated  
36" Bottom Mount**

KF 1913 Vi / KF 1903 Vi



# Fully Integrated 36" Bottom Mount KF 1913 Vi / KF 1903 Vi



## Features:

- MasterCool controls
- ClearView lighting system
- Drop and Lock Shelves
- SmartFresh storage drawers
- FullView storage drawers
- Ice maker
- RemoteVision capable
- Acoustic door and temperature alarm
- Optical door and temperature alarm
- Energy Star

## SPECIFICATIONS

F 1903 Vi — Item 37190301USA - Right Hinged

F 1913 Vi — Item 37191301USA - Left Hinged

Overall Unit Width 35<sup>3</sup>/<sub>4</sub>" (908 mm)

Overall Unit Height 83<sup>1</sup>/<sub>2</sub>" - 85<sup>3</sup>/<sub>16</sub>" (2121 mm - 2165 mm)

Overall Unit Depth 24" (610 mm)

### Niche

Minimum Cabinet Opening Width 36" (915 mm)

Minimum Cabinet Opening Height 83<sup>5</sup>/<sub>8</sub>" (2124 mm)

Minimum Cabinet Opening Depth 25" (635 mm)\*

### Plumbing

**Water Supply Requirements**  
Connect to a cold water supply only. Must be connected to a shut-off valve. The water shut-off valve must be accessible after installation. The water pressure must be between 25 psi (1.7 bar) and may not exceed 80 psi (5.5 bar). If the pressure is higher than 80 psi (5.5 bar), a pressure reducing valve must be installed.

**Water Connection Line**  
Standard 1/4" O.D flexible water line. The maximum outer diameter of the water pipe (without fittings): 3/8" (10 mm). Water line is not included.

### Electrical

**Electrical Requirements - Volts/Amps**  
110V / 120V, 60Hz, 15 Amps  
In the case of side-by-side installations, a separate outlet must be used for each appliance.

**Power Cord - Plug and length**  
NEMA 5-15 plug, 5 ft (1.52 m)

**Custom Panel**  
Please refer to the manual for further details.

**Maximum Panel Weight**  
Upper door - 84 lbs (38 kg)  
Lower door - 31 lbs (14 kg)

**Maximum Panel Thickness**  
1<sup>1</sup>/<sub>2</sub>" (38 mm)

**Minimum Panel Thickness**  
3/4" (19 mm)

### Shipping

**Shipping Weight**  
511.6 lbs (232 kg)

**Shipping Dimensions**  
39<sup>1</sup>/<sub>2</sub>" W x 89<sup>13</sup>/<sub>16</sub>" H x 29<sup>1</sup>/<sub>4</sub>" D

### Support

**Call Miele**  
800.843.7231

**Miele Website**  
[www.mieleusa.com](http://www.mieleusa.com)

**20/20 Link**  
[2020technologies.com](http://2020technologies.com)

### Please note:

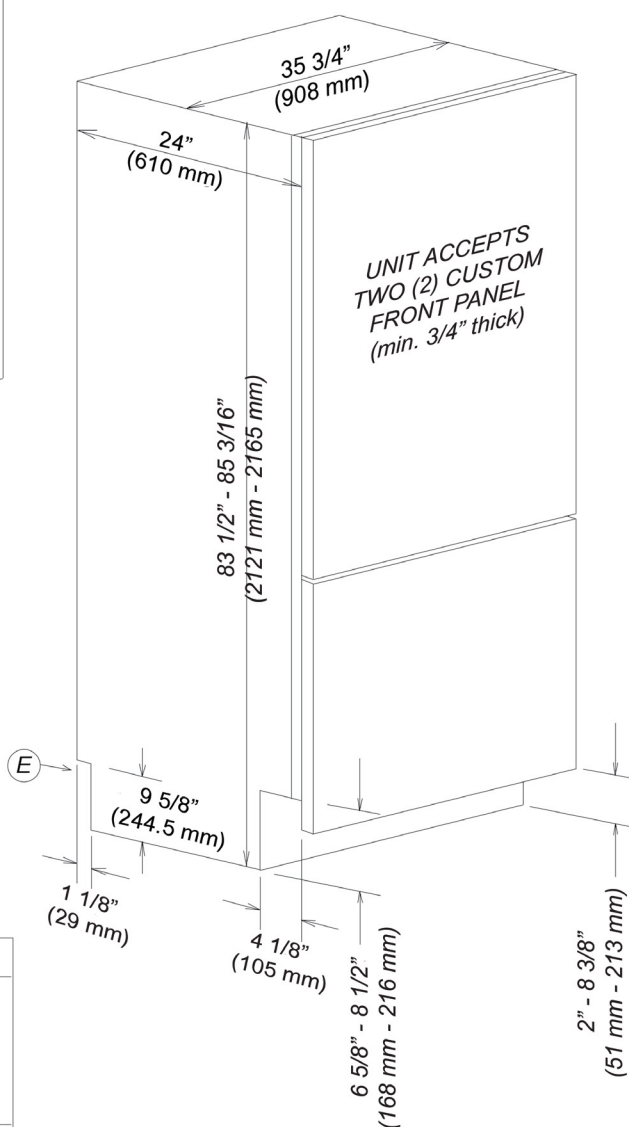
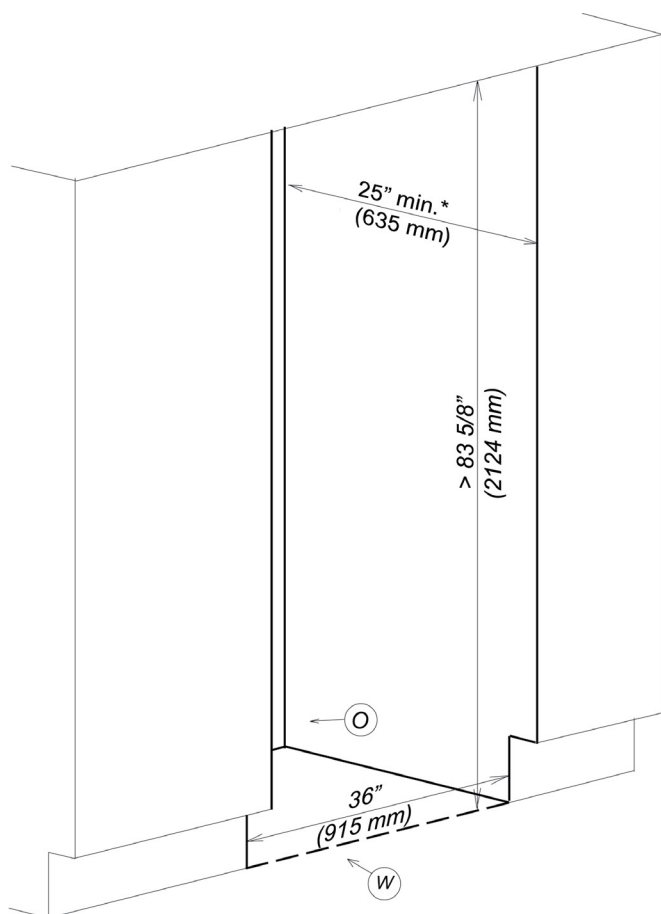
This specification sheet is for a single built-in unit.

When combining multiple MasterCool units side-by-side, please refer to the Merging Kit specification sheet.



# Fully Integrated 36" Bottom Mount KF 1913 Vi / KF 1903 Vi

FOR FLUSH INSTALLATION



\* Niche depth assumes a 3/4" (19 mm) panel, please adjust according to custom panel thickness

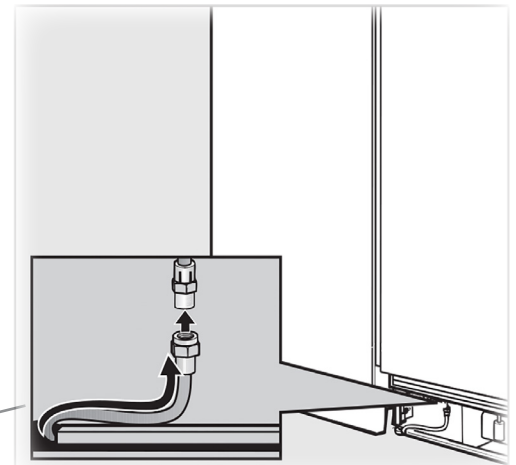
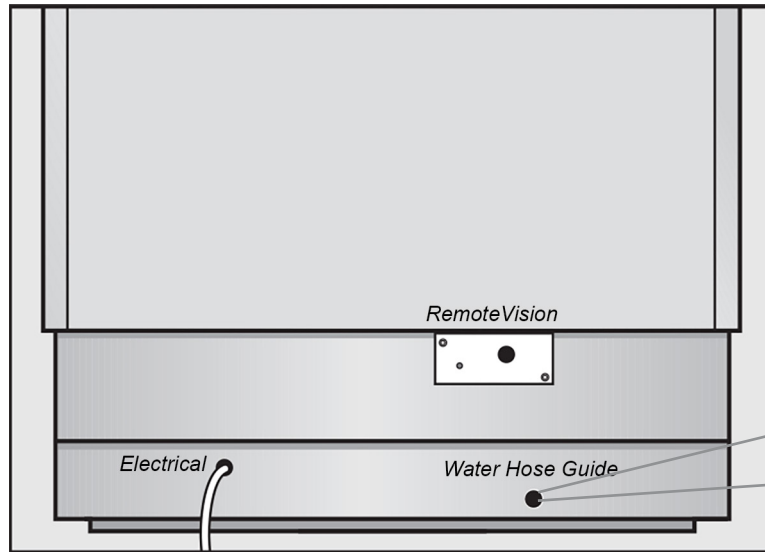
Location Codes
E - 5 foot - 120 Volt - 15 Amp 3-wire molded plug power supply connects lower left rear
O - Standard NEMA 5-15 Outlet - locate less than 9" above finished floor
W - 1/4" flexible water line - not included
Notes
<ul style="list-style-type: none"> <li>All Installations must be done in accordance with local codes</li> <li>Sides of adjoining cabinets should be filled (flush to frame) to insure proper fit and finish</li> <li>For side-by-side installation - Niche depth under 26" (660 mm) will require the location of the Electrical outlet(s) to be in adjacent cabinetry</li> </ul>

# Fully Integrated 36" Bottom Mount KF 1913 Vi / KF 1903 Vi



#39 & #40

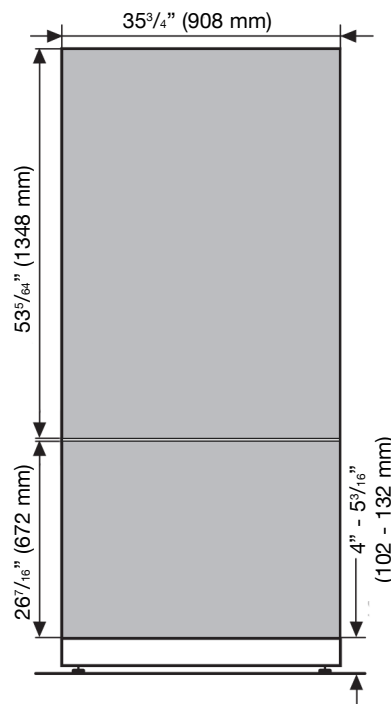
## POWER SUPPLY AND WATER CONNECTION BACK VIEW



Water connection is located in front of unit.  
1/4" compression fitting is needed.

Electrical - 5 foot (1.52 m) - 120 Volt - 15 Amp - NEMA 5-15 molded plug  
Water line - 1/4" flexible water line - not included

## SS DOOR PANEL DIMENSIONS (Available as an accessory)

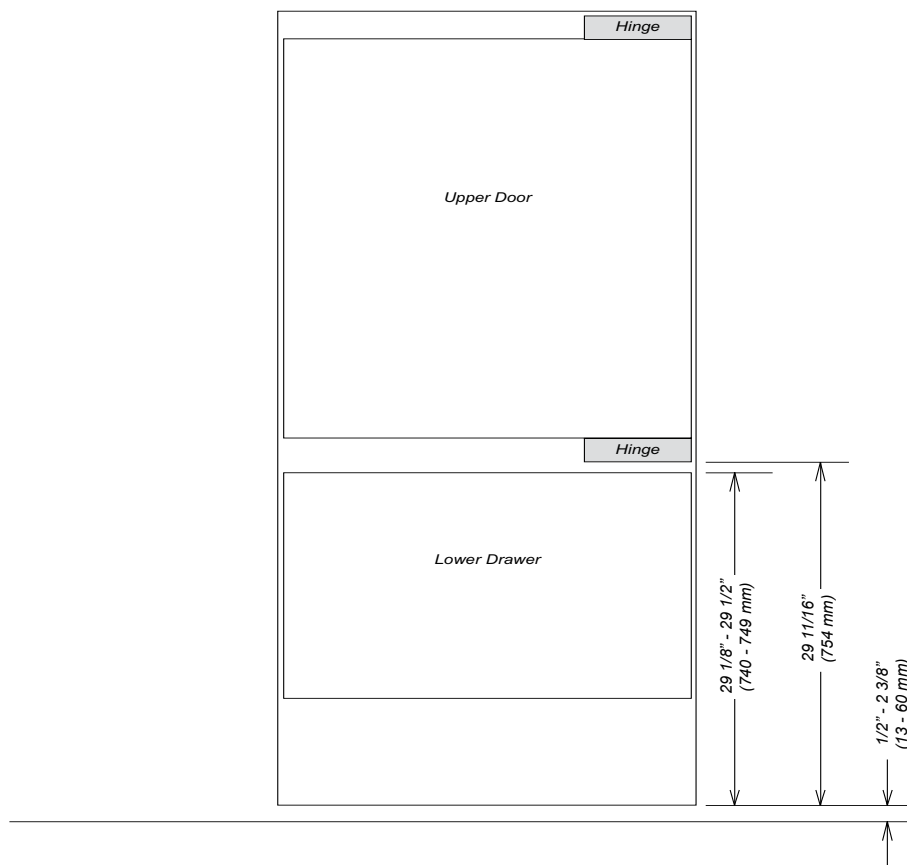


# Fully Integrated 36" Bottom Mount KF 1913 Vi / KF 1903 Vi



#39 & #40

## LOWER HINGE LOCATION



# Fully Integrated 36" Bottom Mount KF 1913 Vi / KF 1903 Vi

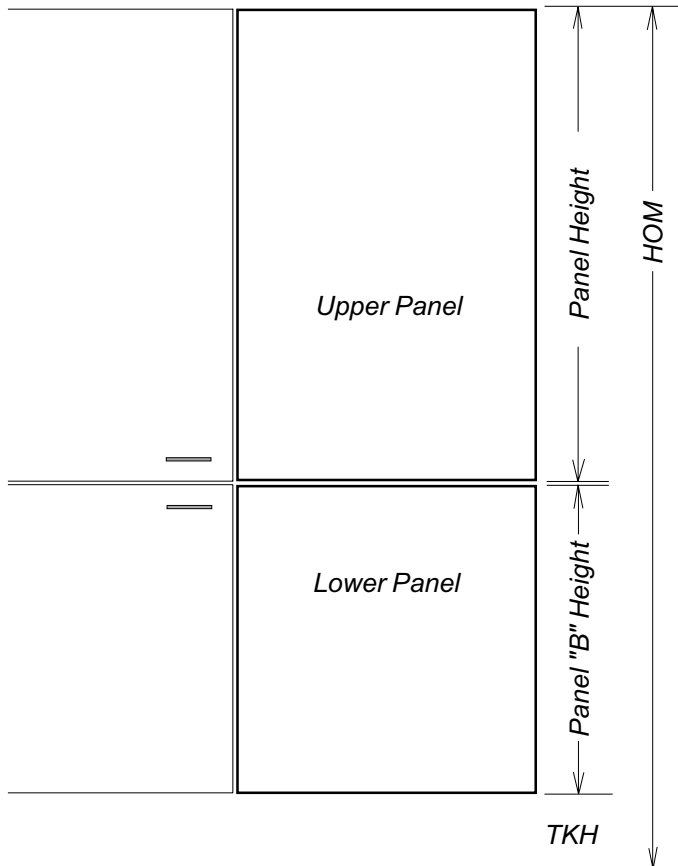


#39 & #40

## CUSTOM PANEL INSTALLATIONS

**These units do not come equipped with a front panel.** They are designed to accept a custom door panel supplied by the cabinet maker. Miele has a unique panel integration system which allows the panels to align with the surrounding cabinets.

Panel size is determined in the following manner:



**Width:** 35 3/4" (908 mm) in all cases  
**Thickness:** Minimum 3/4" (19 mm) outside frame

**Standard Upper Panel Height:** 53 5/16" (1354 mm)

**Notes:** Finish back side of panels to insure appearance  
 Panel may extend above unit. This is **not** considered in height calculation

**Upper Maximum panel weight:** 84 Pounds

**Lower Panel Height:** Use the following calculation:

**Panel Height =** HOM - 53 9/16" (1360.5 mm) - TKH

**HOM =** Total height of machine. Can be adjusted to match adjoining cabinets - typically 84" (2133 mm).

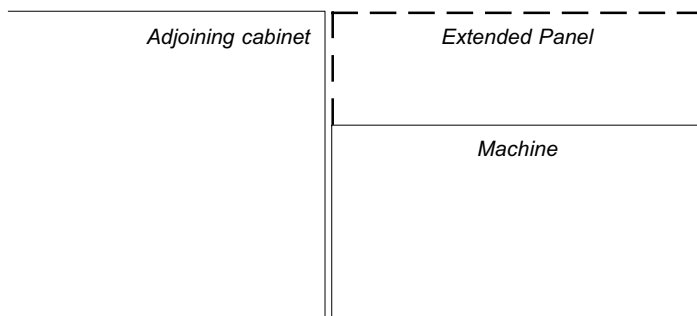
HOM is adjustable between 83 1/2" - 85 3/16" (2121 mm - 2165 mm)

**TKH =** Toe-kick height 2" - 8 3/8" (51 - 212 mm)

**Lower Maximum panel weight:** 31 Pounds

## Upper Panel Notes

If the adjoining cabinets are taller than the height of machine (HOM) - the upper panel may be extended accordingly. Find the difference between height of the adjoining cabinets and the height of machine (HOM) and add to 53 5/16"



**Example:**

Adjoining cabinet height: 87" (2210 mm)  
 Height of machine: 84" (2133 mm)  
 Difference: 3" (76 mm)

Extended panel height: 56 5/16" (1430 mm)

# Fully Integrated 36" Bottom Mount KF 1913 Vi / KF 1903 Vi

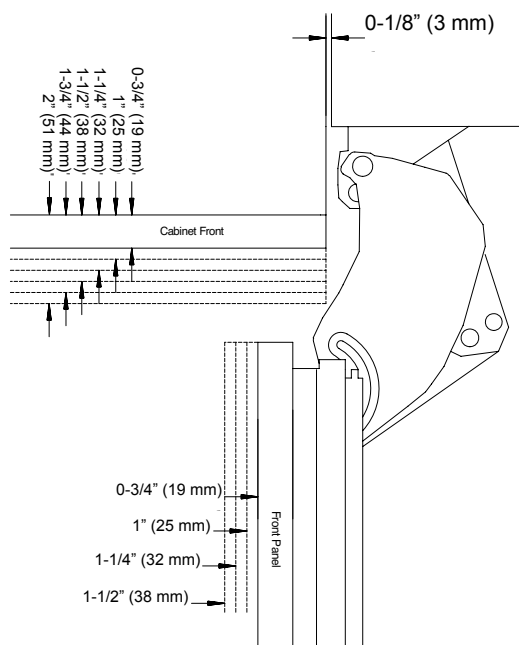


#39 & #40

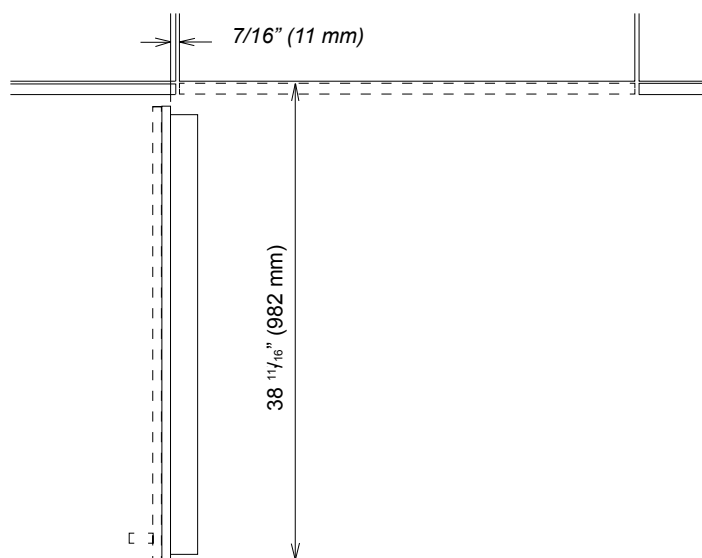
## HINGING DETAILS

### 90° Door

Thickness options



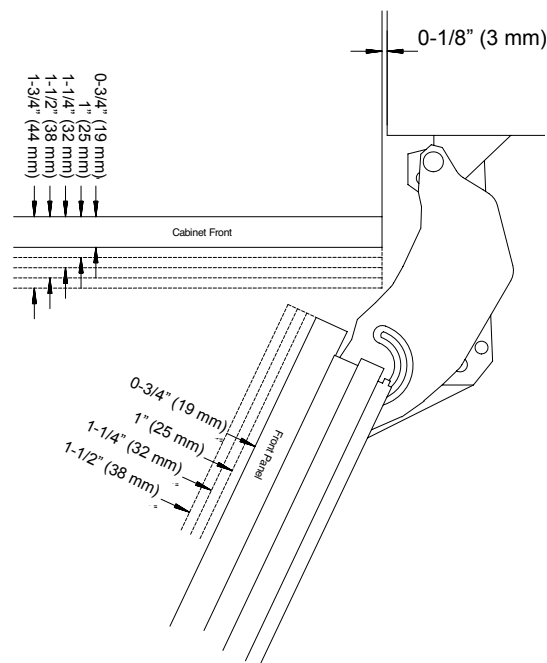
Door Swing



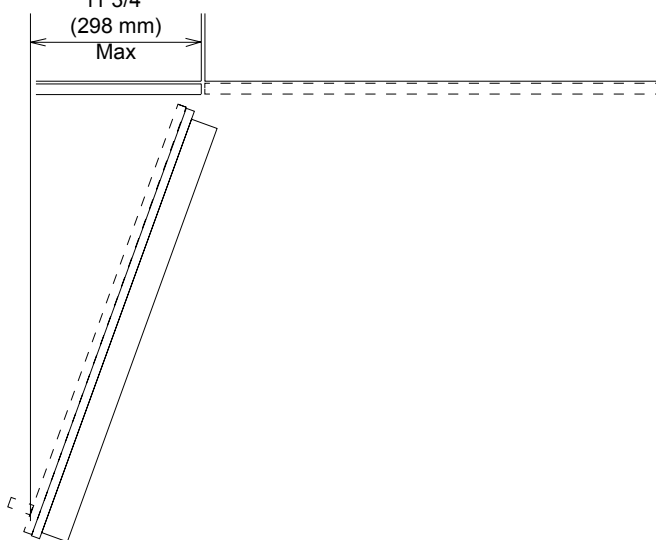
**NOTE:** Additional space needed depending on thickness of front panels and handle used

### 115° Door

Thickness options



Door Swing



**NOTE:** Additional space needed depending on thickness of front panels and handle used

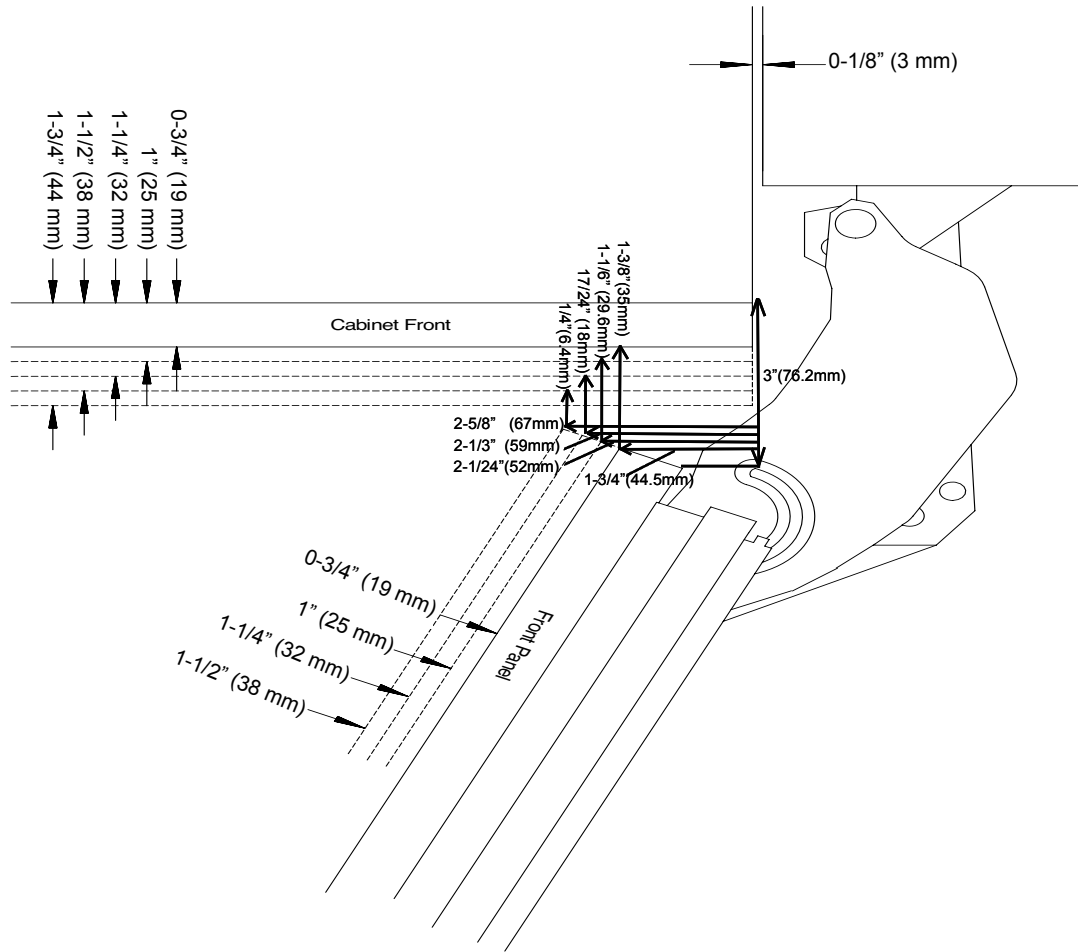


# Fully Integrated 36" Bottom Mount KF 1913 Vi / KF 1903 Vi



#39 & #40

## HINGING DETAILS 115° OPENING

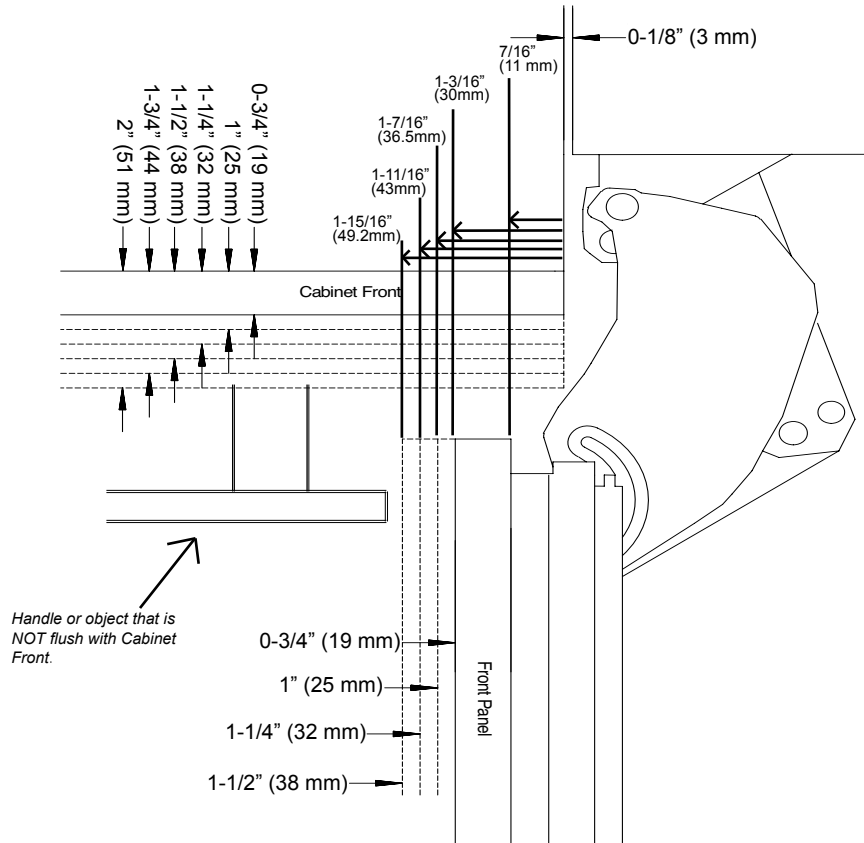


# Fully Integrated 36" Bottom Mount KF 1913 Vi / KF 1903 Vi

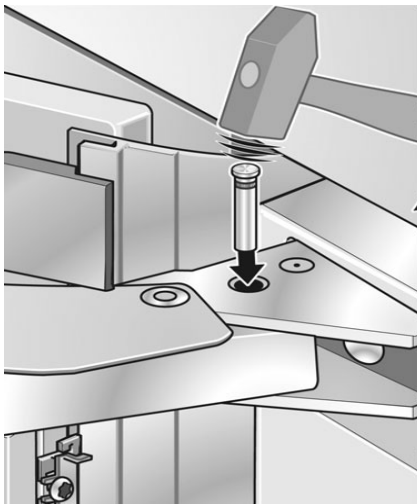


#39 & #40

## HINGING DETAILS 90° OPENING



Handle or object that is NOT flush with Cabinet Front.



When installing hinge side next to an appliance or object that is within range of the door panel, limit the door opening angle to 90°. This is done by installing the banking pin as illustrated. Insert the banking pin through the holes and drive in with a hammer.

## 30" Trim Kit

EBA 6708 MC,

EBA 6808 MC, EBA 6808 MC HVBR,

EBA 6808 MC BRWS, EBA 6808 MC OBSW



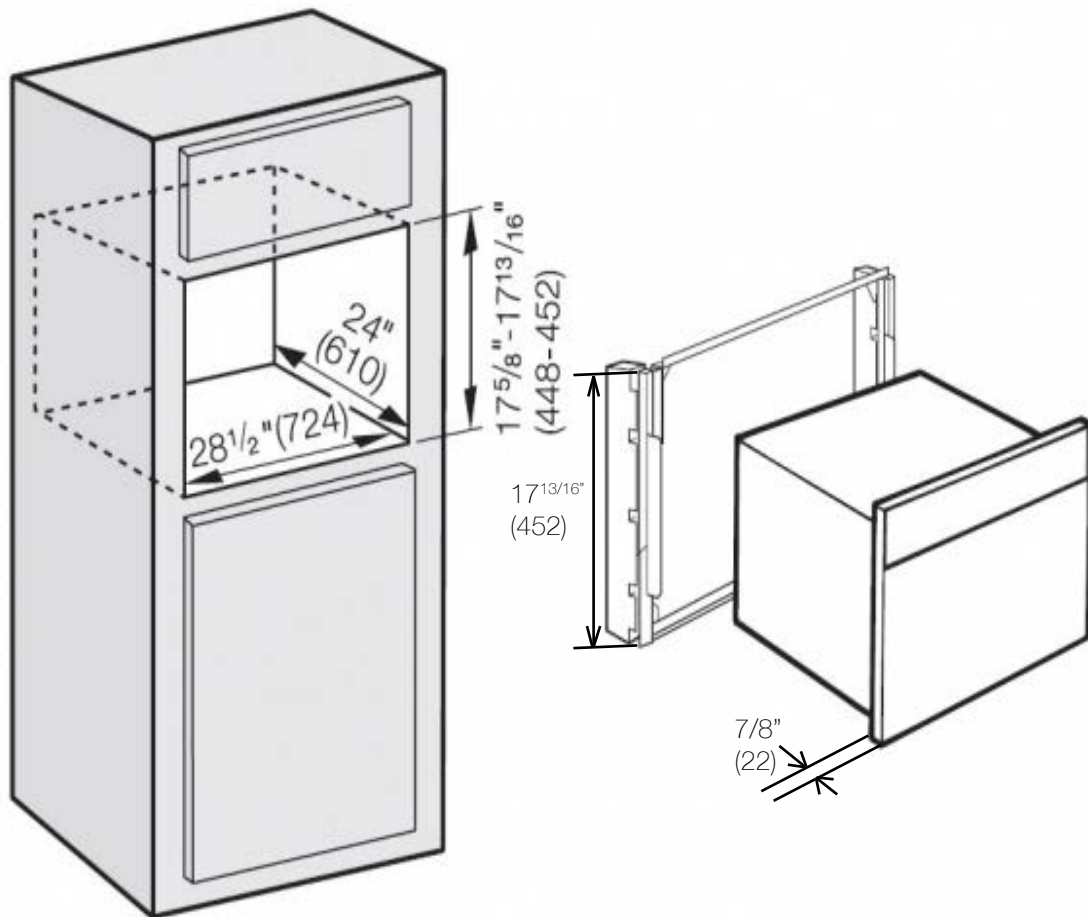
# 30" Trim Kit EBA 6708 MC, EBA 6808 MC



#41

## INSTALLATION SPECIFICATIONS

Installation In Tall Niche



\*\* Follow the appliance's installation directions for plumbing, electrical, and ventilation.

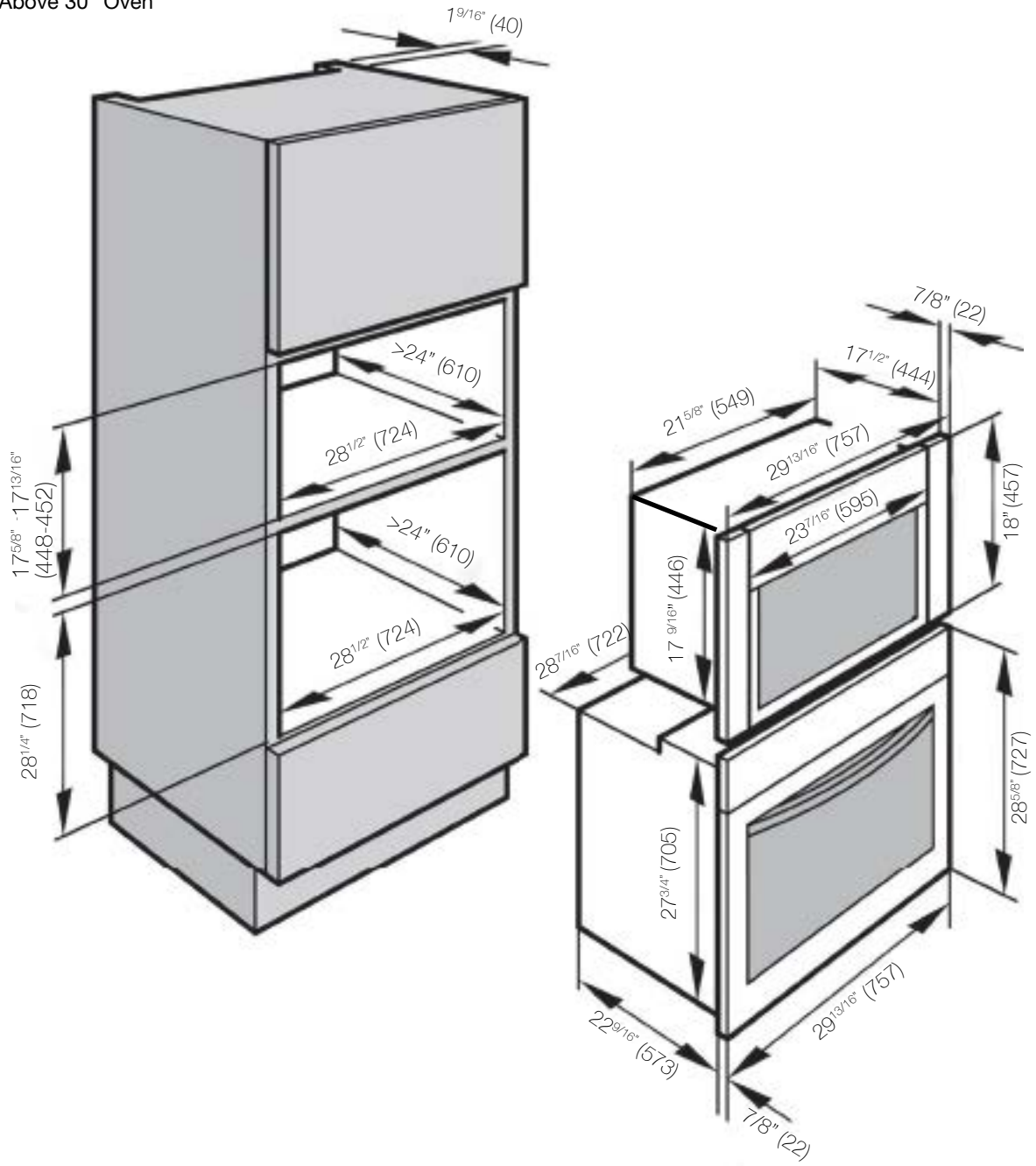
# 30" Trim Kit

## EBA 6708 MC, EBA 6808 MC



#41

Installation Above 30" Oven



\*\* Follow the appliance's insallation directions for plumbing, electrical, and ventalation.

## SECTION 221113 - FACILITY WATER DISTRIBUTION PIPING

### PART 1 - GENERAL

#### 1.1 SUMMARY

- A. This Section includes water-distribution piping and related components outside the building for water service and fire-service mains.

#### 1.2 ACTION SUBMITTALS

- A. Product Data: For each type of product indicated.

#### 1.3 INFORMATIONAL SUBMITTALS

- A. Field quality-control test reports.

#### 1.4 CLOSEOUT SUBMITTALS

- A. Operation and maintenance data.

#### 1.5 QUALITY ASSURANCE

- A. Regulatory Requirements:
  - 1. Comply with requirements of the Portland Water District. Include backflow prevention.
  - 2. Comply with standards of the Portland Water District for potable-water-service piping, including materials, installation, testing, and disinfection.
  - 3. Comply with standards of the Portland Water District for fire-suppression water-service piping, including materials, hose threads, installation, and testing.
- B. Piping materials shall bear label, stamp, or other markings of specified testing agency.
- C. Comply with ASTM F 645 for selection, design, and installation of thermoplastic water piping.
- D. Comply with FMG's "Approval Guide" or UL's "Fire Protection Equipment Directory" for fire-service-main products.
- E. NFPA Compliance: Comply with NFPA 24 for materials, installations, tests, flushing, and valve and hydrant supervision for fire-service-main piping for fire suppression.
- F. NSF Compliance:

1. Comply with NSF 14 for plastic potable-water-service piping. Include marking "NSF-pw" on piping.
2. Comply with NSF 61 Annex G for materials for water-service piping and specialties for domestic water.

## 1.6 PROJECT CONDITIONS

### A. Existing Water-Distribution Piping:

1. An existing 8" DI water service exists to the property line and shall be used to provide water service to the proposed structure. Water service shall be provided as shown on the approved utility plan.
2. An existing 6" DI water service exists to the property line and will not be used for proposed services. This 6" line shall be abandoned in accordance with the approved utility plan and the requirements of the Portland Water District.

## 1.7 COORDINATION

- ### A. Coordinate connection to water main with utility company. Connection shall not be made without approval from and representation by the Portland Water District.

## PART 2 - PRODUCTS

### 2.1 PIPE AND FITTINGS

- #### A. Ductile iron pipe shall meet requirements of AWWA Standard C-151 (latest revision) and be cement lined and seal coated to meet AWWA Standard C-104 (latest revision).

1. Joints shall meet requirements of AWWA C-111 (latest revision).
2. Interior seal coated, bituminous paint oil cut, emulsion not acceptable, thickness minimum of 2 mils dry film thickness.
3. Exterior bituminous coated with minimum of 2 mils dry film thickness
4. Class 52 wall thickness, 4-inch diameter through 12-inch diameter inclusive.
5. Ductile Iron Pipe with diameters 16-inches and larger shall be approved by PWD.
6. State nominal laying length and mark shorter lengths near bell
7. Mechanical joint pipe to be furnished with gland, gaskets and Cor-Ten bolts and nuts.

#### B. Fittings

1. Material shall be ASTM A536 latest, grade 70-50-05, in accordance with AWWA C110 (latest revision) for fittings larger than 24" and C153 (latest revision) for fittings 3" thru 24".
2. Fittings shall be cement lined AWWA C104 (latest revision) or fusion bonded epoxy coated with a 5 mil nominal thickness per AWWA C550 and C116.
3. Exterior bituminous coated, 4 mils minimum dry film thickness or fusion bonded epoxy coated with a 5 mil nominal thickness per AWWA C550 and C116.
4. Sleeves shall not be cement lined, but shall be bituminous coated inside to 4 mils dry film thickness. All sleeves shall be long body type.
5. Mechanical joint with accessories furnished: D.I. glands, gaskets, Cor-Ten T bolts and nuts.
6. Pressure Ratings:
  - a. Class 350 pressure rating in accordance with AWWA C153 – 3"–24" sizes.
  - b. Class 250 pressure rating in accordance with AWWA C110 – 30"-48" sizes
7. The "compact design" fittings must provide adequate space for the MJ joint and accessories to be installed without special tools (i.e., Lowell wrench can be used)..

C. Approved Manufacturers

1. American Cast Iron Pipe.
2. Griffin Pipe
3. U.S. Pipe.
4. Clow Pipe
5. McWain Pipe.
6. Atlantic States Pipe.

2.2 CURB VALVES

A. Manufacturers: Acceptable manufacturer's are McDonald, Mueller, Cambridge Brass and Ford , or pre approved equivalent equal.

1. Curb Valves: Comply with AWWA C800. ¾" to 2" curb stops shall be ball valve with heavy duty design with brass ball that is teflon coated or brass ball with teflon seats with a working pressure of 300 psi. The ball shall be supported by seats which are water tight in either direction. The and valve shall have a full-port opening and shall open with ¼



turn (90°) with a check or stop. The valve stem shall have 2 “O” rings and a bronze ring lock which holds the stem solidly in the valve body. The valve shall not have a drain.

B. Service Boxes for Curb Valves: Per Portland Water District requirements.

1. Approved Manufacturers: Service box shall be Laroche, Clow Canada, Bibby or approved equal. Service box footpiece shall be by Laroche or approved equal. Service Rod shall be North American Manufacture.

## 2.3 RESILIENT SEATED GATE VALVES

A. Manufacturers: Acceptable manufacturer's are U.S.P, AFC Series 2500, Mueller A-2360/61, Clow Series F6100, or pre approved equivalent equal.

B. Valve shall meet the latest revision of the AWWA C509 Standard.

C. Valve shall have a smooth unobstructed water way which shall be a minimum diameter of the valve.

D. Valve ends to be specified and shall be furnished with Cor-Ten (or equal) bolts and nuts.

E. Sealing: Valve shall have a minimum of 2 “O” rings situated such that the “O” rings above the thrust collar can be replaced with the valve under pressure and in the open position.

F. Valve Stem:

1. Open right with a stem nut made of grade D, E manganese bronze.
2. Non-rising
3. Designed with a thrust collar integrally cast to the stem
4. Designed with two thrust washers, placed one above and one below the stem thrust collar
5. Constructed of grade D,E manganese bronze
6. Thrust washers are made of a synthetic polymer with physical properties required

G. Valve Body: The body including the stuffing box and the bonnet shall be constructed of cast iron or ductile iron, meeting the latest revision of AWWA C153.

H. Valve Wedge:

1. Constructed of ductile iron (less guiding mechanism)
2. Fully encapsulated and permanently bonded with a resilient elastomer
3. Shall be constructed to allow the flushing of any interior exposed surface during operations.

I. Coatings:

1. Internal and external valve body, including the stuffing box, bonnet, and interior of the wedge shall be fusion bonded epoxy coated with 8 mils D.F.T
2. Interior shall meet latest version of AWWA C550.
3. Shall be holiday free, interior and exterior, per testing method described in AWWA C550, Sec. 5.1.

- J. Operating Nut:
  - 1. Shall be two inch square ductile iron with a countersunk hold down nut (made of 316 stainless steel or silicone bronze) for stems that are tapered or with a stainless steel pin inserted through the stem for stems of full diameter.
- K. Valves 12" nominal diameter and smaller shall be directly operated by the nut on the valve stem and mounted vertically. Number of turns to open or close shall closely match the formula:  $(3 \times D) + 2$ . Example, a 12" valve should open or close with approximately 38 turns of the operating nut.

#### 2.4 VALVE BOXES:

- A. Valve box bottom section shall be slide type with bell type base with bottom lip. Top section shall be slide type, 36 inches long (minimum). No top flange and no bead or bottom flange. Intermediate (mid) section shall be a slide type with a minimum 3" belled bottom. Base section No. 645 may be used as an alternate. Manufacturer: North American Manufacture
- B. Valve Box cover manufactured by Bibby St. Croix (no substitute), and shall be a 2" drop type cover to fit the 7-1/4" opening of the top section.
- C. Material shall be cast iron or ductile iron free from defects
- D. Interior and exterior of all components shall be bituminous coated with a minimum of 4 mils dry film thickness.

#### 2.5 WATER METERS

- A. Water meters will be furnished and installed in accordance with the Portland Water District requirements.
- B. Water meter boxes per the Portland Water District.

#### 2.6 BACKFLOW PREVENTERS

- A. Double-Check, Backflow-Prevention Assemblies:
  - 1. As approved by the Portland Water District
  - 2. Standard: AWWA C510.
  - 3. Operation: Continuous-pressure applications, unless otherwise indicated.
  - 4. Pressure Loss: 5 psig (35 kPa) maximum, through middle 1/3 of flow range.
  - 5. Configuration: Designed for horizontal, straight through flow.

## PART 3 - EXECUTION

### 3.1 EARTHWORK

- A. Refer to Section 312000 "Earth Moving" for excavating, trenching, and backfilling.

### 3.2 PIPING INSTALLATION

- A. Water-Main Connection: Arrange with utility company for tap of size and in location indicated in water main.
- B. Comply with NFPA 24 for fire-service-main piping materials and installation.
  - 1. Install copper tube and fittings according to CDA's "Copper Tube Handbook."
- C. Install ductile-iron, water-service piping according to AWWA C600 and AWWA M41.
- D. Bury piping with depth of cover over top at least 36 inches.
- E. Extend water-service piping and connect to water-supply source and building-water-piping systems at outside face of building wall in locations and pipe sizes indicated.
  - 1. Terminate water-service piping at building wall until building-water-piping systems are installed. Terminate piping with caps, plugs, or flanges as required for piping material. Make connections to building-water-piping systems when those systems are installed.
- F. Install underground piping with restrained joints at horizontal and vertical changes in direction. Use restrained-joint piping, thrust blocks, anchors, tie-rods and clamps, and other supports.

### 3.3 VALVE INSTALLATION

- A. AWWA Gate Valves: Comply with AWWA C600 and AWWA M44. Install each underground valve with stem pointing up and with valve box.
- B. UL/FMG, Gate Valves: Comply with NFPA 24. Install each underground valve and valves in vaults with stem pointing up and with vertical cast-iron indicator post.
- C. MSS Valves: Install as component of connected piping system.
- D. Corporation Valves and Curb Valves: Install each underground curb valve with head pointed up and with service box.

### 3.4 BACKFLOW PREVENTER INSTALLATION

- A. Install backflow preventers of type, size, and capacity indicated. Include valves and test cocks. Install according to requirements of plumbing and health department and authorities having jurisdiction.
- B. Do not install backflow preventers that have relief drain in vault or in other spaces subject to flooding.
- C. Do not install bypass piping around backflow preventers.

### 3.5 FIELD QUALITY CONTROL

- A. Piping Tests: Conduct piping tests before joints are covered and after concrete thrust blocks have hardened sufficiently. Fill pipeline 24 hours before testing and apply test pressure to stabilize system. Use only potable water.
- B. Hydrostatic Tests: Test at not less than one-and-one-half times working pressure for two hours.
  - 1. Increase pressure in 50-psig (350-kPa) increments and inspect each joint between increments. Hold at test pressure for 1 hour; decrease to 0 psig (0 kPa). Slowly increase again to test pressure and hold for 1 more hour. Maximum allowable leakage is 2 quarts (1.89 L) per hour per 100 joints. Remake leaking joints with new materials and repeat test until leakage is within allowed limits.
- C. Prepare reports of testing activities.

### 3.6 CLEANING

- A. Clean and disinfect water-distribution piping in accordance with Portland Water District Specifications.

END OF SECTION 221113

## SECTION 221313 - FACILITY SANITARY SEWERS

### PART 1 - GENERAL

#### 1.1 ACTION SUBMITTALS

- A. Product Data: For each type of product.
- B. Shop Drawings: For manholes. Include plans, elevations, sections, details, and frames and covers.

#### 1.2 INFORMATIONAL SUBMITTALS

- A. Product Certificates: For each type of pipe and fitting.
- B. Field quality-control reports.

### PART 2 - PRODUCTS

#### 2.1 PVC PIPE AND FITTINGS

- A. PVC Type PSM Sewer Piping:
  - 1. Pipe: ASTM D 3034, SDR 35, PVC Type PSM sewer pipe with bell-and-spigot ends for gasketed joints.
  - 2. Fittings: ASTM D 3034, PVC with bell ends.
  - 3. Gaskets: ASTM F 477, elastomeric seals.

#### 2.2 NONPRESSURE-TYPE 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 include corrosion-resistant-metal tension band and tightening mechanism on each end.
- B. Sleeve Materials:
  - 1. For Cast-Iron Soil Pipes: ASTM C 564, rubber.
  - 2. For Plastic Pipes: ASTM F 477, elastomeric seal or ASTM D 5926, PVC.
  - 3. 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 corrosion-resistant-metal tension band and tightening mechanism on each end.

D. Nonpressure-Type, Rigid Couplings:

1. Description: ASTM C 1461, sleeve-type, reducing- or transition-type mechanical coupling; molded from ASTM C 1440, TPE material; with corrosion-resistant-metal tension band and tightening mechanism on each end.

2.3 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. Sewer Pipe Fitting and Riser to Cleanout: ASTM A 74, Service class, cast-iron soil pipe and fittings.

2.4 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 (100-mm) minimum thickness for walls and base riser section; with separate base slab or base section with integral floor.
5. Riser Sections: 4-inch minimum thickness, of length to provide depth indicated.
6. Top Section: Eccentric-cone type unless concentric-cone or flat-slab-top type is indicated; with 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 with height as 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, with diameter matching manhole frame and cover, and with 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 "SANITARY SEWER."
2. Material: ASTM A 536, Grade 60-40-18 ductile iron unless otherwise indicated.

## 2.5 CONCRETE

- A. General: Cast-in-place concrete complying with ACI 318, ACI 350, and the following:
  1. Cement: ASTM C 150/C 150M, Type II.
  2. Fine Aggregate: ASTM C 33/C 33M, sand.
  3. Coarse Aggregate: ASTM C 33/C 33M, 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 1064/A 1064M, steel, welded wire fabric, plain.
  2. Reinforcing Bars: ASTM A 615/A 615M, Grade 60 deformed steel.
- C. Manhole Channels and Benches: Factory or field formed from concrete. Portland cement design mix, 3000 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: 1 percent through manhole.
  2. Benches: Concrete, sloped to drain into channel.
- D. Ballast and Pipe Supports: Portland cement design mix, 3000 psi minimum, with 0.58 maximum water/cementitious materials ratio.
  1. Reinforcing Fabric: ASTM A1064/A 1064M, steel, welded wire fabric, plain.
  2. Reinforcing Bars: ASTM A 615/A 615M, Grade 60 deformed steel.

## PART 3 - EXECUTION

### 3.1 EARTHWORK

- A. Excavating, trenching, and backfilling are specified in Section 312000 "Earth Moving."

### 3.2 PIPING INSTALLATION

- A. General Locations and Arrangements: Drawing plans and details to indicate general location and arrangement of underground sanitary sewer 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 using 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, at minimum slope of 1 percent unless otherwise indicated.
  - 2. Install piping NPS 6 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 42- minimum cover unless otherwise indicated.
  - 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 PVC corrugated sewer piping according to ASTM D 2321 and ASTM F 1668.
  - 7. Install PVC Type PSM sewer piping according to ASTM D 2321 and ASTM F 1668.

### 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 gasket joints according to CISPI's "Cast
  - 2. Join PVC corrugated sewer piping according to ASTM D 2321.
  - 3. Join PVC Type PSM sewer piping according to ASTM D 2321 and ASTM D 3034 for elastomeric-seal joints or ASTM D 3034 for elastomeric-gasket joints.
  - 4. Join dissimilar pipe materials with nonpressure-type, flexible or rigid couplings.
- B. Pipe couplings, expansion joints, and deflection fittings with pressure ratings at least equal to piping rating may be used in applications below unless otherwise indicated.
  - 1. Use nonpressure flexible couplings where required to join gravity-flow, nonpressure sewer piping unless otherwise indicated.
    - a. Unshielded flexible or rigid couplings for pipes of same or slightly different OD.



- b. Unshielded, increaser/reducer-pattern, flexible or rigid 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.

### 3.4 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. Form continuous concrete channels and benches between inlets and outlet.
- D. Set tops of frames and covers flush with finished surface of manholes that occur in pavements.

### 3.5 CONCRETE PLACEMENT

- A. Place cast-in-place concrete according to ACI 318.

### 3.6 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 use 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 grade.
- C. Set cleanout frames and covers in concrete pavement and roads with tops flush with pavement surface.

### 3.7 CONNECTIONS

- A. Connect nonpressure, gravity-flow drainage piping to building's sanitary building drains specified in Section 221316 "Sanitary Waste and Vent 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. Protect existing piping and manholes to prevent concrete or debris from entering while making tap connections. Remove debris or other extraneous material that may accumulate.

### 3.8 IDENTIFICATION

- A. Comply with requirements in Section 312000 "Earth Moving" for underground utility identification devices. Arrange for installation of green warning tapes directly over piping and at outside edges of underground manholes.

### 3.9 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 report 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. Manholes: Perform hydraulic test according to ASTM C 969.
- 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 221313

SECTION 23 00 00 - 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, ventilating and air conditioning systems indicated.

1.2 RELATED DOCUMENTS

- A. The drawings and the specifications including SECTION 23 05 00 "Common Work Results for HVAC" are hereby made a part of the work of this section.

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, Common Work Results for HVAC, apply are as follows:
  - 1. Piping materials.
  - 2. Hangers.
  - 3. Valves.
  - 4. Piping, valve and equipment identification.
  - 5. Fans.
  - 6. Split-system air conditioning heat pump units.
  - 7. Electric duct coils
  - 8. Electric unit heaters
  - 9. Electric wall heaters
  - 10. Packaged energy recovery ventilator.
  - 11. Electric radiant floor system.

PART 2 PRODUCTS

2.1 PIPING MATERIALS

- A. Refrigerant Piping:
  - 1. 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.

## Thames Street Building

2. Tubing used for refrigerant service shall be cleaned, sealed, capped, or plugged prior to shipment from the manufacturer's plant.
3. Copper Pipe and Fittings: Provide seamless copper tubing, hard drawn, Type K for underground use, Type L for exposed above ground use, ASTM B 88, or ASTM B 280.
  - a. Fittings for copper tubing shall be wrought copper, brazing, or solder-joint type, ANSI B16.22.
  - b. Flared, soft copper tubing shall be annealed ASTM B 280 and may be used only in nominal sizes smaller than one inch for connection to equipment and no larger than 1-3/8 inches outside diameter for other connections.
  - c. Flanges shall be of bronze, ANSI B16.24.
4. Aluminum Pipe and Fittings: Seamless 6061-T4 aluminum conforming to ASTM B210 with mechanically attached fittings.
5. 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.
6. Soldering Materials: Provide ASTM B 32, Grade Sb5, tin-antimony alloy. Soldering flux shall consist of petrolatum base impregnated with zinc and ammonium chlorides.
7. Gaskets: Provide ASTM D 2000, fluorinated elastomers compatible in form with grooves in the flange faces.

### 2.2 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.

### 2.3 PIPING, VALVE AND EQUIPMENT IDENTIFICATION

- A. Pipe Identification: Provide plastic "wrap around" identification markers indicating flow direction and fluid flowing for the following:

Refrigerant Suction Piping  
Refrigerant Liquid Piping

1. Markers shall be placed 30-50 ft. apart for piping in accessible areas.

## Thames Street Building

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 22 00 00 Plumbing 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.

## 2.4 FANS (EF-#)

- A. Shall be model indicated. The fan shall include housing, fan wheel, shaft, bearings, inlet shroud, motor, mounting support and mounting frame as a factory-assembled unit. An OSHA-approved belt guard shall be included. The fan drive shall have a 1.5 service factor for the maximum rated horsepower. Each fan shall incorporate a backdraft damper or one shall be installed at the discharge (louver).
- B. Bearings shall be precision, flange-mounted self-aligning ball bearings at inlet and discharge. Grease lines shall extend to the exterior of the fan housing.
- C. Submit sound power data for inlet and discharge sound.
- D. Submit fan curves for each fan with the design operating point clearly marked.
- E. Furnish accessories as noted on drawings.

2.5 SPLIT SYSTEM AIR CONDITIONING (SAC-# and SCU-#)

- A. The Split System Heat Pump Air Conditioning System shall be Mitsubishi P-Series Hyper-Heating H2i-Series consisting of a single indoor unit served by a single outdoor condensing unit. The system shall be capable of providing 80% of its rated heating capacity at -13°F outside temperature. The system shall utilize R-410A refrigerant. Piping joints and headers in the refrigeration piping shall be manufactured by the system manufacturer, piping shall be type ACR Copper. The split system shall include packaged controls including hard wired remote space sensors and condensate overflow safety switches for each indoor unit.
- B. The indoor air handling unit shall be Mitsubishi PEAD series ducted or as scheduled/indicated. Cooling/Heating capacities shall be as scheduled. The system shall operate on 208V-1 phase power fed from the outdoor unit to the indoor unit. Furnish with refrigerant piping, wiring and condensate piping as recommended by the manufacturer. Units must be suitable for use with the refrigerant line lengths required by the unit placement as shown on the plans with no reduction in capacity. All indoor units shall include condensate pumps, piped to nearest washing machine drain IW funnel or water heater indirect waste drain. All outdoor units shall include wind baffles and 24" tall stands.
- C. The split system condensing 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.

2.6 SPLIT SYSTEM HEAT PUMPS (SAC-2C through SAC-6C/SCU-C)

- A. The Split System Heat Pump Air Conditioning Systems shall be Mitsubishi MXZ-H2i Series consisting of a multiple indoor units served by a single outdoor condensing units. The outdoor unit shall have rated performance of heating operation at -13°F ambient temperatures (note: Submittal must include unit performance from the manufacturer at -13°F). The system shall utilize R-410A refrigerant. Piping joints and headers in the refrigeration piping shall be manufactured by the system manufacturer, piping shall be type ACR Copper. The split system shall include packaged controls including hard wired remote space sensors and condensate overflow safety switches for each indoor unit.
- B. The indoor air handling unit shall be Mitsubishi MSZ series (wall mounted) or as scheduled/indicated. Cooling/Heating capacities shall be as scheduled. The system shall operate on 230V-1 phase power fed from the outdoor unit to the indoor unit. Furnish with refrigerant piping, wiring and condensate piping as recommended by the manufacturer. Units must be suitable for use with the refrigerant line lengths required by the unit placement as shown on the plans with no reduction in capacity. All indoor units shall include condensate pumps, piped to nearest washing machine drain IW funnel or lavatory tailpiece. All outdoor units shall include wind baffles and 24" tall stands.
- C. The split system 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.

## Thames Street Building

- D. Outdoor units shall be set on the ground on 24" tall stands mounted on concrete pads as recommended by the manufacturer. Provide snow / hail guards and base pan heaters. The indoor units shall be piped in an aesthetically pleasing manner with a minimum of exposed piping. Exposed piping shall have a finished molded PVC cover. Installation shall be per the manufacturers recommendations.

### 2.7 ELECTRIC DUCT COILS

- A. Electric Duct Coils shall be Indeeco TXFU, Chromalox or equal and shall have finned tubular elements consisting of a grade A coil constructed from 80% nickel and 20% chromium, centered in a stainless steel tube that is filled with granular magnesium oxide. The finned element is a stainless steel fin helically wound onto the tube. Provide coils with airflow interlocks, SCR controller, both automatic and manual reset thermal cutouts (for primary and secondary overtemperature protection), built-in snap acting, door interlocking disconnect marked with "on" and "off" positions and factory mounted control transformer. Coils shall be suitable for use with 208V, 1-Phase power and shall provide the scheduled capacity. Coils shall be UL-Listed.

### 2.8 ELECTRIC WALL HEATER (EWH-#)

- A. Electric Wall Heaters shall be Berko model FRC or equal, capacity scheduled on drawings. Heaters shall utilize power noted on schedule and shall be provided with remote mount thermostat, built-in thermal cutout, non-glowing 80/20 Ni-Ch electric resistance wire enclosed in a steel sheath with steel fins. Cabinet shall be surface mounted and painted with an enamel paint (color by architect). Unit shall include disconnect switch mounted behind the front panel for positive disconnect of power supply.

### 2.9 ELECTRIC UNIT HEATER (UH-#)

- A. Electric Cabinet Unit Heaters shall be Berko model HUHA or equal, capacity scheduled on drawings. Heaters shall utilize 208v/1ph/60hz power and shall be provided with remote mount thermostat, built-in thermal cutout, non-glowing 80/20 Ni-Ch electric resistance wire enclosed in a steel sheath with steel fins. Cabinet shall be painted with an enamel paint (color by architect).

### 2.10 ELECTRIC RADIANT FLOOR SYSTEM

- A. Electric radiant floor system shall be Thermosoft or SunTouch, UL Listed with copper heating elements, high temperature insulation and metal grounding jacket. Cable shall be grounded from end to end and shall require single point power (240/1/60). Floor system shall have a maximum Watt density of 12W/sf and a minimum of 6W/sf.

### 2.11 TOTAL ENERGY RECOVERY VENTILATOR (ERV-#)

- A. Shall be Greenheck ERCH, Loren Cook, Semco, 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), electric preheat, air-to-air heat exchangers, gas furnace, dx cooling coil, packaged condenser, low leakage insulated dampers, filter sections, vapor-tight lights, 120v. NEMA 3R service outlet, variable frequency inverter drives for fans and



## Thames Street Building

wheel, electric preheat defrost system, welded structural steel base, non-fused disconnect switches and double-wall, insulated airtight casing with interior sheetmetal liner. The casing shall have 1" thick (minimum) 3.0 pcf fiberglass thermal insulation. Provide 16" high insulated roof curbs and intake and exhaust hoods for rooftop (exterior) units.

- B. The air-to-air heat recovery units shall be a rotating "enthalpy" wheel design or static plate core capable of sensible and latent energy transfer. Rotating wheel exchangers and drives shall include a purge section and a five (5) year replacement warranty for materials and labor. The exterior casing shall be constructed of galvanized steel, weathertight, phosphatized and painted with a finish coat of epoxy paint inside and out (Greenheck "Permatecor", or approved equal).
- C. Fans shall be DWDI forward curved or airfoil blade or plenum fan with variable pitch belt drives selected at 1.5 times the maximum rated motor horsepower. Motors shall be mounted on an adjustable slide base. Motors shall be premium high efficiency, inverter-duty rated. Fan bearings shall be regreasable tapered roller pillow block bearings with an L10 life of 100,000 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.
- D. Supply prefilters shall be 2" thick, MERV13 extended surface pleated media disposable type, Multi-Pleat Green 13 by Koch Filter Corporation, Airguard "DP-Green" or approved equal. Exhaust prefilters shall be 2" thick, 30-35% efficient, MERV8, extended surface pleated media disposable type by CamFarr, 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.
- E. Provisions shall be made for reducing the speed of the wheel (VFD) or otherwise reducing the recovered heat on a call for cooling of the supply airstream (economizer cycle).
- F. Outside air and exhaust air 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. Intake and exhaust hoods shall be provided.
- G. Electrical work shall be in accordance with the National Electrical Code (NFPA 70) and shall include variable frequency drives for supply and exhaust fans, junction boxes, disconnect switches, duplex weatherproof GFCI receptacles, and vapor-tight marine lights in each compartment. Provide switches with pilot lights. Wiring shall be in galvanized steel or liquidtight conduit. A single point electrical connection shall be provided (except receptacle). Motors shall be premium high efficiency inverter-duty type.
- H. Gas furnace shall be power vented, indirect fired unit with direct spark ignition, aluminized tubular heat exchanger with a minimum efficiency of 80%. Furnace shall be ETL listed to ANSI Z83.8.
- I. Packaged DX-cooling shall include hermetic scroll compressors, lead circuit shall be a digital scroll with variable capacity and crankcase heaters. Compressors shall be located

outside the airstream and shall be serviceable without affecting airflow. Refrigerant flow control shall be through a thermal expansion valve. System shall include manual reset high pressure and automatic reset low pressure cutouts, service/charging valves, moisture indicating sight glass and direct drive dynamically balanced condenser fans.

- J. Controls shall include the following: dehumidification control, enthalpy controller, wheel rotation sensor, electric preheat frost control, variable frequency drives (3), dirty filter sensor for outdoor and exhaust filters and stand-alone controls with remote panel to provide sequences outlined in specifications section 230900.
- K. The heat recovery units shall be started up and their operation verified by an authorized representative of the equipment.

## 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 fluid under working conditions. Inverted eccentric reducing fittings shall be used whenever water pipes reduce in size.
- E. 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.

- F. PVC piping shall have solvent welded joints except at connections to equipment and valves which shall be screwed for sizes 2" and smaller and flanged for sizes 2-1/2" and larger. Solvent welded joints: Pipe ends deburred, and beveled. Pipe end and fitting: Cleaned and dried, primed to soften bonding surfaces. Pipe end: Apply even full layer of solvent cement after priming. Before cement starts to set, insert pipe end into fitting and turn 1/4 turn to evenly distribute cement. Hold joint together until cement sets-up, wipe excess cement off joint.
- 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"
1"	7'	3/8"
1-1/4"	8'	3/8"
1-1/2"	9'	3/8"
2"	10'	3/8"
2-1/2"	11'	1/2"
3"	12'	1/2"

- C. Verticals: Supported at the base and at intervals as follows by use of clamp hangers:

Steel Pipe: Not more than 16 ft.

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.
- E. PVC Piping: Supported at 4' intervals.
- F. Spring Isolators: All piping within 20' upstream and downstream of the pumps.

## Thames Street Building

### 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.

## Thames Street Building

### 3.8 FIRESTOPPING

- A. Firestopping shall be performed in accordance with Specification Section 07860 “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 23 05 00 - COMMON WORK RESULTS FOR HVAC

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.

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.

## Thames Street Building

### 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 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.

### 1.7 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.

### 1.8 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.

### 1.9 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)

## Thames Street Building

American Water Works Association (AWWA)  
Local Fire Code  
Local Plumbing Codes  
American Welding Society  
International Building Code (IBC)

### 1.10 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, five (5) copies, 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" less two (2) copies. Work shall progress in accordance with "Reviewed" shop drawings (ONLY).
- B. Groups of similar shop drawings shall be submitted as individual bound documents with covers and indexes. Typical similar items would be "Diffusers and Registers", "Valves and Controls". Rejection of individual items shall not be cause for rejection of the entire document.
- C. Clearly indicate item(s) to be reviewed on each submission by highlighting or underlining intended item(s). Submissions not clearly marked shall be returned "Amend and Resubmit".
- D. 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.
- E. 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.

### 1.11 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.



## Thames Street Building

- 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 and the Maine State Internal Plumbing Code.
- 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 valves and other serviceable components.
- B. Access panels installed in fire-rated assemblies shall have the same fire rating as the assembly.

## Thames Street Building

### 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:  
  
3/4 Horsepower and less - 120 volt, 1 phase, 60 Hz.  
1 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 16 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:

## Thames Street Building

MOTOR HORSEPOWER	PERCENTAGE EFFICIENCY		
	(1200RPM)	(1800 RPM)	(3600 RPM)
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 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.

### 3.11 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.

### 3.12 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.

### 3.13 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.

### 3.14 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.

## Thames Street Building

### 3.15 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.

### 3.16 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.

### 3.17 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 23 05 93 - TESTING, ADJUSTING AND BALANCING FOR HVAC

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 GENERAL REQUIREMENTS

- A. The provisions of Section 23 05 00, "Common Work Results for HVAC", apply to this section.

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

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.

## Thames Street Building

- 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. 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 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.

## Thames Street Building

1. Air Handling Unit CFM: Minus 0 percent to plus 10 percent.
2. Other Fans: Minus 0 percent to plus 10 percent.
3. Minimum Outside Air (for manually set dampers): Minus 0 percent to plus 10 percent.
4. 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.

## Thames Street Building

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 and water 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



## Thames Street Building

- 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 23 07 00 - INSULATION

PART 1 GENERAL

1.1 RELATED DOCUMENTS

- A. The drawings and the specifications including Section 23 05 00 "Common Work Results for HVAC" are hereby made a part of the work of this section.

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, Common Work Results for HVAC, apply are as follows:
  - 1. Piping insulation.
  - 2. Duct insulation.
  - 3. Equipment insulation.
  - 4. Insulation application schedule.
  - 5. Vapor barrier coating.

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.
- C. Outside: Areas beyond the exterior side of walls or above the roof, unexcavated spaces, and crawl spaces.
- D. 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.
- E. Exposed: Visible from a finished or unfinished space.

## Thames Street Building

### 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 (where Architectural shields are not provided). 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.

## 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 (1.5 lb/cu.ft. for 3" thick 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.

## 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.

## 2.5 EXTERIOR WEATHERPROOFING

- A. Exterior weatherproofing shall be Polyguard "Alumaguard" composite membrane embossed aluminum foil/polymer laminate with rubberized asphalt with acrylic adhesive. Weatherproofing shall be zero perm, self-healing and puncture resistant, UV stable and shall carry a 10-year warranty.

## 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.

## Thames Street Building

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.
- 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.

## Thames Street Building

- 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. 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. All piping exposed in finished spaces (Corridors, Apartments, etc.) shall be jacketed (white).

### 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

Thames Street Building

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/R-VALUE</u> (must meet both)	<u>MATERIAL/JACKET</u>
<b>PIPING:</b>		
Domestic Cold Water Piping (Copper, PEX or CPVC)		
1" and smaller	1/2" & R2	Fiberglass w/ASJ or Flexible Unicellular
1-1/4" and larger	1" & R2	Fiberglass w/ASJ or Flexible Unicellular
Domestic Hot Water Piping (Copper, PEX or CPVC)		
1" and smaller	1/2" & R5	Fiberglass w/ASJ or Flexible Unicellular
1-1/4" and larger	1" & R5	Fiberglass w/ASJ or Flexible Unicellular
Water and Drain Piping Under Handicap Accessible Fixtures		ADA Insulation Kit
Refrigerant Suction and Liquid Piping (outside)	3/4"	Flexible Unicellular w/vapor barrier and PVC jacket
Refrigerant Suction and Liquid Piping (inside)	3/4"	Flexible Unicellular
Condensate Drain Piping	1/2"	Flexible Unicellular
Roof drain sump bodies and Rainwater Piping	1/2"	Flexible Unicellular
All piping exposed in finished Spaces		Jacketed (white)
<b>DUCTWORK:</b>		
Supply ductwork from ERV to spaces served	1-1/2" & R6	Ductwrap, FSK
Unlined Supply ductwork From SAC units	1-1/2" & R6	Ductwrap, FSK

Thames Street Building

<u>SERVICE</u>	<u>THICKNESS/R-VALUE</u> (must meet both)	<u>MATERIAL/JACKET</u>
Exhaust duct from EF to point of discharge	1-1/2" & R6	Ductwrap, FSK
Exterior ductwork (on roof)	3"	Ductboard w/Alumaguard Weatherproofing
EQUIPMENT:		
Water Meter	1/2"	Flexible Unicellular
Backflow Preventer	1/2"	Flexible Unicellular
Valves	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.

\* END OF SECTION \*



SECTION 23 09 00 - INSTRUMENTATION AND CONTROLS FOR HVAC

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 system shall be an electric/electronic system to provide 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.

1.2 ACCEPTABLE MANUFACTURERS / INSTALLERS

- A. Honeywell
- B. Siebe / Invensys
- C. Siemens
- D. Trane
- E. Basix Automation / Andover
- F. Tekmar
- G. Taco iWorx

1.3 RELATED DOCUMENTS

- A. The drawings and the specifications including SECTION 23 09 00 "Common Work Results for HVAC" and SECTION 26 00 00 "ELECTRICAL" are hereby made a part of the work of this section.

1.4 SUBMITTALS

- A. Substitutions: Your attention is directed to Section 23 05 00 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 shop drawings paragraph in Section 23 05 00, Common Work Results for HVAC, 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.

## Thames Street Building

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. Operator's interface terminal.

## 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.

#### 2.4 TEMPERATURE SENSORS / THERMOSTATS

- A. Temperature Sensors: RTD Elements, accuracy of +0.1% at 70°F, sensors shall be securely attached to a single gang electrical box or other suitable base, securely mounted on the wall or other building surface. Each sensor shall be located where shown or, if not shown, where it will respond to the average temperature in the room. Sensors, generally, shall be mounted 48 inches above the floor within ADA reach guidelines, and shall not be mounted on outside walls if other locations are possible. If located on an outside wall, it shall have an insulated base. Sensors shall have adjustment devices, by means of which the operating points can be adjusted through a range of not less than 10 degrees above and below the operating points specified.
- B. Apartment thermostats shall be similar to Mitsubishi PAR-21MAA, hard-wired, or equal, programmable thermostats, battery backup, programmable heating/cooling limits.
- C. No devices containing mercury are permitted.

#### 2.5 SEQUENCE OF CONTROL (Commercial Space)

- A. Provide and install electronic/electric components to enable the mechanical system to operate in the following sequences:
1. SAC/SCU units: Wired controller provided with units, Contractor shall install and wire per manufacturers requirements. The space temperature sensor shall be located on an interior column. The unit shall maintain the space temperature setpoint by operating

## Thames Street Building

the heat pump in heating or cooling mode as necessary. The outside air dampers shall be open and the supply fan shall operate continuously during the occupied period.

2. Electric wall heaters/ unit heaters: Shall operate as required to satisfy the wall mounted thermostat.
3. Exhaust Fan EF-3: The fan shall operate based on a wall-mounted switch.

### 2.6 SEQUENCE OF CONTROL (Common Spaces)

- A. Provide and install electronic/electric components to enable the mechanical system to operate in the following sequences:
  1. SAC/SCU units: Wired controller provided with units, Contractor shall install and wire per manufacturers requirements. The space temperature sensor shall be located as indicated on the drawings. The unit shall maintain the space temperature setpoint by operating the heat pump in heating or cooling mode as necessary. The outside air dampers shall be open and the supply fan shall operate continuously during the occupied period.
  2. Electric wall heaters/ unit heaters: Shall operate as required to satisfy the wall mounted thermostat.
  3. Exhaust Fans EF-1 and EF-2: The fan shall operate continuously.
  4. Duct coil (HC-1): Shall be energized (subject to the airflow proving switch) to maintain a discharge temperature of 60°F.
  5. Energy Recovery Ventilator (ERV-1):
    - 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: At outside air temperatures below 55°F, the gas furnace shall modulate to maintain a 70°F discharge air temperature. At outside air temperatures above 70°F, the packaged DX-cooling shall cycle/modulate to maintain a discharge temperature of 60°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 unit drops below 40°F.
    - d. Motorized Dampers: Outside air and exhaust air motorized dampers shall close upon unit shutdown.
    - e. Duct Smoke Detectors: Smoke detectors in the supply and exhaust air of the ERV shall de-energize the unit, close the outside air and exhaust dampers if smoke is detected. The smoke detectors shall be wired to interface with the building fire alarm system (by Electrical Contractor).

## 2.7 SEQUENCE OF CONTROL (Living Spaces – Each Unit)

- A. Provide and install electronic/electric components to enable the mechanical system to operate in the following sequences:
  - 1. SAC/SCU units: Wired controller provided with units, Contractor shall install and wire per manufacturers requirements. The space temperature sensor shall be located in the living room. On a call for heat at outside air temperatures where the compressor has shut down, the fan shall still operate so that the electric duct coils can provide heat to the space.
  - 2. Duct Coils (HC): On a call for heat the electric coil shall be energized (subject to the airflow proving switch). The duct coils shall be the second stage of heat.
  - 3. Electric Radiant Floors: Electric radiant floors shall operate to maintain floor surface temperature

## 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,

## Thames Street Building

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.

SECTION 23 30 00 - HVAC FOR DISTRIBUTION

PART 1 GENERAL

1.1 RELATED DOCUMENTS

- A. The drawings and the specifications including SECTION 23 05 00 "Common Work Results for HVAC" are hereby made a part of the work of this section.

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, Common Work Results for HVAC, apply are as follows:
  - 1. Ductwork.
  - 2. Ductwork accessories.
  - 3. Air devices.
  - 4. Firestopping materials and methods.
  - 5. Dampers.
  - 6. Ductwork sealing products.
  - 7. Clothes dryer exhaust duct.
  - 8. Combination fire/smoke dampers.

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.



## Thames Street Building

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.
5. Dryer exhaust ducts shall be smooth surfaced metal (no flex-duct allowed) with hard-cast sealed joints. Dryer ducts shall be full size from dryer connection to point of discharge and shall be equipped with self-closing dampers. No screws shall be permitted at dryer duct joints.

### D. Construction for Spiral Seam Round and Flat Oval Ductwork:

1. Interior round or flat oval ductwork indicated as acoustically lined or double-wall (DW) shall be United-McGill Acousti-K27 or equal, double wall medium pressure construction with solid 26 gauge sheetmetal inner liner and 2" thick fiberglass insulation. Ductwork and fittings shall be furnished with solid liners. Insulation shall be provided with thermal conductivity of 0.27 BTU/HR-°F-FT<sup>2</sup>-IN. Exposed interior ductwork shall be double-wall construction (DW), sealed air and watertight, 2" thick (R-6) fiberglass insulation.
  - a. Sheetmetal Gauges: Per SMACNA for listed pressure class.
  - b. Fittings: Fittings shall be machine formed type or welded multi-segment type. All seams shall be factory sealed or welded airtight. Tap offs shall be 90° conical type or 45° standard type, with smooth, machine formed entrance, designed for low pressure drop and low noise generation. 90° elbows shall be 5 piece construction (where space permits) or vaned type mitered elbow where space is restricted. Unless specifically indicated (and field-verified) as 5 piece construction, use vaned 90° elbows. Vanes shall be single thickness, solid-welded in place.
  - c. Joints on round spiral ductwork shall be slip type, coupling type, Van Stone flanges, or factory fabricated flange system type connectors, as standard with the manufacturer. Flat oval joints shall be Van Stone flanges (gasketed) or factory fabricated flange system type connectors. Joints shall be made up with joint sealer applied in strict accordance with the manufacturer's recommendations. Joint sealer shall be as recommended by the manufacturer.
  - d. Duct and fittings shall have been tested for air friction loss and leakage in an independent testing laboratory. Test results shall be submitted with the Shop Drawings for review.
  - e. External reinforcing angles shall be provided in accordance with the manufacturer's recommendations. External reinforcing angles shall be galvanized or painted with a rust inhibiting aluminum paint. Include reinforcing data with Shop Drawing

submittal. Duct and reinforcing shall be designed for a positive static pressure of 6 inches of water gage.

- f. No internal tie rod reinforcing will be allowed.
- g. Hangers shall be of the clamp-on or trapeze type. Exposed ductwork shall use clamp-on hangers only. Holes shall not be drilled through the ducts.

## 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. Ceiling Radiation Dampers: Ruskin CFD series, UL rated for 1-1/2 hours with 165 °F fusible link. Ceiling Radiation Dampers shall comply with UL "Standard for Safety 555.
- F. Drawbands for Flexible Ducts: Clinch type stainless steel with screwdriver adjustment, or nylon with lever action tightening tool provided by the drawband manufacturer.
- 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:
  - 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.

## Thames Street Building

- I. 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.
- J. Acoustical duct liner for rectangular ductwork shall be Type AP Armaflex SA duct liner. The liner shall be elastomeric unicellular (closed cell) and have a thermal conductivity of 0.27 Btuh/°F.-sf-in. and be cleanable and suitable for duct velocities of 4000 FPM. Duct liner thickness shall be 1" unless indicated otherwise. The installation shall include 100% coverage of the manufacturer's recommended adhesive and protective Z-strips at all exposed upstream edges. Mechanical fasteners shall be used in addition to adhesive. Insulation shall comply with NFPA 90A and NFPA 90B and be approved by Factory Mutual. Duct dimension noted on drawings are net, inside of liner.

### 2.3 AIR DEVICES (Krueger, Price, Metal Aire, Titus, Seiho) 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.
- E. Grilles and Registers: Construction and finish as indicated, 1/2" louver spacing, 45° curved blade. Grilles and 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. All ceiling mounted registers, grilles and diffusers shall be provided with ceiling radiation dampers.

## 2.4 ELEVATOR SHAFT VENT

- A. Shall be Greenheck Model PEV-400, Ruskin, or equal, with 26"x26" smoke damper and 120V. actuator with "Open-Closed Indicator" located in the throat. Furnish with birdscreen and Kynar 500 finish with color selection by Architect. Furnish with 12 gauge cold-rolled steel roof curb.
- B. The vent shall be 38"x38"x18" high on a 36" high curb. Vent and louver construction shall be heavy gauge 6063-T5 aluminum. The vent shall be insulated and the glass section(s) shall be 1/8" thick annealed glass.
- C. Coordinate with Electrical Contractor and Fire Alarm System.

## 2.5 COMBINATION FIRE & SMOKE DAMPERS

- A. Combination fire / smoke dampers shall be Ruskin, Greenheck or equal, front access, 1½ hour fire rating, with dynamic rating, UL555 listed. **Provide each with end switch and smoke detector.**
- B. Models shall be as follows (based on Ruskin):
  - 1) FSD60 – Rectangular fire/smoke damper.
  - 2) FSDR25 – Round fire/smoke damper.
  - 3) FSD60FA – Rectangular fire/smoke damper w/ front access (at grilles).
- C. Furnish with an integral 16 gauge insulated sleeve with break-away connections.
- D. Damper shall be constructed of galvanized steel with airfoil blades. Sleeve type shall accommodate rectangular, round or flat oval ductwork, as required, with Class I leakage construction.
- E. Suitable access to smoke damper actuators is provided thru the grille face.
- F. Installation shall be per the manufacturer's recommendations and the performance listing. Dampers shall be installed where indicated and at all "shaft" penetrations in accordance with IBC. Refer to Architectural drawings for coordination of ratings.
- G. Actuator: Externally-mounted electric actuator, 24v (transformer required) or 120v wired in accordance with the NEC with end switch.
- H. Activation (Smoke Detection):
  - 1) Where a damper is installed in a corridor wall or ceiling: The damper is permitted to be controlled by a smoke detection system in the corridor. Upon activation of the corridor smoke detector, all the smoke dampers shall close, and shutdown the air handlers. Smoke dampers shall be connected to the building fire alarm system.
  - 2) Where a damper is NOT installed in a corridor wall or ceiling: The damper shall be controlled by a local duct smoke detector (provided with damper) at each damper. Upon

activation of the duct smoke detector, all the smoke dampers shall close, and shutdown the air handlers.

### 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 BOCA code.
- 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

## Thames Street Building

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. 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.
- J. Discrepancies between actual field conditions and the Contract Documents shall be brought to the attention of the Architect prior to fabrication.
- K. 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.
- L. 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.
- M. 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.
- N. 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.

### 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.

## Thames Street Building

### 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 eight (8) 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.



## Thames Street Building

### 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.

## Thames Street Building

- 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

## Thames Street Building

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.

## Thames Street Building

### 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

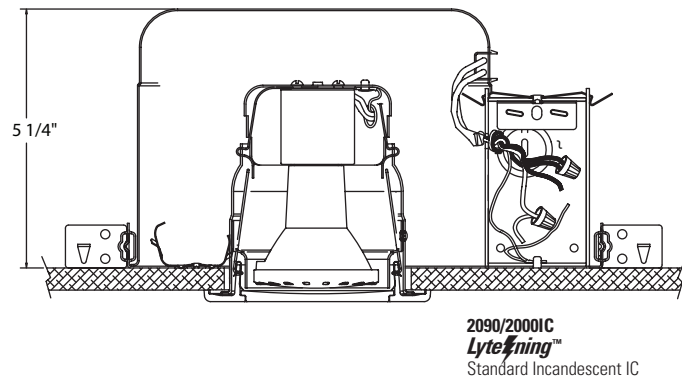
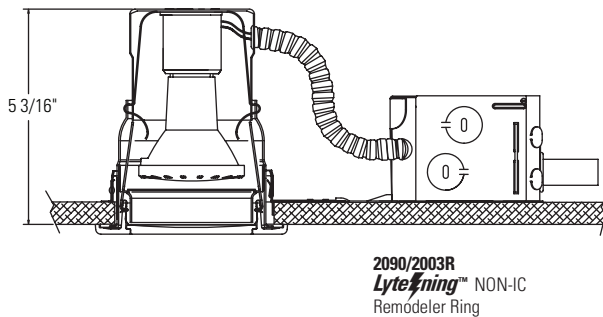
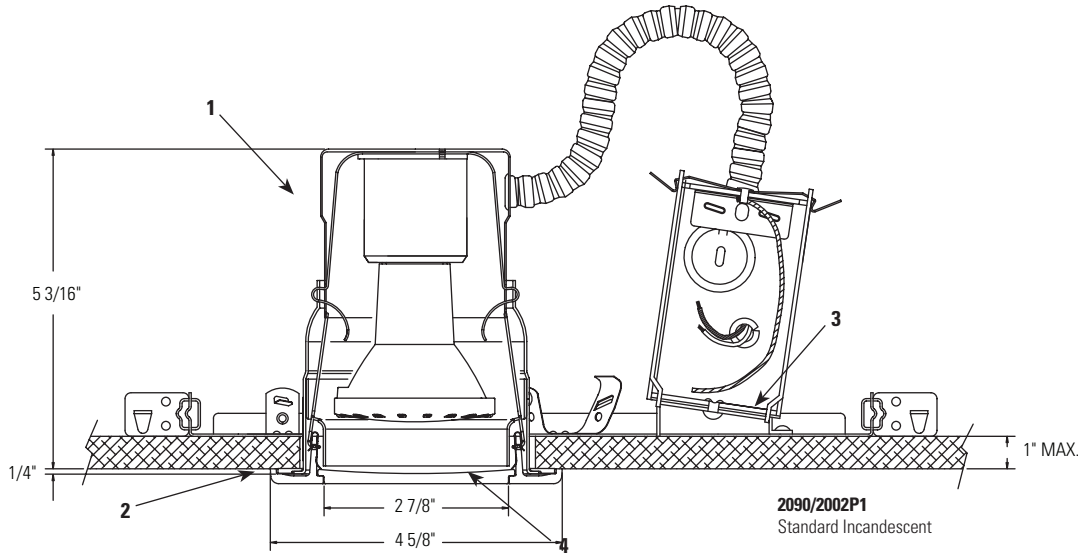
- A On completion of the job, Contractor shall provide competent technicians to thoroughly instruct the Owner's representative in the care and operation of the system. The total period of instruction shall not exceed 2 hours and be performed in a minimum of one interval. The time of instruction shall 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 \*\*\*

[D] Fixture



Complete Fixture consists of Reflector Trim & Frame-In Kit. Select each separately.

Reflector Trim	Frame-In Kit — See Individual Frame-In Kit Specification Sheets			
	Line Voltage			
2090	Frame-In Kit	Installation Type	Lamping	Height
	2000P1	Standard Non-IC	50W PAR20	5 1/4"
	2002P1	Standard Non-IC		5 3/16"
	2003R	Non-IC Remodeler		5 3/16"
	2000IC	IC	50W PAR20	5 1/4"
2000AIC	IC AirSeal®		5 1/4"	

## Features

- Housing:** Hydroformed aluminum, .040 thk. min. Non-yellowing, gloss white powder coat finish for permanent reflectivity and surface protection.
- Trim Flange:** Frosted clear polycarbonate flange ring. Pull down and release for toolless relamping.
- Frame-In Kit:** (2002P2 standard frame shown) Other frames shown below. See Frame-In Kit specification sheets for more details.
- Glass:** Processed borosilicate glass textured diffuser. Smooth surface on exposed side for wipe down cleaning. Meets NEC® requirements for spas and hot tubs. May be installed less than 7' 6" above max water surface height.

## Labels

UL (Suitable for Wet Locations - Covered Ceilings only), I.B.E.W.  
NEC® is a registered trademark of the National Fire Protection Association.

Job Information	Type:
<b>Job Name:</b>	
<b>Cat. No.:</b>	
<b>Lamp(s):</b>	
<b>Notes:</b>	

631 Airport Road, Fall River, MA 02720 • (508) 679-8131 • Fax (508) 674-4710  
We reserve the right to change details of design, materials and finish.  
www.lightolier.com © 2011 Philips Group • H0711

Purpose built for applications where surface-mounted downlights are preferred, the Exo family of fixtures offers a variety of solutions with a perfect balance of function and fashion. With several size & shape options ranging from a simple cube to elongated rectangular shades, the Exo family yields the ultimate in minimalist form while secretly concealing a specification-grade, multifunction downlight within. Each LED module's high-performance output is harnessed by your choice of four field changeable optics ranging from a precise 20° beam perfect for task-oriented applications to a wide 60° beam ideal for general illumination-minded applications. Additional precision control is offered by way of integrated 0°-30° tool-free beam aiming. Finally, a truly customized look can be achieved throughout the entire Exo family by selecting one its three decorative recessed trim color options.

Each LED module produces 1047 delivered lumens while consuming 14 watts of power, and is offered in standard CCTs of 2700K, 3000K and 3500K. Light output is harnessed by your choice of 20°, 30°, 40° or 60° field changeable optics, and each fixture includes a 120-277 universal voltage driver which is also universally dimmable (low-voltage electronic, Triac and 0-10v dimming) for maximum jobsite flexibility.

**Product features**

- Four shade sizes for maximum design and performance flexibility
- Complementary pendant and flushmount versions available
- Specification grade beam spread options for spot to general illumination applications
- Unique tool-free aiming for incredible versatility
- Universally dimmable LED lamping options to create the desired ambiance
- Sleek rectangular shades for a truly minimalist look
- Matte Black and Matte White finish options
- Three decorative trim options for a custom look
- 5-year warranty

**SPECIFICATIONS**

SHADE HEIGHT	6.1", 18", 36" options
SHADE WIDTH	5.2"
SHADE LENGTH	5.2" single / 10.4" dual
DELIVERED LUMENS	1047 single / 1635 dual
WATTS	14 single / 28 dual
VOLTAGE	Universal 120-277v
DIMMING	Universal 0-10v, ELV, Triac
LIGHT DISTRIBUTION	20°, 30°, 40°, 60° field changeable optics
MOUNTING OPTIONS	Ceiling (flush, 12", 24", 36", 48" stem)
CCT	2700K, 3000K, 3500K
CRI	90+
COLOR BINNING	3-Step
GENERAL LISTING	ETL, Title 24
FIELD SERVICEABLE LED	Yes
CONSTRUCTION	Steel
FINISH	Matte Black, Matte White
TRIM	Black, White, Gold Haze
LED LIFETIME	50,000 to L70
WARRANTY*	5 years

\* Visit techlighting.com for specific warranty limitations and details.



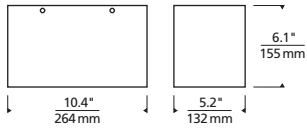
EXO DUAL  
shown in black/gold haze



EXO PENDANT  
shown in white/black 36"



EXO CEILING  
shown in white/white 18"



Black/Black



White/Black



Black/Gold Haze



White/Gold Haze



Black/White



White/White

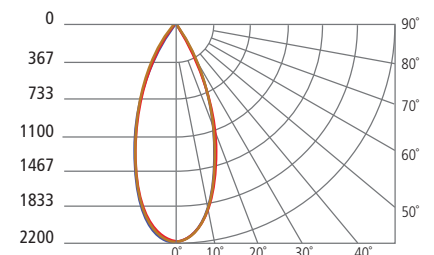
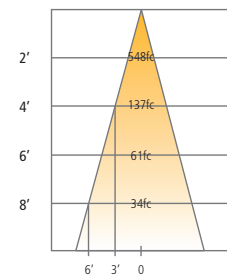
PHOTOMETRICS\*

\*For latest photometrics, please visit [www.techlighting.com](http://www.techlighting.com)

EXO SINGLE PENDANTS & CEILING

Description: LED Multiples Module  
40° Beam - 0° Tilt, 3000K  
Model: LED Multiples 40° Low  
Input Power (Watts): 12.4  
Input Power Factor: 0.98  
Absolute Luminous Flux (Lumens): 1056  
Lumen Efficacy (Lumens per Watt): 85.2

ANGLE	0°	45°	90°
0°	2188	2188	2188
5°	2137	2136	2106
10°	1956	1938	1893
15°	1633	1608	1536
20°	1206	1175	1082
25°	736	705	632
30°	377	362	318
35°	179	174	151
40°	82	81	74
45°	42	42	39
50°	24	23	22
55°	14	13	12
60°	8	8	8
65°	5	5	5
70°	2	2	2
75°	1	0	0
80°	0	0	0
85°	0	0	0
90°	0	0	0





ORDERING INFORMATION

EXO PENDANTS

700TDEXOP	SHADE HEIGHT	STEM LENGTH (A)	BEAM SPREAD	SHADE COLOR / HARDWARE FINISH	TRIM FINISH	LAMP
	6 6.1"	12 12"	20 20°	B MATTE BLACK	B BLACK	-LED927 LED 90 CRI 2700K 120V 277 UNV
	18 18"	24 24"	30 30°	W MATTE WHITE	G GOLD HAZE	-LED930 LED 90 CRI 3000K 120V 277 UNV
	36 36"	36 36"	40 40°		W WHITE	-LED935 LED 90 CRI 3500K 120V 277 UNV
		48 48"	60 60°			

EXO CEILING

700FMEXO	SHADE HEIGHT	BEAM SPREAD	SHADE COLOR	TRIM FINISH	LAMP
	6 6.1"	20 20°	B MATTE BLACK	B BLACK	-LED927 LED 90 CRI 2700K 120V 277 UNV
	18 18"	30 30°	W MATTE WHITE	G GOLD HAZE	-LED930 LED 90 CRI 3000K 120V 277 UNV
	36 36"	40 40°		W WHITE	-LED935 LED 90 CRI 3500K 120V 277 UNV
		60 60°			

EXO DUAL

700FMEXOD	SHADE HEIGHT	BEAM SPREAD	SHADE COLOR	TRIM FINISH	LAMP
	6 6.1"	20 20°	B MATTE BLACK	B BLACK	-LED927 LED 90 CRI 2700K 120V 277 UNV
		30 30°	W MATTE WHITE	G GOLD HAZE	-LED930 LED 90 CRI 3000K 120V 277 UNV
		40 40°		W WHITE	-LED935 LED 90 CRI 3500K 120V 277 UNV
		60 60°			

PROJECT INFO

FIXTURE TYPE & QUANTITY	JOB NAME & INFO	NOTES



Extrusion model	Finish	Cover	LED Color	LED Output	Length	Mounting	Wire Lead
B4574	A – Anodized	GK – Square Frosted	<b>27 – 2700K</b> 30 – 3000K 35 – 3500K 40 – 4000K RGB- Red, Green & Blue	LO – Low output MO – Medium output HO – High Output <b>HD- High Density High Output</b> XX- RGB	Any up to 78"	<b>S-spring</b> P- plastic bracket ADJ- adjustable bracket	36 – 36" 72 – 72" 36F - 36" with female connector 72F - 72" with female connector 36M - 36" with male connector 72M - 72" with male connector

\*LENGTHS VARY

Output Type	Lumens at 3000k*	Watts per foot
LO	224 Lm/f	3 W/f
MO	530 Lm/f	6 W/f
HO	750 Lm/f	9 W/f
HD	920 Lm/F	11.2 W/f
RGB	243 Lm/F	4.5 W/f

\*Clear cover

FIXTURE CODE:

Wire out end cap

Wire out back of extrusion



GIP suspended fixture

Extrusion model	Finish	Cover	LED Color	LED Output	Length	Mounting	Wire Lead Option**
B4574	A – Anodized	<b>GK – Square Frosted</b> GL – Round Frosted	<b>27 – 2700K</b> 30 – 3000K 35 – 3500K 40 – 4000K RGB- Red, Green & Blue	<b>LO – Low output</b> MO – Medium output HO – High Output <b>HD- High Density High Output</b> XX- RGB	Any up to 78"	<b>C</b> Cable <b>C+</b> Conductive Cable <b>R</b> Rod <b>R+</b> <b>Conductive Rod</b>	Any up to 180" **if not using conductive mounts

Output Type	Lumens at 3000k*	Watts per foot
LO	224 Lm/f	3 W/f
MO	530 Lm/f	6 W/f
HO	750 Lm/f	9 W/f
HD	920 Lm/f	11.2 W/f
RGB	243 Lm/f	4.5 W/f

\*LENGTHS VARY - COORDINATE MOUNTING FOR GYP. CEILINGS

Distance of mounts from end of fixture:

Additional Notes:



\*Clear cover

# CYCLE 4800-24

PROJECT PROJÉT
SPEC TYPE
NOTES

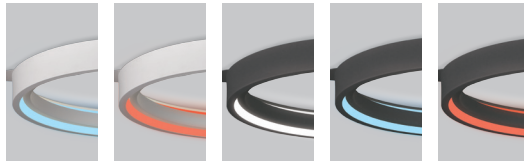


## OPTIONS



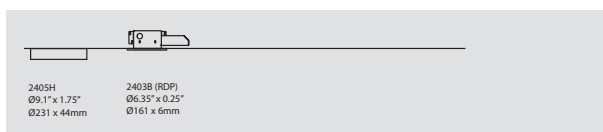
2990I                      2990E                      2990IE

## OPTIONAL INSIDE FINISH OF EXTERNAL RING FINI INTERNE OPTIONNEL DE L'ANNEAU EXTÉRIEUR



WHM-BLU      WHM-RED      ANTE-WH      ANTE-BLU      ANTE-RED

## MOUNTING OPTIONS OPTIONS DE MONTAGE



4800-24	4800-24-RCA (OPTION)	4800-24-RCC (OPTION)

ORDERING SPECIFICATION SPÉCIFICATION DE COMMANDE	CODE
<b>MODEL MODÈLE</b>	4800-24
4800-24 CYCLE	
<b>LIGHT SOURCE SOURCE LUMINEUSE</b>	
(WATTAGE, LAMP TYPE, OTHER INFO)	
LED.24  24W, LED	
LED.48  48W, LED	
<b>COLOR TEMPERATURE TEMPÉRATURE DE COULEUR</b>	
30  3000K	
35 3500K	
40 4000K	
<b>VOLTAGE VOLTAGE</b>	
120V  120 VOLT	
277V 277 VOLT	
347V 347 VOLT*	
*ONLY AVAILABLE WITH 24W, 40W LIGHT SOURCE	
<b>DIMMING OPTION OPTION DE GRADATION</b>	DV
DV 0-10V DIMMING	
LED DIMMING DRIVER IS STANDARD IN THIS PRODUCT	
<b>DRIVER POSITION POSITION DU PILOT</b>	
RDP RECESSED DRIVER*	
*3981C IS REQUIRED	
*ONLY AVAILABLE WITH 120V & 277V	
<b>CABLE CABLE</b>	AC
AC AIRCRAFT MOUNTING & CLEAR CABLE, FIELD ADJUSTABLE	
<b>CABLE LENGTH LONGUEUR DE CABLE</b>	
60 60" AIRCRAFT CABLE (STD LENGTH)	
** CUSTOM AIRCRAFT CABLE LENGTH (PLEASE SPECIFY)	
FOR OVERALL LENGTH PLEASE CONTACT YOUR EUREKA REPRESENTATIVE.	
<b>MOUNTING OPTION OPTION DE MONTAGE</b>	RC
RC  ROUND CANOPY / PAVILLON ROND	
FOR RECESSED DRIVER OPTION: 0.25" (2403B)	
FOR STANDARD: 1.75" CANOPY (2405H)	
<b>MOUNTING CABLE OPTION OPTION DE MONTAGE DE CABLE</b>	
IF NO OPTION IS SELECTED, AN OFF-CENTERED ROUND CANOPY WITH STRAIGHT AIRCRAFT CABLES IS STANDARD	
RCA CENTERED ROUND CANOPY - AIRCRAFT CABLES ANGLED TO CENTER*	
RCC  CENTERED ROUND CANOPY - STRAIGHT AIRCRAFT CABLES	
*NOT AVAILABLE WITH RECESSED DRIVER (RDP)	
<b>CANOPY FINISH FINI PAVILLON</b>	
WHM  MATTE WHITE (ONLY FOR MATTE WHITE RING FINISH)	
CHR CHROME (ONLY FOR ANTHRACITE FINE TEXTURE RING FINISH)	
<b>RING FINISH FINI ANNEAU</b>	
WHM  MATTE WHITE	
ANTE ANTHRACITE FINE TEXTURE	
<b>OPTIONAL INSIDE FINISH OF EXTERNAL RING FINI INTERNE OPTIONNEL DE L'ANNEAU EXTÉRIEUR</b>	
IF NO FINISH IS SELECTED THE INSIDE FINISH OF THE EXTERNAL RING WILL BE WHITE	
BLU BLUE	
RED RED	
<b>ACCESSORY ACCESSOIRE</b>	
3981C JUNCTION BOX FOR RECESSED DRIVER OPTION	
2990I TONE INTERIOR CHARCOAL FELT	
2990E TONE EXTERIOR CHARCOAL FELT	
2990EI TONE EXTERIOR-INTERIOR CHARCOAL FELT	

## PRODUCT CHARACTERISTICS CARACTÉRISTIQUES DU PRODUIT

**BIM** **DIM** **IES** **LED**

<b>DESIGN:</b>	The perfectly diffused direct/indirect illumination of Cycle create a luminous halo that fills large spaces with presence and simplicity.
<b>LIGHT SOURCE:</b>	Custom designed and manufactured light engine featuring high performance LEDs that deliver 500 lm/ft initial lumens in regular output or 1000lm/ft in high output.
<b>STRUCTURE:</b>	Seamlessly finished, rolled concentric aluminium extrusions with highly reflective inner matte white polyester powder coating available with outer finish in matte white or textured anthracite. Inner finish insert available in blue or red for a colored glow.
<b>CERTIFIED:</b>	c-CSA-us

# ANATOMY

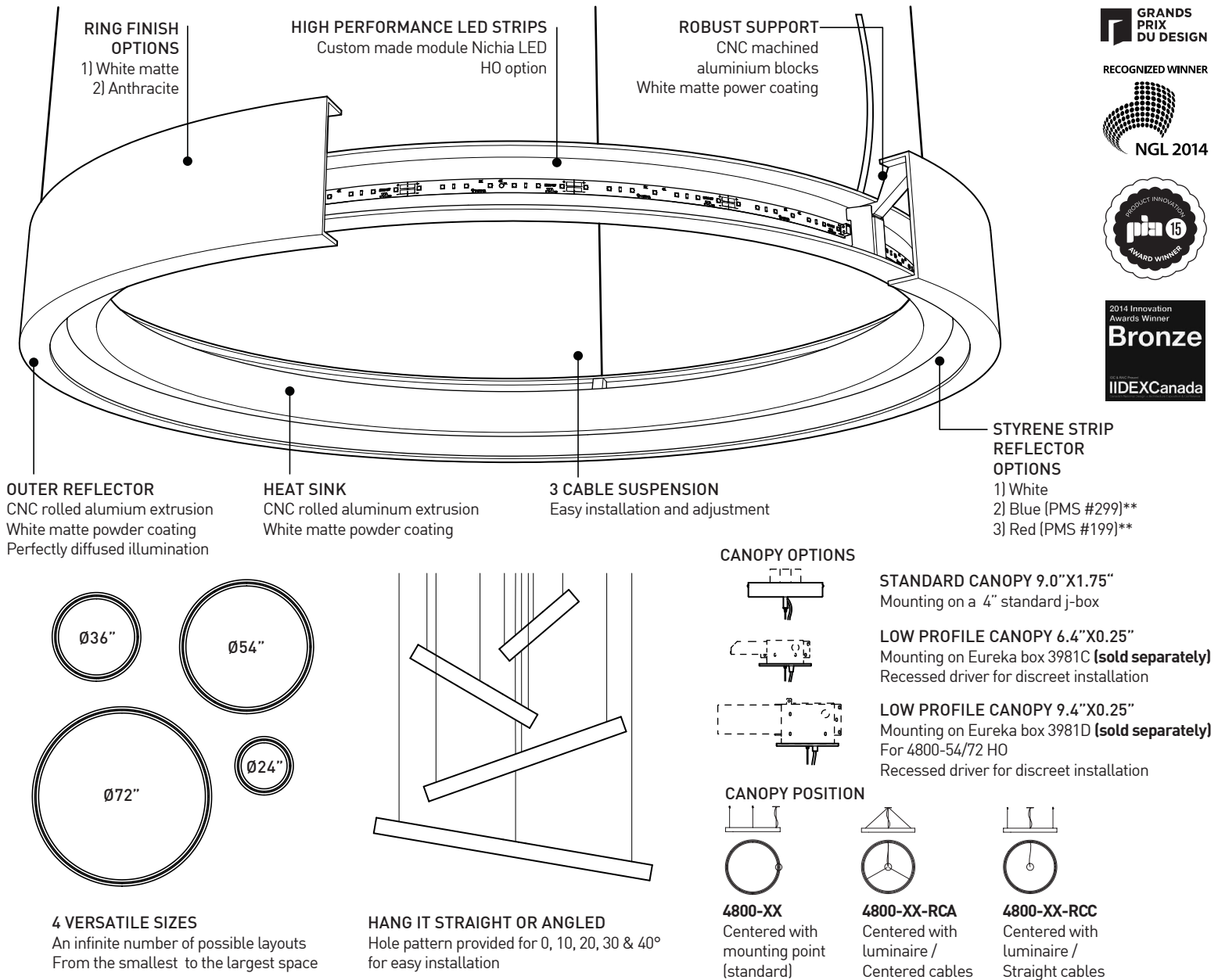
BIM

DIM

IES

LED


CYCLE



CHARACTERISTICS	4800-24	4800-36	4800-54	4800-72
LIGHT SOURCE	84x Nichia ± 24W	140x Nichia ± 40W	224x Nichia ± 64W	308x Nichia ± 87W
DELIVERED LUMENS	1226 lm (4000K)	2067 lm (4000K)	3333 lm (4000K)	4600 lm (4000K)
LIGHT SOURCE (HO)	168x Nichia ± 48W	280x Nichia ± 80W	448x Nichia ± 128W	616x Nichia ± 174W
DELIVERED LUMENS (HO)	2456 lm (4000K)	4134 lm (4000K)	6666 lm (4000K)	9200 lm (4000K)
MODULE	UL Recognized - Custom design flexible strip - Made in USA			
CRI	85 CRI (typical)			
STRUCTURE	Custom CNC rolled aluminium extrusions (0.125in thickness) / Seamless welding			
LIGHT DISTRIBUTION	Direct/Indirect 50/50			
VOLTAGE*	120V or 277V or 347*	120V or 277V or 347*	120V or 277V or 347*	120V or 277V
DIMMING	0-10V Dimming (standard with this fixture)			
WARRANTY	5 years			
WEIGHT (PACKAGED)	35 lbs	50 lbs	75 lbs	100 lbs


\* 347V not available for HO option

\*\* Color may vary slightly as it will be affected by the color temperature of the light and by the saturation/reflection onto the colored surface

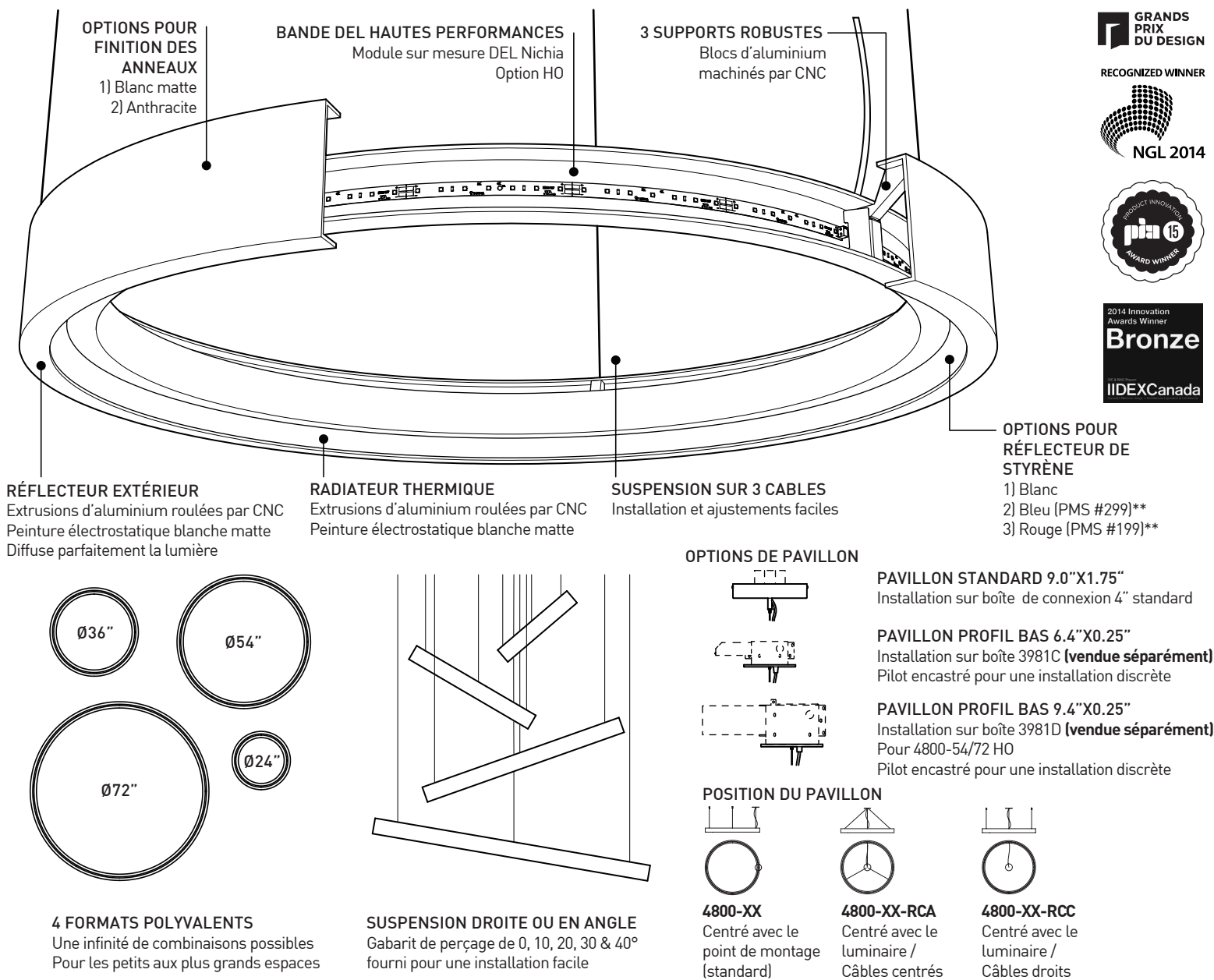


**EUREKA**

225 de Liège Ouest, Suite #200  
Montréal (QC), Canada H2P 1H4  
Tel : 514.385.3515 Fax : 514.385.4169  
[www.eurekalighting.com](http://www.eurekalighting.com)



**4800-24 | 4800-36**  
**4800-54 | 4800-72**



RECOGNIZED WINNER



CARACTÉRISTIQUES	4800-24	4800-36	4800-54	4800-72
SOURCE LUMINEUSE	84x Nichia ± 24W	140x Nichia ± 40W	224x Nichia ± 64W	308x Nichia ± 87W
LUMENS REELS	1226 lm [4000K]	2067 lm [4000K]	3333 lm [4000K]	4600 lm [4000K]
SOURCE LUMINEUSE (HO)	168x Nichia ± 48W	280x Nichia ± 80W	448x Nichia ± 128W	616x Nichia ± 174W
LUMENS REELS (HO)	2456 lm [4000K]	4134 lm [4000K]	6666 lm [4000K]	9200 lm [4000K]
MODULE	Reconnu UL - Bandes DEL sur mesure - Fabriqué aux États-Unis			
IRC	85 IRC (typique)			
STRUCTURE	Extrusions d'aluminium roulées par CNC (0.125po d'épaisseur) / joints de soudure invisibles			
DISTRIBUTION LUMINEUSE	Direct/Indirect 50/50			
VOLTAGE*	120V ou 277V ou 347*	120V ou 277V ou 347*	120V ou 277V ou 347*	120V ou 277V
GRADATION	Gradation 0-10V [standard avec ce luminaire]			
GARANTIE	5 ans			
POIDS (EMBALLÉ)	35 lbs	50 lbs	75 lbs	100 lbs

\* 347V pas disponible pour l'option HO

\*\* La couleur peut varier en fonction de la température lumineuse choisie et de la saturation / réflexion sur la surface colorée



225 de Liège Ouest, Suite #200  
Montréal (QC), Canada H2P 1H4  
Tel : 514.385.3515 Fax : 514.385.4169  
[www.eurekalighting.com](http://www.eurekalighting.com)



4800-24 | 4800-36  
4800-54 | 4800-72

# CYCLE 4800-36

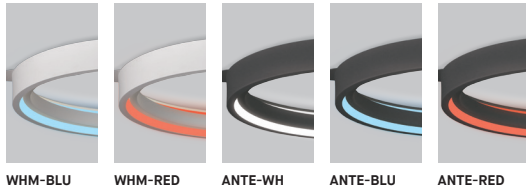
PROJECT PROJÉT
SPEC TYPE
NOTES



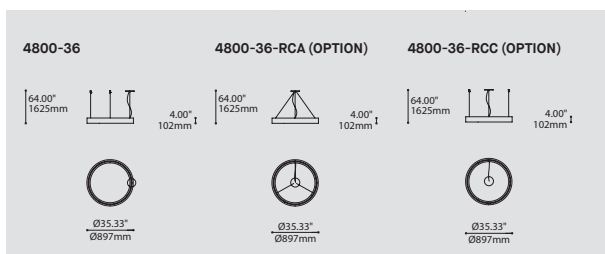
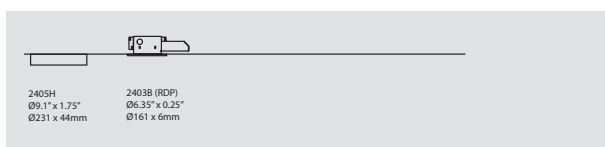
## OPTIONS



## OPTIONAL INSIDE FINISH OF EXTERNAL RING FINI INTERNE OPTIONNEL DE L'ANNEAU EXTÉRIEUR



## MOUNTING OPTIONS OPTIONS DE MONTAGE



ORDERING SPECIFICATION	SPÉCIFICATION DE COMMANDE	CODE
MODEL MODÈLE		4800-36
4800-36	CYCLE 36"	
LIGHT SOURCE SOURCE LUMINEUSE		
(WATTAGE, LAMP TYPE, OTHER INFO)		
LED.40	40W, LED	
LED.80	80W, LED HO	
COLOR TEMPERATURE TEMPÉRATURE DE COULEUR		
30	3000K	
35	3500K	
40	4000K	
VOLTAGE VOLTAGE		
120V	120 VOLT	
277V	277 VOLT	
347V	347 VOLT*	
*ONLY AVAILABLE WITH 40W LIGHT SOURCE		
DIMMING OPTION OPTION DE GRADATION		DV
DV	0-10V DIMMING LED DIMMING DRIVER IS STANDARD IN THIS PRODUCT.	
DRIVER POSITION POSITION DU PILOT		
RDP	RECESSED DRIVER* *3981C (4800-36) *ONLY AVAILABLE WITH 120V & 277V	
CABLE CABLE		AC
AC	AIRCRAFT MOUNTING & CLEAR CABLE, FIELD ADJUSTABLE	
CABLE LENGTH LONGUEUR DE CABLE		
60	60" AIRCRAFT CABLE (STD LENGTH)	
**	CUSTOM AIRCRAFT CABLE LENGTH (PLEASE SPECIFY) FOR OVERALL LENGTH PLEASE CONTACT YOUR EUREKA REPRESENTATIVE.	
MOUNTING OPTION OPTION DE MONTAGE		RC
RC	ROUND CANOPY / PAVILLON ROND FOR RECESSED DRIVER OPTION: 0.25" (2403B) (FOR 4800-36) FOR STANDARD: 1.75" CANOPY (2405H)	
MOUNTING CABLE OPTION OPTION DE MONTAGE DE CABLE		
IF NO OPTION IS SELECTED, AN OFF-CENTERED ROUND CANOPY WITH STRAIGHT AIRCRAFT CABLES IS STANDARD		
RCA	CENTERED ROUND CANOPY - AIRCRAFT CABLES ANGLED TO CENTER*	
RCC	CENTERED ROUND CANOPY - STRAIGHT AIRCRAFT CABLES *NOT AVAILABLE WITH RECESSED DRIVER (RDP)	
CANOPY FINISH FINI PAVILLON		
WHM	MATTE WHITE (ONLY FOR MATTE WHITE RING FINISH)	
CHR	CHROME (ONLY FOR ANTHRACITE FINE TEXTURE RING FINISH)	
RING FINISH FINI ANNEAU		
WHM	MATTE WHITE	
ANTE	ANTHRACITE FINE TEXTURE	
OPTIONAL INSIDE FINISH OF EXTERNAL RING FINI INTERNE OPTIONNEL DE L'ANNEAU EXTÉRIEUR		
IF NO FINISH IS SELECTED THE INSIDE FINISH OF THE EXTERNAL RING WILL BE WHITE		
BLU	BLUE	
RED	RED	
ACCESSORY ACCESSOIRE		
3981C	JUNCTION BOX FOR RECESSED DRIVER OPTION	

## PRODUCT CHARACTERISTICS CARACTÉRISTIQUES DU PRODUIT



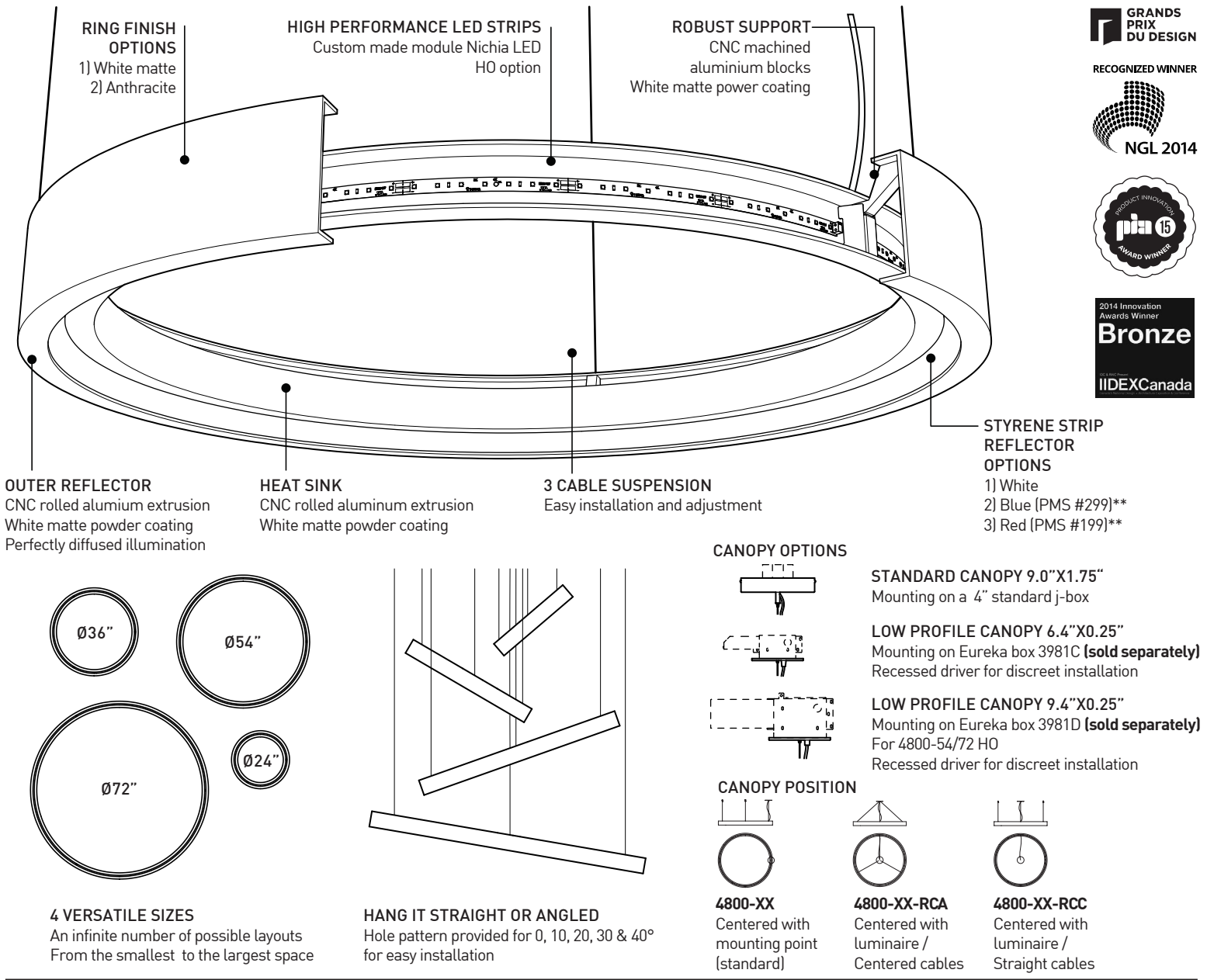
DESIGN:	The perfectly diffused direct/indirect illumination of Cycle creates a luminous halo that fills large spaces with presence and simplicity
INSTALLATION:	Easy to install, adjust and level triple aircraft mounting, available with straight or angled cables on a central canopy.
LIGHT SOURCE:	Custom designed and manufactured light engine featuring high performance discreet LEDs that deliver 500 lm/ft initial lumens in regular output or 1000lm/ft in high output
STRUCTURE:	Seamlessly finished, rolled concentric aluminium extrusions with highly reflective inner matte white polyester powder coating available with outer finish in matte white or textured anthracite. Inner finish insert available in blue or red for a colored glow.
CERTIFIED:	c-CSA-us



# ANATOMY

BIM DIM IES LED

CYCLE



CHARACTERISTICS	4800-24	4800-36	4800-54	4800-72
LIGHT SOURCE	84x Nichia ± 24W	140x Nichia ± 40W	224x Nichia ± 64W	308x Nichia ± 87W
DELIVERED LUMENS	1226 lm (4000K)	2067 lm (4000K)	3333 lm (4000K)	4600 lm (4000K)
LIGHT SOURCE (HO)	168x Nichia ± 48W	280x Nichia ± 80W	448x Nichia ± 128W	616x Nichia ± 174W
DELIVERED LUMENS (HO)	2456 lm (4000K)	4134 lm (4000K)	6666 lm (4000K)	9200 lm (4000K)
MODULE	UL Recognized - Custom design flexible strip - Made in USA			
CRI	85 CRI (typical)			
STRUCTURE	Custom CNC rolled aluminium extrusions (0.125in thickness) / Seamless welding			
LIGHT DISTRIBUTION	Direct/Indirect 50/50			
VOLTAGE*	120V or 277V or 347*	120V or 277V or 347*	120V or 277V or 347*	120V or 277V
DIMMING	0-10V Dimming (standard with this fixture)			
WARRANTY	5 years			
WEIGHT (PACKAGED)	35 lbs	50 lbs	75 lbs	100 lbs

\* 347V not available for HO option  
\*\* Color may vary slightly as it will be affected by the color temperature of the light and by the saturation/reflection onto the colored surface

225 de Liège Ouest, Suite #200  
Montréal (QC), Canada H2P 1H4  
Tel : 514.385.3515 Fax : 514.385.4169  
[www.eurekalighting.com](http://www.eurekalighting.com)

**4800-24 | 4800-36**  
**4800-54 | 4800-72**



**OPTIONS POUR FINITION DES ANNEAUX**  
1) Blanc matte  
2) Anthracite

**BANDE DEL HAUTES PERFORMANCES**  
Module sur mesure DEL Nichia  
Option HO

**3 SUPPORTS ROBUSTES**  
Blocs d'aluminium  
machinés par CNC

**RÉFLECTEUR EXTÉRIEUR**  
Extrusions d'aluminium roulées par CNC  
Peinture électrostatique blanche matte  
Diffuse parfaitement la lumière

**RADIATEUR THERMIQUE**  
Extrusions d'aluminium roulées par CNC  
Peinture électrostatique blanche matte

**SUSPENSION SUR 3 CABLES**  
Installation et ajustements faciles

**OPTIONS POUR RÉFLECTEUR DE STYRÈNE**  
1) Blanc  
2) Bleu (PMS #299)\*\*  
3) Rouge (PMS #199)\*\*

**OPTIONS DE PAVILLON**

**PAVILLON STANDARD 9.0"X1.75"**  
Installation sur boîte de connexion 4" standard

**PAVILLON PROFIL BAS 6.4"X0.25"**  
Installation sur boîte 3981C (vendue séparément)  
Pilot encastré pour une installation discrète

**PAVILLON PROFIL BAS 9.4"X0.25"**  
Installation sur boîte 3981D (vendue séparément)  
Pour 4800-54/72 HO  
Pilot encastré pour une installation discrète

**POSITION DU PAVILLON**

**4800-XX**  
Centré avec le point de montage (standard)

**4800-XX-RCA**  
Centré avec le luminaire / Câbles centrés

**4800-XX-RCC**  
Centré avec le luminaire / Câbles droits

**4 FORMATS POLYVALENTS**  
Une infinité de combinaisons possibles  
Pour les petits aux plus grands espaces

**SUSPENSION DROITE OU EN ANGLE**  
Gabarit de perçage de 0, 10, 20, 30 & 40°  
fourni pour une installation facile



RECOGNIZED WINNER



CARACTÉRISTIQUES	4800-24	4800-36	4800-54	4800-72
SOURCE LUMINEUSE	84x Nichia ± 24W	140x Nichia ± 40W	224x Nichia ± 64W	308x Nichia ± 87W
LUMENS REELS	1226 lm [4000K]	2067 lm [4000K]	3333 lm [4000K]	4600 lm [4000K]
SOURCE LUMINEUSE (HO)	168x Nichia ± 48W	280x Nichia ± 80W	448x Nichia ± 128W	616x Nichia ± 174W
LUMENS REELS (HO)	2456 lm [4000K]	4134 lm [4000K]	6666 lm [4000K]	9200 lm [4000K]
MODULE	Reconnu UL - Bandes DEL sur mesure - Fabriqué aux États-Unis			
IRC	85 IRC (typique)			
STRUCTURE	Extrusions d'aluminium roulées par CNC (0.125po d'épaisseur) / joints de soudure invisibles			
DISTRIBUTION LUMINEUSE	Direct/Indirect 50/50			
VOLTAGE*	120V ou 277V ou 347*	120V ou 277V ou 347*	120V ou 277V ou 347*	120V ou 277V
GRADATION	Gradation 0-10V [standard avec ce luminaire]			
GARANTIE	5 ans			
POIDS (EMBALLÉ)	35 lbs	50 lbs	75 lbs	100 lbs

\* 347V pas disponible pour l'option HO

\*\* La couleur peut varier en fonction de la température lumineuse choisie et de la saturation / réflexion sur la surface colorée



225 de Liège Ouest, Suite #200  
Montréal (QC), Canada H2P 1H4  
Tel : 514.385.3515 Fax : 514.385.4169  
[www.eurekalighting.com](http://www.eurekalighting.com)



4800-24 | 4800-36  
4800-54 | 4800-72

# CYCLE 4800-54/72

[O3] FIXTURE

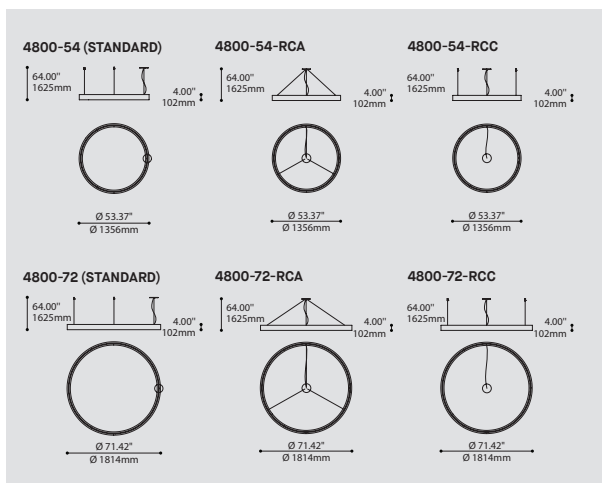
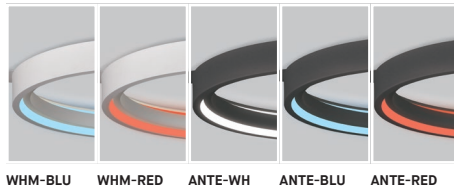
PROJECT PROJÉT
SPEC TYPE
NOTES



## MOUNTING OPTIONS OPTIONS DE MONTAGE

2405H 09.1" x 1.75" Ø231 x 44mm	2403B 06.3" x 0.25" Ø160 x 6.35mm	2405B (RDP) 09.4" x 0.25" Ø240 x 6mm
---------------------------------------	---	--

## FINISH OPTION FINI COULEUR



ORDERING SPECIFICATION SPÉCIFICATION DE COMMANDE	CODE
<b>MODEL MODÈLE</b>	
4800-54 <b>CYCLE 54"</b>	
4800-72 <b>CYCLE 72"</b>	
<b>LIGHT SOURCE SOURCE LUMINEUSE</b>	
(WATTAGE, LAMP TYPE, OTHER INFO)	
4800-54	
LED.64.30	64W, LED 3000K (WARM)
LED.64.40	64W, LED 4000K (NEUTRAL)
<b>LED.128.30</b>	<b>128W, LED HO 3000K (WARM)</b>
LED.128.40	128W, LED HO 4000K (NEUTRAL)
4800-72	
LED.87.30	87W, LED 3000K (WARM)
LED.87.40	87W, LED 4000K (NEUTRAL)
LED.174.30	174W, LED HO 3000K (WARM)
LED.174.40	174W, LED HO 4000K (NEUTRAL)
<b>VOLTAGE VOLTAGE</b>	
120V	<b>120 VOLT</b>
277V	277 VOLT
347V	347 VOLT*
	*ONLY AVAILABLE WITH 64W
<b>DIMMING OPTION OPTION DE GRADATION</b>	<b>DV</b>
DV	0-10V DIMMING LED DIMMING DRIVER IS STANDARD IN THIS PRODUCT
<b>DRIVER POSITION POSITION DU PILOT</b>	
RDP	RECESSED DRIVER* *3981C (64W & 87W) OR 3981D (128W & 174W) ACCESSORY IS REQUIRED *ONLY AVAILABLE WITH 120V & 277V
<b>CABLE CABLE</b>	<b>AC</b>
AC	AIRCRAFT MOUNTING & CLEAR CABLE, FIELD ADJUSTABLE
<b>CABLE LENGTH LONGUEUR DE CABLE</b>	
60	60" AIRCRAFT CABLE (STD LENGTH)
**	CUSTOM AIRCRAFT CABLE LENGTH (PLEASE SPECIFY) FOR OVERALL LENGTH PLEASE CONTACT YOUR EUREKA REPRESENTATIVE
<b>MOUNTING OPTION OPTION DE MONTAGE</b>	<b>RC</b>
RC	ROUND CANOPY / PAVILLON ROND FOR RECESSED DRIVER OPTION (64W & 87W): 0.25" (2403B) FOR RECESSED DRIVER OPTION (128W & 174W): 0.25" (2405B) FOR STANDARD: 1.75" CANOPY (2405H)
<b>MOUNTING CABLE OPTION OPTION DE MONTAGE DE CABLE</b>	
IF NO OPTION IS SELECTED, AN OFF-CENTERED ROUND CANOPY WITH STRAIGHT AIRCRAFT CABLES IS STANDARD	
RCA	CENTERED ROUND CANOPY - AIRCRAFT CABLES ANGLED TO CENTER*
<b>RCC</b>	<b>CENTERED ROUND CANOPY - STRAIGHT AIRCRAFT CABLES</b> *NOT AVAILABLE WITH RECESSED DRIVER (RDP)
<b>CANOPY FINISH FINI PAVILLON</b>	
WHM	<b>MATTE WHITE (ONLY FOR MATTE WHITE RING FINISH)</b>
CHR	CHROME (ONLY FOR ANTHRACITE FINE TEXTURE RING FINISH)
<b>RING FINISH FINI ANNEAUX</b>	
WHM	<b>MATTE WHITE</b>
ANTE	ANTHRACITE FINE TEXTURE
<b>OPTIONAL INSIDE FINISH OF EXTERNAL RING FINI INTERNE OPTIONNELLE DE L'ANNEAU EXTÉRIEUR</b>	
IF NO FINISH IS SELECTED THE INSIDE RING FINISH OF THE EXTERNAL RING WILL BE WHITE	
BLU	BLUE
RED	RED
<b>ACCESSORY ACCESSOIRE</b>	
3981C	JUNCTION BOX FOR RECESSED DRIVER OPTION (64W & 87W)
3981D	JUNCTION BOX FOR RECESSED DRIVER OPTION (128W & 174W)

## PRODUCT CHARACTERISTICS CARACTÉRISTIQUES DU PRODUIT



<b>DESIGN:</b>	The perfectly diffused direct/indirect illumination of Cycle create a luminous halo that fills large spaces with presence and simplicity.
<b>LIGHT SOURCE:</b>	Custom designed and manufactured light engine featuring high performance LEDs that deliver 500 lm/ft initial lumens in regular output or 1000lm/ft in high output.
<b>STRUCTURE:</b>	Seamlessly finished, rolled concentric aluminium extrusions with highly reflective inner matte white polyester powder coating available with outer finish in matte white or textured anthracite. Inner finish insert available in blue or red for a colored glow.
<b>CERTIFIED:</b>	c-CSA-us

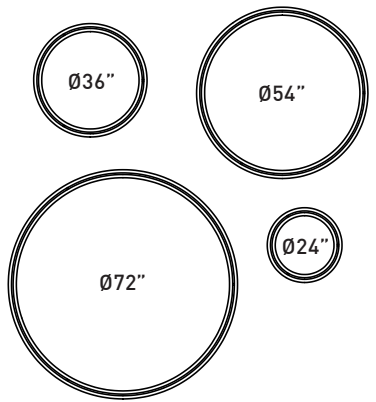
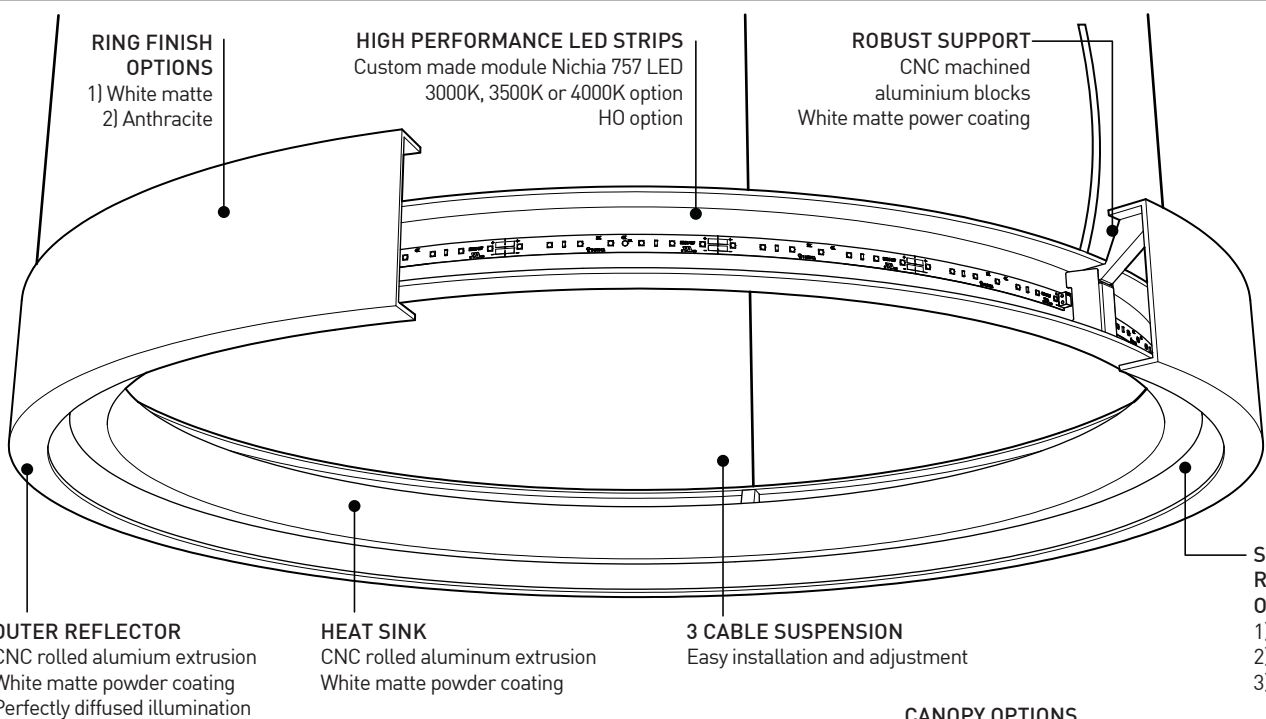


SPECIFICATION

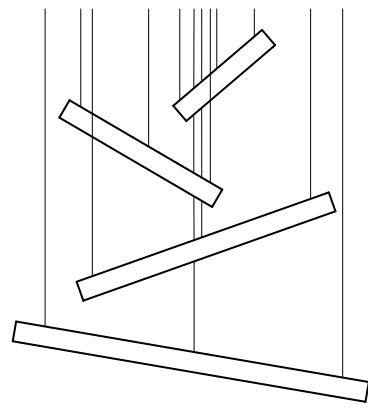
# ANATOMY

BIM DIM IES LED

# CYCLE

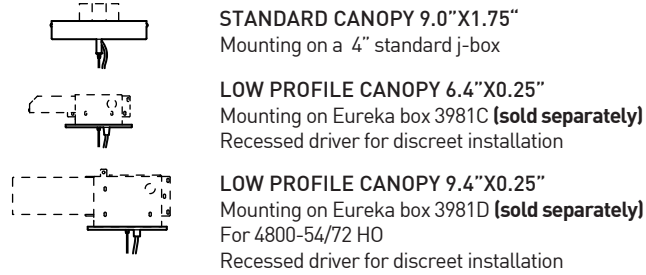


**4 VERSATILE SIZES**  
An infinite number of possible layouts  
From the smallest to the largest space

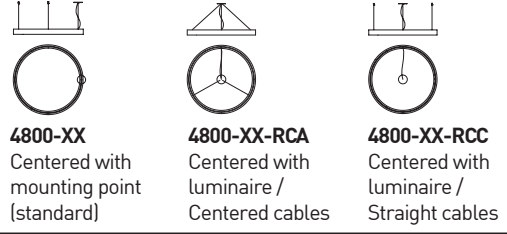


**HANG IT STRAIGHT OR ANGLED**  
Hole pattern provided for 0, 10, 20, 30 & 40°  
for easy installation

**CANOPY OPTIONS**



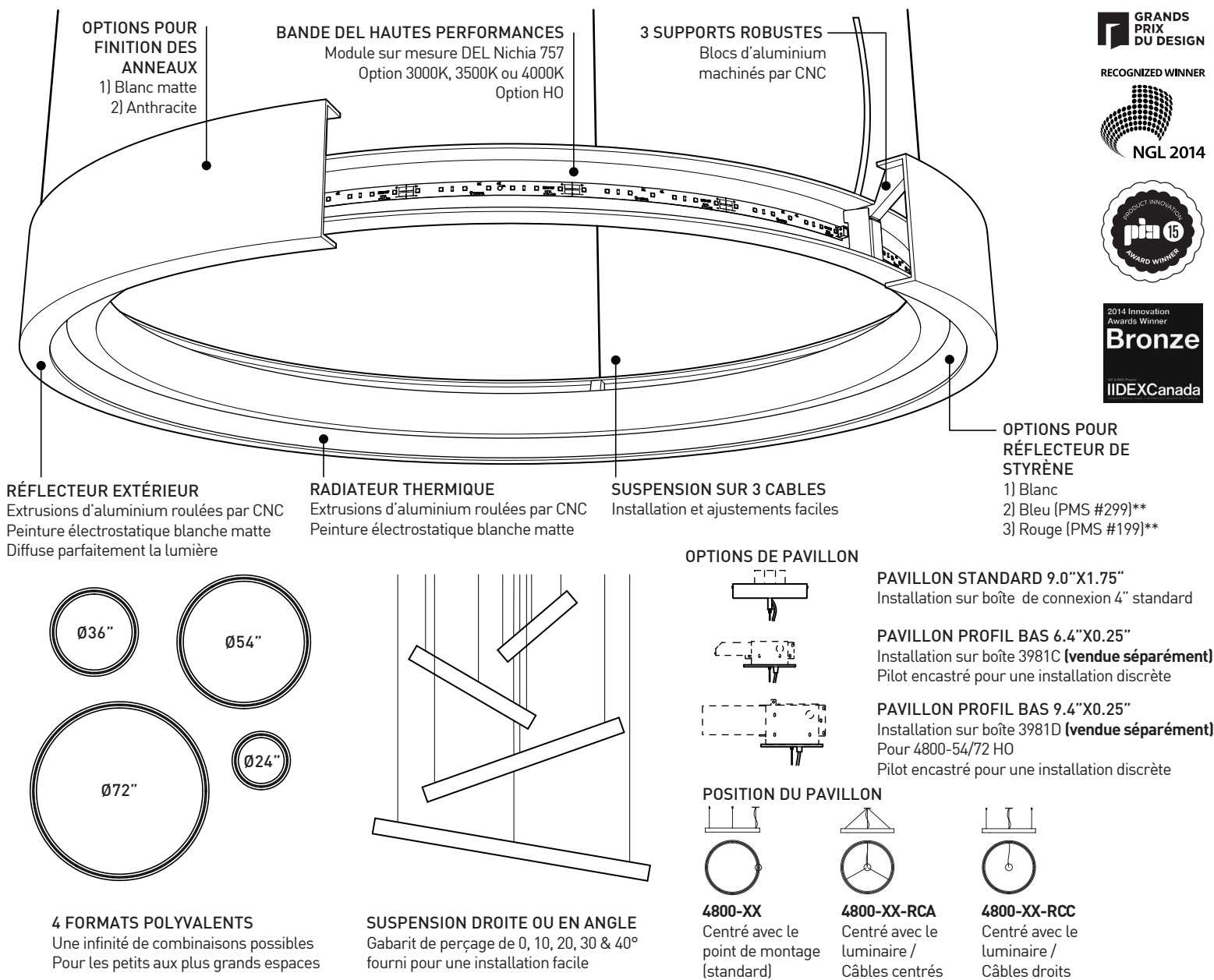
**CANOPY POSITION**



CHARACTERISTICS	4800-24	4800-36	4800-54	4800-72
LIGHT SOURCE	84x Nichia 757 ± 24W	140x Nichia 757 ± 40W	224x Nichia 757 ± 64W	308x Nichia 757 ± 87W
DELIVERED LUMENS	1226 lm (4000K)	2067 lm (4000K)	3333 lm (4000K)	4600 lm (4000K)
LIGHT SOURCE (HO)	168x Nichia 757 ± 48W	280x Nichia 757 ± 80W	448x Nichia 757 ± 128W	616x Nichia 757 ± 174W
DELIVERED LUMENS (HO)	2456 lm (4000K)	4134 lm (4000K)	6666 lm (4000K)	9200 lm (4000K)
MODULE	UL Recognized - Custom design flexible strip - Made in USA			
CRI	85 CRI Typical			
STRUCTURE	Custom CNC rolled aluminium extrusions (0.125in thickness) / Seamless welding			
LIGHT DISTRIBUTION	Direct/Indirect 50/50			
VOLTAGE*	120V or 277V or 347*	120V or 277V or 347*	120V or 277V or 347*	120V or 277V
DIMMING	0-10V Dimming (standard with this fixture)			
WARRANTY	5 years			
WEIGHT (PACKAGED)	35 lbs	50 lbs	75 lbs	100 lbs

\* 347V not available for HO option  
\*\* Color may vary slightly as it will be affected by the color temperature of the light and by the saturation/reflection onto the colored surface





RECOGNIZED WINNER



NGL 2014



CARACTÉRISTIQUES	4800-24	4800-36	4800-54	4800-72
SOURCE LUMINEUSE	84x Nichia 757 ± 24W	140x Nichia 757 ± 40W	224x Nichia 757 ± 64W	308x Nichia 757 ± 87W
LUMENS REELS	1226 lm (4000K)	2067 lm (4000K)	3333 lm (4000K)	4600 lm (4000K)
SOURCE LUMINEUSE (HO)	168x Nichia 757 ± 48W	280x Nichia 757 ± 80W	448x Nichia 757 ± 128W	616x Nichia 757 ± 174W
LUMENS REELS (HO)	2456 lm (4000K)	4134 lm (4000K)	6666 lm (4000K)	9200 lm (4000K)
MODULE	Reconnu UL - Bandes DEL sur mesure - Fabriqué aux États-Unis			
IRC	85 IRC Typique			
STRUCTURE	Extrusions d'aluminium roulées par CNC (0.125po d'épaisseur) / joints de soudure invisibles			
DISTRIBUTION LUMINEUSE	Direct/Indirect 50/50			
VOLTAGE*	120V ou 277V ou 347*	120V ou 277V ou 347*	120V ou 277V ou 347*	120V ou 277V
GRADATION	Gradation 0-10V [standard avec ce luminaire]			
GARANTIE	5 ans			
POIDS (EMBALLÉ)	35 lbs	50 lbs	75 lbs	100 lbs

\* 347V pas disponible pour l'option HO

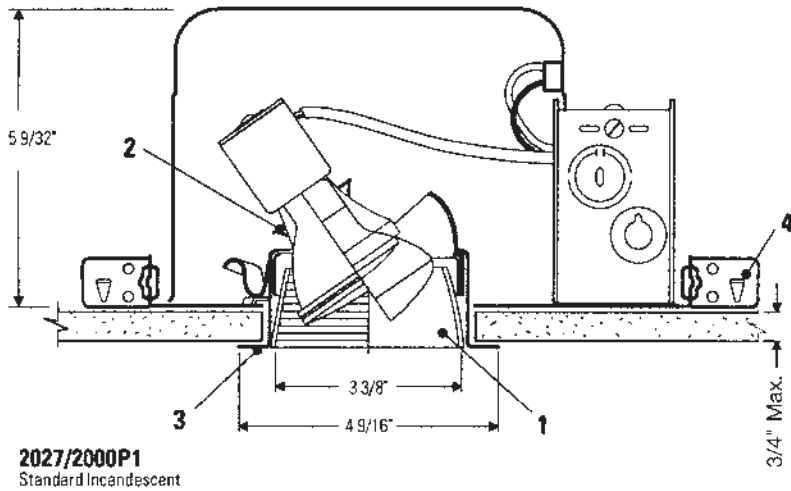
\*\* La couleur peut varier en fonction de la température lumineuse choisie et de la saturation / réflexion sur la surface colorée



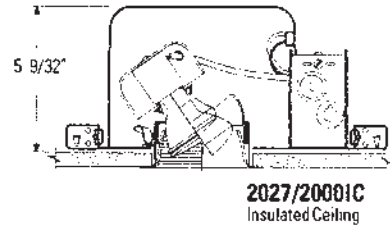
4800-24 | 4800-36  
4800-54 | 4800-72



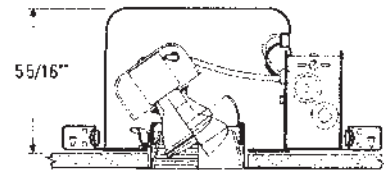
[R] & [W] FIXTURE



**2027/2000P1**  
Standard Incandescent



**2027/2000IC**  
Insulated Ceiling



**2027/2000AIC**  
Air Seal® Insulated Ceiling

Complete Fixture consists of Reflector Trim & Frame-In Kit. Select each separately.

Reflector Trim		Frame-In Kit — See Individual Frame-In Kit Specification Sheets			
<b>2027†</b>	Matte Black Step Baffle	Incandescent			
<b>2027WH</b>	Matte White Step Baffle	Frame-In Kit	Installation Type	Lamping	Height
<b>2029CL†</b>	Specular Clear	<b>2000P1</b>	Standard Non-IC	50W PAR20 75W PAR16 R20	5 9/32"
<b>2029CD†</b>	Clear Diffuse	<b>2000IC</b>	IC	50W, PAR 20	5 9/32"
<b>2029GD†</b>	Specular Gold	<b>2000AIC</b>	IC	43W PAR16	5 3/16"
<b>2029BK†</b>	Specular Black				
<b>2027BNM</b>	Natural Metal™ baffle with Natural Metal™ Flange				

† = add "NM" to sku for Natural Metal™ Flange

### Features

- Aperture:** Aluminum step baffle or cone.
- Lamp Holder Assembly:** Provides 358° horizontal rotation and 0° – 35° vertical adjustment.
- Trim Housing:** Hydroformed aluminum 0.040" (16 ga.) thick. Matte white Natural Metal™ trim flange.
- Frame-In Kit:** (2000P1 standard frame shown.) Other frame shown on the right. See Frame-In Kit specification sheets for more details.

### Labels

UL (Suitable for Damp Locations), I.B.E.W

Job Information	Type:
<b>Job Name:</b>	
<b>Cat. No.:</b>	
<b>Lamp(s):</b>	
<b>Notes:</b>	

Lightolier a Genlyte company www.lightolier.com  
 631 Airport Road, Fall River, MA 02720 • (508) 679-8131 • Fax (508) 674-4710  
 We reserve the right to change details of design, materials and finish.  
 © 2006 Genlyte Group LLC • B0906

LIGHTOLIER®



**[R] & [W] FIXTURE**

**Lighting Performance Data**

PAR Lamps:		Narrow				Medium											
L	W	50W PAR20 NSP (T-H)		55W PAR16 NSP (T-H)		50W PAR20 NFL (T-H)		55W PAR16 NFL (T-H)									
Beam length	Beam width																
D	A																
Distance	Aiming angle																
FC																	
Footcandles																	
<small>Data based on bare lamp photometrics. Dashed lines in beam spreads indicate narrow axes of oval shaped beams. L and W are the outer points where the candlepower drops to 50% of the maximum. FC is the initial footcandles at the center of beam.</small>																	
Footcandles (On Beam Center at 6')		128		139		35		36									
Beam Spread (To 50% Max. CP)		12°		12°		32°		30°									
Max. Candlepower (Candelas)		4600		5000		1250		1300									
Rated Life (Hours)		2000		2000		2000		2000									
<b>0° AIMING ANGLE</b> Illumination on Horizontal Plane 		D	FC	L	W	D	FC	L	W	D	FC	L	W	D	FC	L	W
		6'	128	1.3'	1.3'	6'	139	1.3'	1.3'	3'	139	1.7'	1.7'	3'	144	1.6'	1.6'
<b>30° AIMING ANGLE</b> Illumination on Horizontal Plane 		8'	72	1.7'	1.7'	8'	78	1.7'	1.7'	5'	50	2.9'	2.9'	5'	52	2.7'	2.7'
		10'	46	2.1'	2.1'	10'	50	2.1'	2.1'	7'	26	4.0'	4.0'	7'	27	3.8'	3.8'
		12'	32	2.5'	2.5'	12'	35	2.5'	2.5'	9'	15	5.2'	5.2'	9'	16	4.8'	4.8'
<b>30° AIMING ANGLE</b> Illumination on Vertical Plane 		D	FC	L	W	D	FC	L	W	D	FC	L	W	D	FC	L	W
		5'	120	1.4'	1.2'	5'	130	1.4'	1.2'	3'	90	2.4'	2.0'	3'	94	2.2'	1.9'
		7'	61	2.0'	1.7'	7'	66	2.0'	1.7'	5'	32	3.9'	3.3'	5'	34	3.7'	3.1'
		9'	37	2.5'	2.2'	9'	40	2.5'	2.2'	7'	17	5.5'	4.6'	7'	17	5.1'	4.3'
		11'	25	3.1'	2.7'	11'	27	3.1'	2.7'	9'	10	7.1'	6.0'	9'	10	6.6'	5.6'
		D	FC	L	W	D	FC	L	W	D	FC	L	W	D	FC	L	W
		2'	144	1.7'	0.8'	2'	156	1.7'	0.8'	1'	156	3.9'	1.1'	1'	163	2.7'	1.1'
		3'	64	2.6'	1.3'	3'	69	2.6'	1.3'	2'	39	6.1'	2.3'	2'	41	5.5'	2.1'
		4'	36	3.5'	1.7'	4'	39	3.5'	1.7'	3'	17	9.1'	3.4'	3'	18	8.2'	3.2'
		5'	23	4.3'	2.1'	5'	25	4.3'	2.1'	4'	10	12.2'	4.6'	4'	10	10.9'	4.3'

**Beam Center Location**



This chart locates the distance **C** to the center of the light beam for various distance **D** when the lamp is aimed 30° from vertical, the preferred aiming angle for lighting pictures on the wall,

Distance <b>D</b> (ft.)	1	2	3	4	5	6	7	8	9	10
Distance <b>C</b> (ft.)	1.7	3.5	5.2	6.9	8.7	10.4	12.1	13.8	15.6	17.3

**Job Information**

**Type:**

Lightolier a Genlyte company www.lightolier.com  
 631 Airport Road, Fall River, MA 02720 • (508) 679-8131 • Fax (508) 674-4710  
 We reserve the right to change details of design, materials and finish.  
 © 2006 Genlyte Group LLC • B0906

# 2340-DIM

# Stiletto 24" Dimmable LED Sconce/Bath Bar

[S] FIXTURE

### Dimensions:

Height: 23 ¾"  
Width: 5"

### Description:

Shade: Frosted Acrylic  
Wall Plate: 5" sq  
w/adjustable position  
Extension: 3 ¼"  
Dimmable with Electronic Low Voltage  
or Standard (TRIAC) Incandescent

FIXTURE PROVIDED BY  
URBAN DWELLINGS

### Lamping Options:

LED  
10W, 840 Lumens  
Warm White (3000K), 90 CRI  
120VAC Input w/LED Driver

### Available Finishes:

Satin White

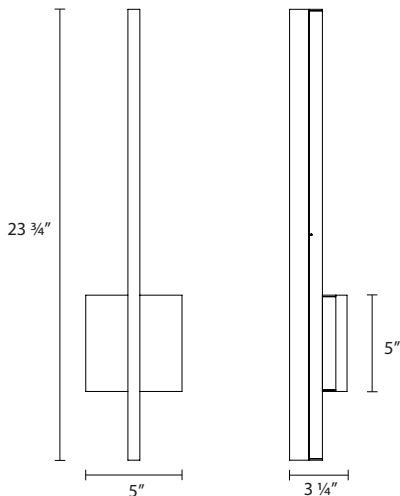
**2340.03-DIM**

Bright Satin Aluminum

**2340.16-DIM**

Satin Black

**2340.25-DIM**



SONNEMAN  
A WAY OF LIGHT





# LED Puff Light



## Areas of application

- Provides general illumination in residential applications. Ideal for use in foyers, hallways, bedrooms, offices, utility work areas, stairways and many other rooms in the house.

M-22PL-840-SQ15-WFL-D

## Product benefits

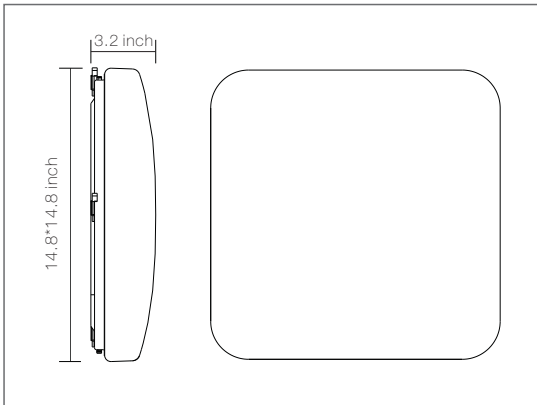
- Efficient luminaire for replacement of compact fluorescent lamp luminaires
- Pleasant homeogenous light
- Extremely long life
- 5 years warranty
- T.H.D:<20%
- Net Weight:720g

## Product features

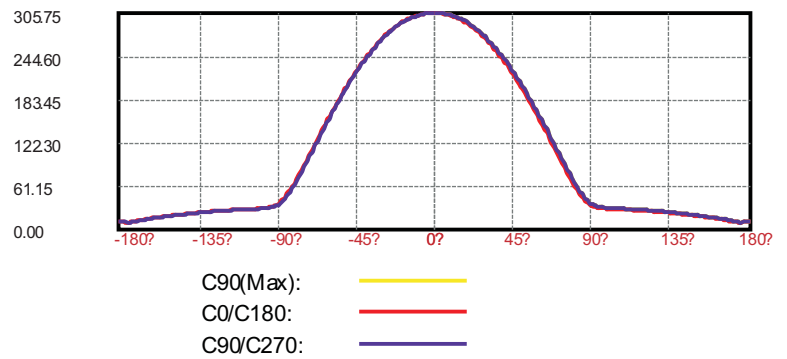
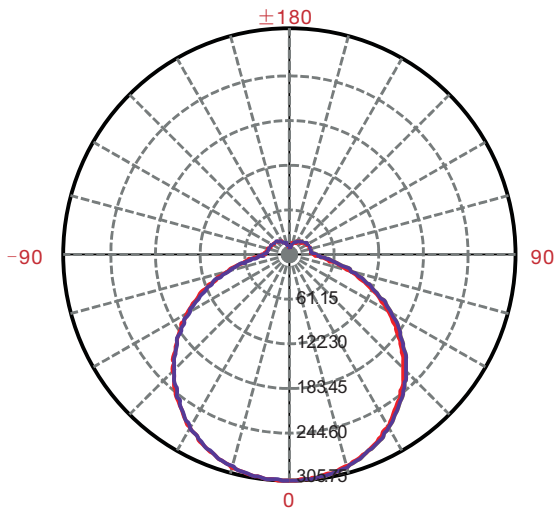
Product Model	Input Voltage	Wattage	Lumens	Efficacy	Power Factor	Rated Life
M-22PL-840-SQ 15-WFL-D	120V	27W	1500 lm	56 lm/W	>0.9	35,000 Hours Rated Life
	Beam Spread	CCT(K)	CRI	Finish	Lamp Base	Dimming Compatibility
	Flood	4000K	≥80	White	N/A	Dimmable



### Dimensional drawings



### Light Distribution Curve [Unit:cd]

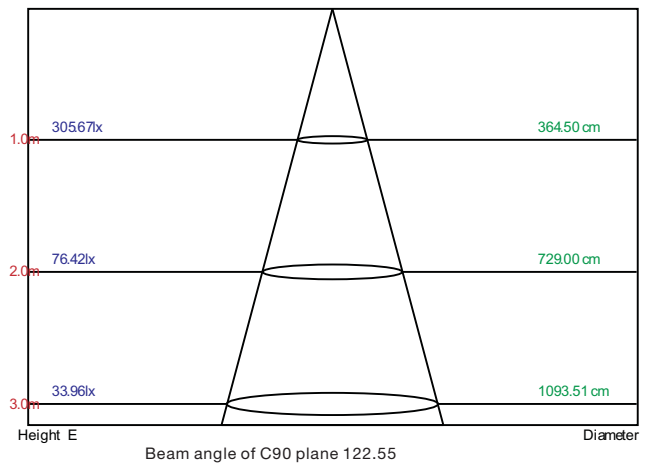


### Lux Distance Curve

Illuminance at a Distance

	Center Beam LUX		Beam Width	
	V	H	V	H
2m	76.42 LUX		7.2m	7.2m
4m	19.10 LUX		14.5m	14.3m
6m	8.49 LUX		21.7m	21.5m
8m	4.78 LUX		28.9m	28.6m
10m	3.06 LUX		36.2m	35.8m
12m	2.12 LUX		43.4m	42.9m

Vert. Spread: 122.2      Horiz. Spread: 121.7





Extrusion model	Finish	Cover	LED Color	LED Output	Length	Mounting	Wire Lead
B5554	A – Anodized	FC – HS Frosted LC- LIGER Frosted Matte CC – HS Clear	27 – 2700K 30 – 3000K 35 – 3500K 40 – 4000K RGB- Red, Green & Blue	LO – Low output MO – Medium output HO – High Output HD- High Density High Output XX- RGB	Any up to 118"	S-spring P- plastic bracket ADJ- adjustable bracket	36 – 36" 72 – 72" 36F - 36" with female connector 72F - 72" with female connector 36M - 36" with male connector 72M - 72" with male connector

TO BE USED ABOVE AND BELOW THE MAIL BOXES TO ILLUMINATE WALL BEHIND - ELEVATION AND DETAIL TO FOLLOW

Output Type	Lumens at 3000k*	Watts per foot
LO	224 Lm/f	3 W/f
MO	530 Lm/f	6 W/f
HO	750 Lm/f	9 W/f
HD	920 Lm/F	11.2 W/f
RGB	243 Lm/f	4.5 W/f

\*Clear cover

Wire out end cap

Wire out back of extrusion

FIXTURE CODE:

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. Note all wire sizes shown on drawings are for copper. Contractor must size up conductors per NEC if aluminum is used.
- 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.

## Thames Street Building

### 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.

## Thames Street Building

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.

## Thames Street Building

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.



## Thames Street Building

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.

## Thames Street Building

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.

## Thames Street Building

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: Wiremold Model RFB2
- 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.

## Thames Street Building

- 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:

## Thames Street Building

- 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.

## Thames Street Building

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 260553 - IDENTIFICATION 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. Identification of power and control cables.
  - 2. Identification for conductors.
  - 3. Underground-line warning tape.
  - 4. Warning labels and signs.
  - 5. Instruction signs.
  - 6. Equipment identification labels.
  - 7. Miscellaneous identification products.

1.3 ACTION SUBMITTALS

- A. Product Data: For each electrical identification product indicated.

1.4 QUALITY ASSURANCE

- A. Comply with ANSI A13.1.
- B. Comply with NFPA 70.
- C. Comply with 29 CFR 1910.144 and 29 CFR 1910.145.
- D. Comply with ANSI Z535.4 for safety signs and labels.
- E. Adhesive-attached labeling materials, including label stocks, laminating adhesives, and inks used by label printers, shall comply with UL 969.

1.5 COORDINATION

- A. Coordinate identification names, abbreviations, colors, and other features with requirements in other Sections requiring identification applications, Drawings, Shop Drawings, manufacturer's wiring diagrams, and the Operation and Maintenance Manual; and with those required by codes, standards, and 29 CFR 1910.145. Use consistent designations throughout Project.

## Thames Street Building

- B. Coordinate installation of identifying devices with completion of covering and painting of surfaces where devices are to be applied.
- C. Coordinate installation of identifying devices with location of access panels and doors.
- D. Install identifying devices before installing acoustical ceilings and similar concealment.

## PART 2 - PRODUCTS

### 2.1 ARMORED AND METAL-CLAD CABLE IDENTIFICATION MATERIALS

- A. Comply with ANSI A13.1 for minimum size of letters for legend and for minimum length of color field for each cable size.
- B. Colors for Cables Carrying Circuits at 600 V and Less:
  - 1. Black letters on a white field.
  - 2. Legend: Indicate voltage.
- C. Vinyl Labels: Preprinted, flexible label laminated with a clear, weather- and chemical-resistant coating and matching wraparound clear adhesive tape for securing ends of legend label.
- D. Self-Adhesive Vinyl Tape: Colored, heavy duty, waterproof, fade resistant; 2 inches (50 mm) wide; compounded for outdoor use.
- E. Heat-Shrink Preprinted Tubes: Flame-retardant polyolefin tube with machine-printed identification label. Sized to suit diameter of and shrinks to fit firmly around cable it identifies. Full shrink recovery at a maximum of 200 deg F (93 deg C). Comply with UL 224.

### 2.2 POWER AND CONTROL CABLE IDENTIFICATION MATERIALS

- A. Comply with ANSI A13.1 for minimum size of letters for legend and for minimum length of color field for each cable size.
- B. Vinyl Labels: Preprinted, flexible label laminated with a clear, weather- and chemical-resistant coating and matching wraparound clear adhesive tape for securing ends of legend label.
- C. Self-Adhesive, Self-Laminating Polyester Labels: Preprinted, 3-mil- (0.08-mm-) thick flexible label with acrylic pressure-sensitive adhesive that provides a clear, weather- and chemical-resistant, self-laminating, protective shield over the legend. Labels sized to fit the cable diameter such that the clear shield overlaps the entire printed legend.
- D. Heat-Shrink Preprinted Tubes: Flame-retardant polyolefin tube with machine-printed identification label. Sized to suit diameter of and shrinks to fit firmly around cable it identifies. Full shrink recovery at a maximum of 200 deg F (93 deg C). Comply with UL 224.

## 2.3 UNDERGROUND-LINE WARNING TAPE

### A. Tape:

1. Recommended by manufacturer for the method of installation and suitable to identify and locate underground electrical and communications utility lines.
2. Printing on tape shall be permanent and shall not be damaged by burial operations.
3. Tape material and ink shall be chemically inert, and not subject to degrading when exposed to acids, alkalis, and other destructive substances commonly found in soils.

### B. Color and Printing:

1. Comply with ANSI Z535.1 through ANSI Z535.5.
2. Inscriptions for Red-Colored Tapes: ELECTRIC LINE.
3. Inscriptions for Orange-Colored Tapes: TELEPHONE CABLE, CATV CABLE, COMMUNICATIONS CABLE.

## 2.4 WARNING LABELS AND SIGNS

### A. Comply with NFPA 70 and 29 CFR 1910.145.

### B. Self-Adhesive Warning Labels: Factory-printed, multicolor, pressure-sensitive adhesive labels, configured for display on front cover, door, or other access to equipment unless otherwise indicated.

### C. Baked-Enamel Warning Signs:

1. Preprinted aluminum signs, punched or drilled for fasteners, with colors, legend, and size required for application.
2. 1/4-inch (6.4-mm) grommets in corners for mounting.
3. Nominal size, 7 by 10 inches (180 by 250 mm).

### D. Warning label and sign shall include, but are not limited to, the following legends:

1. Multiple Power Source Warning: "DANGER - ELECTRICAL SHOCK HAZARD - EQUIPMENT HAS MULTIPLE POWER SOURCES."
2. Workspace Clearance Warning: "WARNING - OSHA REGULATION - AREA IN FRONT OF ELECTRICAL EQUIPMENT MUST BE KEPT CLEAR FOR 36 INCHES (915 MM)."

## 2.5 INSTRUCTION SIGNS

### A. Engraved, laminated acrylic or melamine plastic, minimum 1/16 inch (1.6 mm) thick for signs up to 20 sq. inches (129 sq. cm) and 1/8 inch (3.2 mm) thick for larger sizes.

1. Engraved legend with black letters on white face.
2. Punched or drilled for mechanical fasteners.
3. Framed with mitered acrylic molding and arranged for attachment at applicable equipment.

## Thames Street Building

- B. Adhesive Film Label: Machine printed, in black, by thermal transfer or equivalent process. Minimum letter height shall be 3/8 inch (10 mm).

### 2.6 EQUIPMENT IDENTIFICATION LABELS

- A. Adhesive Film Label: Machine printed, in black, by thermal transfer or equivalent process. Minimum letter height shall be 3/8 inch (10 mm).
- B. Self-Adhesive, Engraved, Laminated Acrylic or Melamine Label: Adhesive backed, with white letters on a dark-gray background. Minimum letter height shall be 3/8 inch (10 mm).
- C. Engraved, Laminated Acrylic or Melamine Label: Punched or drilled for screw mounting. White letters on a dark-gray background. Minimum letter height shall be 3/8 inch (10 mm).

### 2.7 MISCELLANEOUS IDENTIFICATION PRODUCTS

- A. Paint: Comply with requirements in painting Sections for paint materials and application requirements. Select paint system applicable for surface material and location (exterior or interior).
- B. Fasteners for Labels and Signs: Self-tapping, stainless-steel screws or stainless-steel machine screws with nuts and flat and lock washers.

## PART 3 - EXECUTION

### 3.1 INSTALLATION

- A. Verify identity of each item before installing identification products.
- B. Location: Install identification materials and devices at locations for most convenient viewing without interference with operation and maintenance of equipment.
- C. Apply identification devices to surfaces that require finish after completing finish work.
- D. Self-Adhesive Identification Products: Clean surfaces before application, using materials and methods recommended by manufacturer of identification device.
- E. Underground-Line Warning Tape: During backfilling of trenches install continuous underground-line warning tape directly above line at 6 to 8 inches (150 to 200 mm) below finished grade. Use multiple tapes where width of multiple lines installed in a common trench exceeds 16 inches (400 mm) overall.

### 3.2 IDENTIFICATION SCHEDULE

- A. Accessible and Metal-Clad Cables, 600 V or Less, for Service, Feeder, and Branch Circuits More Than 30 A, and 120 V to ground: Identify with self-adhesive vinyl label. Install labels at 30-foot (10-m) maximum intervals.

## Thames Street Building

- B. Power-Circuit Conductor Identification, 600 V or Less: For conductors in vaults, pull and junction boxes, manholes, and handholes, use color-coding conductor tape to identify the phase.
  - 1. Color-Coding for Phase Identification, 600 V or Less: Use colors listed below for ungrounded feeder and service conductors.
    - a. Color shall be factory applied or field applied for sizes larger than No. 8 AWG, if authorities having jurisdiction permit.
    - b. Colors for 208/120-V Circuits:
      - 1) Phase A: Black.
      - 2) Phase B: Red.
      - 3) Phase C: Blue.
- C. Install instructional sign including the color-code for grounded and ungrounded conductors using adhesive-film-type labels.
- D. Control-Circuit Conductor Identification: For conductors and cables in pull and junction boxes, and handholes, use self-adhesive vinyl labels with the conductor or cable designation, origin, and destination.
- E. Control-Circuit Conductor Termination Identification: For identification at terminations provide self-adhesive vinyl labels with the conductor designation.
- F. Auxiliary Electrical Systems Conductor Identification: Identify field-installed alarm, control, and signal connections.
  - 1. Identify conductors, cables, and terminals in enclosures and at junctions, terminals, and pull points. Identify by system and circuit designation.
  - 2. Use system of marker tape designations that is uniform and consistent with system used by manufacturer for factory-installed connections.
  - 3. Coordinate identification with Project Drawings, manufacturer's wiring diagrams, and the Operation and Maintenance Manual.
- G. Locations of Underground Lines: Identify with underground-line warning tape for power, lighting, communication, and control wiring.
  - 1. Install underground-line warning tape for both direct-buried cables and cables in raceway.
- H. Warning Labels for Indoor Cabinets, Boxes, and Enclosures for Power and Lighting: Self-adhesive warning labels.
  - 1. Comply with 29 CFR 1910.145.
  - 2. Identify system voltage with black letters on an orange background.
  - 3. Apply to exterior of door, cover, or other access.
  - 4. For equipment with multiple power or control sources, apply to door or cover of equipment including, but not limited to, the following:
    - a. Power transfer switches.
    - b. Controls with external control power connections.

## Thames Street Building

- I. Operating Instruction Signs: Install instruction signs to facilitate proper operation and maintenance of electrical systems and items to which they connect. Install instruction signs with approved legend where instructions are needed for system or equipment operation.
- J. Equipment Identification Labels: On each unit of equipment, install unique designation label that is consistent with wiring diagrams, schedules, and the Operation and Maintenance Manual. Apply labels to disconnect switches and protection equipment, central or master units, control panels, control stations, terminal cabinets, and racks of each system. Systems include power, lighting, control, communication, signal, monitoring, and alarm systems unless equipment is provided with its own identification.
  1. Labeling Instructions:
    - a. Indoor Equipment: Self-adhesive, engraved, laminated acrylic or melamine label. Unless otherwise indicated, provide a single line of text with 1/2-inch- (13-mm-) high letters on 1-1/2-inch- (38-mm-) high label; where two lines of text are required, use labels 2 inches (50 mm) high.
    - b. Outdoor Equipment: Engraved, laminated acrylic or melamine label.
    - c. Elevated Components: Increase sizes of labels and letters to those appropriate for viewing from the floor.
    - d. Unless provided with self-adhesive means of attachment, fasten labels with appropriate mechanical fasteners that do not change the NEMA or NRTL rating of the enclosure.
  2. Equipment to Be Labeled:
    - a. Panelboards: Typewritten directory of circuits in the location provided by panelboard manufacturer. Panelboard identification shall be self-adhesive, engraved, laminated acrylic or melamine label.
    - b. Enclosures and electrical cabinets.
    - c. Access doors and panels for concealed electrical items.
    - d. Enclosed switches.
    - e. Enclosed circuit breakers.
    - f. Enclosed controllers.
    - g. Variable-speed controllers.
    - h. Push-button stations.
    - i. Contactors.
    - j. Remote-controlled switches, dimmer modules, and control devices.

END OF SECTION 260553

SECTION 260924

LIGHTING CONTROL DEVICES

PART 1 – GENERAL

1.1 SUMMARY

A. Section Includes:

1. Wall box mounted, wall/corner mounted, and ceiling mounted occupancy sensors including dual technology, ultrasonic, and passive infrared technologies. This includes self contained PIR sensors as well as low voltage sensors that work with Switchpacks.

B. Related Sections:

1. Section 265100 – Interior Lighting.

1.2 REFERENCES

A. American National Standards Institute/Institute of Electrical and Electronic Engineers (ANSI/IEEE)

1. C62.41-1991 – Recommended Practice for Surge Voltages in Low Voltage AC Power Circuits.

B. ASTM International (ASTM)

1. D4674 -02a Standard Test Method for Accelerated Testing for Color Stability of Plastics Exposed to Indoor Fluorescent Lighting and Window-Filtered Daylight.

C. National Electrical Manufacturers Association (NEMA)

1. WD1 (R2005) - General Color Requirements for Wiring Devices.

D. Underwriters Laboratories, Inc. (UL):

1. 94 – Flammability Rating
2. 916 – Energy Management Equipment.
3. 508 (2005) - Standard for Industrial Control Equipment.
4. 244A – Appliance Controls

1.3 SYSTEM DESCRIPTION

A. Permanently installed

1. Wall switch occupancy sensors
2. Ceiling mounted occupancy sensors

1.4 SUBMITTALS

A. Submit under provisions of Section 013300.

B. Specification Conformance Document: Indicate whether the submitted equipment:

1. Meets specification exactly as stated.
2. Meets specification via an alternate means and indicate the specific methodology used.

C. Shop Drawings; include:

1. Load schedule indicating actual connected load, load type, and voltage per circuit, circuits and their respective control zones, circuits that are on emergency, and capacity, phase, and corresponding circuit numbers.
2. Schematic of system.

## Thames Street Building

3. Lighting plan clearly marking product type, location and orientation of each sensor.
  - D. Product Data: Catalog specification sheets with performance specifications demonstrating compliance with specified requirements.
- 1.5 QUALITY ASSURANCE
- A. Manufacturer: Minimum 20 years' experience in manufacture of occupancy sensor lighting controls.
  - B. Manufacturer's Quality System: Registered to ISO 9001:2000 Quality Standards, including in-house engineering for product design activities.
  - C. Occupancy Sensing Lighting Controls:
    1. Listed by UL specifically for the required loads. Provide evidence of compliance upon request.
  - D. Installer Qualifications: Installer shall be one who is experienced in performing the work of this section, and who has specialized in installation of work similar to that required for this project.
  - E. Source Limitations: To assure compatibility, obtain occupancy sensors from a single source with complete responsibility over all lighting controls, including accessory products. The use of subcontracted component assemblers is not acceptable.
- 1.6 PROJECT CONDITIONS
- A. Do not install equipment until following conditions can be maintained in spaces to receive equipment:
    1. Ambient temperature: 0° to 40° C (32° to 104° F).
    2. Relative humidity: Maximum 90 percent, non-condensing.
    3. Occupancy Sensors must be protected from dust during installation.
- 1.7 WARRANTY
- A. Provide manufacturer's 5-year parts warranty.
- 1.8 MAINTENANCE
- A. Make ordering of new equipment for expansions, replacements, and spare parts available to end user.
  - B. Make new replacement parts available for minimum of ten years from date of manufacture.
  - C. Provide factory direct technical support.

## PART 2- PRODUCTS

- 2.1 MANUFACTURERS
- A. Acceptable Manufacturer: Eaton Lighting Systems (formerly Cooper Controls)
  - B. Substitutions: Allowed under provisions of Division 1.
- 2.2 SENSOR PERFORMANCE REQUIREMENTS
- A. Sensing mechanism:
    1. Infrared: Utilize multiple segmented lens, with internal grooves to eliminate dust and residue build-up.
    2. Dual technology:



## Thames Street Building

- a. Utilize multiple segmented lens, with internal grooves to eliminate dust and residue build-up.
  - b. Utilize an operating frequency of 32 kHz or 40 kHz that shall be crystal controlled to operate within plus or minus 0.005% tolerance.
  - c. Incorporate Doppler shift ultrasonic and passive infrared motion detection technologies. Products that react to noise or ambient sound shall not be considered.
- B. Power failure memory:
1. Controls incorporate non-volatile memory. Should power be interrupted and subsequently restored, settings and parameters saved in protected memory shall not be lost.
- C. Designed and tested to withstand discharges without impairment of performance when subjected to discharges of 15,000 volts per IEC 801-2.
- D. Products tested in identical manner, complaint to NEMA WD 7 -2011 Occupancy Motion Sensors Standards.
- E. Sensor shall have time delays from 10 to 30 min.
- F. When specified, sensors shall automatically adjust time delay and sensitivity settings.
- G. All sensors shall provide an LED as a visual means of indication at all times to verify that motion is being detected during both testing and normal operation.
- H. All sensors shall have readily accessible, user adjustable settings for time delay and sensitivity. Settings shall be located on the sensor (not the control unit) and shall be recessed to limit tampering.
- I. Where specified, sensor shall have an internal additional isolated relay with Normally Open, Normally Closed, and Common outputs for use with HVAC control, Data Logging and other control options. Sensors utilizing separate components or specially modified units to achieve this function are not acceptable.

### 2.3 LINE VOLTAGE CEILING MOUNTED OCCUPANCY SENSORS

- A. Product: OAC-DT-2000-MV, OAC-DT-2000-DMV
- B. Provide all necessary mounting hardware and instructions.
- C. Capable of detection of occupancy at desktop level up to 300 square feet, and gross motion up to 1000 square feet
- D. Shall accommodate loads from 0-800 watts at 120 volts; 0 to 1200 watts at 277 volts and shall have 180-degree coverage capability.
- E. Shall be able to have their visible plastic parts replaced, for color changes in the field, without removing the body of the control from the wall and without requiring special tools.
- F. Shall utilize Zero Crossing Circuitry which increases relay life, protects from the effects of inrush current, and increases sensor's longevity.
- G. Shall have no leakage current to load, in manual or in Auto/Off Mode for safety purposes and shall have voltage drop protection.
- H. Where specified, dual relay sensors shall offer daylighting foot-candle adjustment control for either or both relays.

### 2.4 OCCUPANCY WALL SWITCHES

- A. Product: OSW-P-0451-MV-\*, ONW-P-1001-MV-\*, ONW-P-1001-347-\*, ONW-P-1001-DMV-\*, ONW-P-1001-D347-\*, ONW-P-1001-SP-\*, ONW-P-1001-RR7-\*
- B. Capable of detection of occupancy at desktop level up to 300 square feet, and gross motion

up to 1000 square feet

- C. Shall accommodate loads from 0-800 watts at 120 volts; 0 to 1200 watts at 277 volts and shall have 180 degree coverage capability.
- D. Shall be able to have their visible plastic parts replaced, for color changes in the field, without removing the body of the control from the wall and without requiring special tools.
- E. Shall utilize Zero Crossing Circuitry which increases relay life, protects from the effects of inrush current, and increases sensor's longevity.
- F. Shall have no leakage current to load, in manual or in Auto/Off Mode for safety purposes and shall have voltage drop protection.
- G. Where specified, wall switch sensors shall provide a field selectable option to convert sensor operation from Automatic On to Manual On.
- H. Where specified, dual relay sensors shall offer daylighting footcandle adjustment control for either or both relays.

## 2.5 SOURCE QUALITY CONTROL

- A. Perform full-function testing on 100% of all system components and panel assemblies at the factory.

## PART 3- EXECUTION

### 3.1 INSTALLATION

- A. Install equipment in accordance with manufacturer's installation instructions.
- B. Provide complete installation of system in accordance with Contract Documents.
- C. Provide equipment at locations and in quantities indicated on Drawings. Provide any additional equipment required to provide control intent.

### 3.2 TESTING

- A. Upon completion of all wiring and after all fixtures are installed and lamped, a representative shall check the installation prior to energizing the system. Each installed occupancy sensor shall be tested in the Test Mode to see that lights turn OFF and on based on occupancy.
- B. At the time testing, the owner's representative shall be thoroughly instructed in the proper operation of the system.

END OF SECTION

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 graft 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.

## Thames Street Building

### 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.

## Thames Street Building

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.

## Thames Street Building

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.

## Thames Street Building

3. Electronic trip circuit breakers with rms sensing; field-replaceable rating plug or field-replicable 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.

## Thames Street Building

- 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.



## Thames Street Building

- 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 262713

ELECTRICITY METERING

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 equipment for electricity metering by utility company.

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.

1.5 DELIVERY, STORAGE, AND HANDLING

- A. Receive, store, and handle modular meter center according to NECA 400.

1.6 COORDINATION

- A. Electrical Service Connections: Coordinate with utility companies and components they furnish as follows:
  1. Comply with requirements of utilities providing electrical power services.
  2. Coordinate installation and connection of utilities and services, including provision for electricity-metering components.

PART 2 - PRODUCTS

2.1 EQUIPMENT FOR ELECTRICITY METERING BY UTILITY COMPANY

- A. Meters will be furnished by utility company.

## Thames Street Building

- B. Modular Meter Center: Factory-coordinated assembly of a main service disconnect device, wireways, tenant meter socket modules, and tenant feeder circuit breakers arranged in adjacent vertical sections. Assembly shall be complete with interconnecting buses and other features as specified below.
1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
    - a. Eaton Electrical Inc.; Cutler-Hammer Business Unit.
    - b. General Electric Company; GE Consumer & Industrial - Electrical Distribution.
    - c. Siemens Energy & Automation, Inc.
    - d. Square D; a brand of Schneider Electric.
  2. Comply with requirements of utility company for meter center.
  3. Housing: NEMA 250, Type 3R enclosure.
  4. Minimum Short-Circuit Rating: 42,000 A symmetrical at rated voltage.
  5. Main Disconnect Device: Circuit breaker, series-combination rated for use with downstream feeder and branch circuit breakers.
  6. Tenant Feeder Circuit Breakers: Series-combination-rated molded-case units, rated to protect circuit breakers in downstream tenant and house load centers that have 10,000A interrupting capacity.
    - a. Identification: Complying with requirements in Section 260553 "Identification for Electrical Systems" with legend identifying tenant's address.
    - b. Physical Protection: Tamper resistant, with hasp for padlock.
  7. Meter Socket: Rating coordinated with indicated tenant feeder circuit rating.

## PART 3 - EXECUTION

### 3.1 INSTALLATION

- A. Comply with equipment installation requirements in NECA 1.
- B. Install meters furnished by utility company. Install raceways and equipment according to utility company's written requirements. Provide empty conduits for metering leads and extend grounding connections as required by utility company.

### 3.2 IDENTIFICATION

- A. Comply with requirements for identification specified in Section 260553 "Identification for Electrical Systems."
  1. Series Combination Warning Label: Self-adhesive type, with text as required by NFPA 70.
  2. Equipment Identification Labels: Adhesive film labels with clear protective overlay.

END OF SECTION 262713

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. 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

- 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, 125 V, 20 A: Comply with NEMA WD 1, NEMA WD 6 Configuration 5-20R, UL 498, and FS W-C-596.
- B. General Use: Pass & Seymour BR20-I or equal.
- C. Tamper Resistant: Pass & Seymour TR63-I or equal.
- D. Electric Range: Pass & Seymour 3854/3854-40 or equal.

### 2.4 GFCI RECEPTACLES

- A. General Description:
  - 1. Straight blade, 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: Pass & Seymour BR20A1-I or equal.
- C. Tamper Resistant GFCI: Pass & Seymour 2095TRI or equal.

### 2.5 CORD AND PLUG SETS

- A. Description:
  - 1. Match voltage and current ratings and number of conductors to requirements of equipment being connected.

## Thames Street Building

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. SPST switches, Pass & Seymour CS20AC1-I or equal.
- D. 3-Way Switches, Pass & Seymour CS20AC3-I or equal.
- E. 4-Way Switches, Pass & Seymour CS20AC4-I or equal.
- F. Boiler Cut-off switches, Pass & Seymour PS20AC2-RED or equal.
- G. Telephone Outlet:
  1. Description: Single RJ-45 jack for terminating 100-ohm, balanced, four-pair UTP; TIA/EIA-568-B.1; complying with Category 5e. Comply with UL 1863.

### 2.7 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.

### 2.8 FINISHES

- A. Device Color:
  1. Per architect 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:

## Thames Street Building

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. 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 263213  
ENGINE GENERATORS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. This Section includes packaged engine-generator sets suitable for use in applications with the features as specified and indicated where the engine generators will be used as the standby power source for the system.

1.3 DEFINITIONS

- A. Operational Bandwidth: The total variation from the lowest to highest value of a parameter over the range of conditions indicated, expressed as a percentage of the nominal value of the parameter.
- B. Emergency Standby Power (ESP): Per ISO 8528: The maximum power available during a variable electrical power sequence, under the stated operating conditions, for which a generating set is capable of delivering in the event of a utility power outage or under test conditions for up to 200 h of operation per year with the maintenance intervals and procedures being carried out as prescribed by the manufacturers. The permissible average power output (Ppp) over 24 h of operation shall not exceed 70 % of the ESP unless otherwise agreed by the RIC engine manufacturer.

1.4 ACTION SUBMITTALS

- A. Product Data: For each type of packaged engine generator indicated. Include rated capacities, operating characteristics, and furnished specialties and accessories. In addition, include the following:
  - 1. Thermal damage curve for generator.
  - 2. Time-current characteristic curves for generator protective device.
  - 3. Sound test data, based on a free field requirement.
- B. Shop Drawings: Detail equipment assemblies and indicate dimensions, weights, and location and size of each field connection.
  - 1. Dimensioned outline plan and elevation drawings of engine-generator set and other components specified.
  - 2. Wiring Diagrams: Control interconnection, Customer connections.
- C. Certifications:
  - 1. Submit statement of compliance which states the proposed product(s) is certified to the emissions standards required by the location and application of the Project.

1.5 INFORMATIONAL SUBMITTALS

- A. Warranty:
  - 1. Submit manufacturer's warranty statement to be provided for this Project.

1.6 QUALITY ASSURANCE

- A. Installer Qualifications: Manufacturer's authorized representative who is trained and approved for installation of units required for this Project.
- B. Manufacturer Qualifications: A qualified manufacturer. Maintain, within 200 miles of Project site, a service center capable of providing training, parts, and emergency maintenance repairs.
- C. Source Limitations: Obtain packaged generator sets and auxiliary components through one source from a single manufacturer.
- D. Comply with NFPA 70 (National Electrical Code. Equipment shall be suitable for use in systems in compliance to Article 700, 701, and 702).
- E. Comply with NFPA 110 (Emergency and Standby Power Systems) requirements for Level 1 emergency power supply system.
- F. Comply with UL 2200.
- G. Noise Emission: Comply with applicable state and local government requirements for maximum noise level at adjacent property boundaries due to sound emitted by generator set including engine, engine exhaust, engine cooling-air intake and discharge, and other components of installation.

1.7 PROJECT CONDITIONS

- A. Environmental Conditions: Engine-generator system shall withstand the following environmental conditions without mechanical or electrical damage or degradation of performance capability:
  - 1. Ambient Temperature: Minus 15 to plus 40 deg C.
  - 2. Relative Humidity: 0 to 95 percent.
  - 3. Altitude: Sea level to 1000 feet (300 m).

1.8 WARRANTY

- A. Base Warranty: Manufacturer shall provide base warranty coverage on the material and workmanship of the generator set for a minimum of twenty-four (24) months for Standby product and twelve (12) months for Prime/Continuous product from registered commissioning and start-up.

## PART 2 - PRODUCTS

### 2.1 MANUFACTURERS

- A. Manufacturers: Only approved bidders shall supply equipment provided under this contract. Equipment by other named suppliers that meets the requirement of this specification are acceptable if approved not less than 2 weeks before scheduled bid date.
1. Cummins Power Generation
  2. Caterpillar
  3. Kohler
  4. Generac

### 2.2 ENGINE-GENERATOR SET

- A. Factory-assembled and -tested, engine-generator set.
- B. Mounting Frame: Maintain alignment of mounted components without depending on concrete foundation; and have lifting attachments.
1. Rigging Information: Indicate location of each lifting attachment, generator-set center of gravity, and total package weight in submittal drawings.
- C. Capacities and Characteristics:
1. Alternator shall be capable of accepting maximum load in a single step and be capable of recovering to a minimum of 90% of rated no load voltage. Following the application of the specified kVA load at near zero power factor applied to the generator set.
  2. Nameplates: For each major system component to identify manufacturer's name and address, and model and serial number of component. The engine-generator nameplate shall include information of the power output rating of the equipment.
- D. Generator-Set Performance:
1. Steady-State Voltage Operational Bandwidth: 0.5 percent of rated output voltage from no load to full load.
  2. Transient Voltage Performance: Not more than 20 percent variation for 50 percent step-load increase or decrease. Voltage shall recover and remain within the steady-state operating band within three seconds. On application of a 100% load step the generator set shall recover to stable voltage within 10 seconds.
  3. Steady-State Frequency Operational Bandwidth: 0.25 percent of rated frequency from no load to full load.
  4. Steady-State Frequency Stability: When system is operating at any constant load within the rated load, there shall be no random speed variations outside the steady-state operational band and no hunting or surging of speed.
  5. Transient Frequency Performance: Less than 5 percent variation for 50 percent step-load increase or decrease. Frequency shall recover and remain within the steady-state operating band within five seconds. On application of a 100% load step the generator set shall recover to stable frequency within 10 seconds.

6. Output Waveform: At full load, harmonic content measured line to line or line to neutral shall not exceed 5 percent total and 3 percent for any single harmonic. Telephone influence factor, determined according to NEMA MG 1, shall not exceed 50.
8. Start Time: Comply with NFPA 110, Level 1, Type 10, system requirements. Ambient Condition Performance: Engine generator shall be designed to allow operation at full rated load in an ambient temperature under site conditions, based on highest ambient condition. Ambient temperature shall be as measured at the air inlet to the engine generator for enclosed units, and at the control of the engine generator for machines installed in equipment rooms.
9. Noise Output: Engine generator shall be tested by the manufacturer per ANSI S12.34. Data documenting performance shall be provided with submittal documentation.

## 2.3 ENGINE

- A. Fuel: Natural gas.
- B. Rated Engine Speed: 1800 rpm.
- C. Lubrication System: The following items are mounted on engine or skid:
  1. Lube oil pump: shall be positive displacement, mechanical, full pressure pump.
  2. Filter and Strainer: Provided by the engine manufacturer of record to provide adequate filtration for the prime mover to be used.
  3. Crankcase Drain: Arranged for complete gravity drainage to an easily removable container with no disassembly and without use of pumps, siphons, special tools, or appliances.
- D. Engine Fuel System: The engine fuel system shall be installed in strict compliance to the engine manufacturer's instructions.
- E. Coolant Jacket Heater: Electric-immersion type, factory installed in coolant jacket system. Comply with NFPA 110 requirements for Level 1 equipment for heater capacity and performance.
  1. Designed for operation on a single 120-volt AC, single phase, 60 hertz power connection. Heater voltage shall be shown on the project drawings.
  2. Provided with a 12VDC thermostat, installed at the engine thermostat housing
- F. Governor: Adjustable isochronous, with speed sensing.
- G. Cooling System: Closed loop, liquid cooled, with radiator factory mounted on engine-generator-set mounting frame.
  1. The generator set manufacturer shall provide prototype test data for the specific hardware proposed demonstrating that the machine will operate at rated standby load in an outdoor ambient condition of 40C.
  2. Coolant: Solution of 50 percent ethylene-glycol-based antifreeze and 50 percent water, with anticorrosion additives as recommended by engine manufacturer.
  3. Size of Radiator overflow tank: Adequate to contain expansion of total system coolant from cold start to 110 percent load condition.
  4. Expansion Tank: Constructed of welded steel plate and rated to withstand maximum closed-loop coolant system pressure for engine used. Equip with gage glass and petcock.
  5. Temperature Control: Self-contained, thermostatic-control valve modulates coolant flow automatically to maintain optimum constant coolant temperature as recommended by engine manufacturer.

6. Duct Flange: Generator sets installed indoors shall be provided with a flexible radiator duct adapter flange.
- H. Muffler/Silencer: Selected with performance as required to meet sound requirements of the application, sized as recommended by engine manufacturer and selected with exhaust piping system to not exceed engine manufacturer's engine backpressure requirements. For generator sets with outdoor enclosures the silencer shall be inside the enclosure.
- I. Air-Intake Filter: Engine-mounted air cleaner with replaceable dry-filter element and restriction indicator.
- J. Starting System: 12VDC, as recommended by the engine manufacturer; electric, with negative ground.
  1. Components: Sized so they will not be damaged during a full engine-cranking cycle with ambient temperature at maximum specified in Part 1 "Project Conditions" Article.
  2. Cranking Cycle: As required by NFPA 110 for level 1 systems.
  3. Battery Cable: Size as recommended by engine manufacturer for cable length as required. Include required interconnecting conductors and connection accessories.
  4. Battery Compartment: Factory fabricated of metal with acid-resistant finish.
  5. Battery-Charging Alternator: Factory mounted on engine with solid-state voltage regulation. The battery charging alternator shall have sufficient capacity to recharge the batteries with all parasitic loads connected within 4 hours after a normal engine starting sequence.
  6. Battery Chargers: Unit shall comply with UL 1236 and include the following features:
    - a. Operation: Equalizing-charging rate of 10 A shall be initiated automatically after battery has lost charge until an adjustable equalizing voltage is achieved at battery terminals. Unit shall then be automatically switched to a lower float-charging mode and shall continue to operate in that mode until battery is discharged again.
    - b. Automatic Temperature Compensation: Adjust float and equalize voltages for variations in ambient temperature from minus 40 deg C to plus 60 deg C to prevent overcharging at high temperatures and undercharging at low temperatures.
    - c. Automatic Voltage Regulation: Maintain constant output voltage regardless of input voltage variations up to plus or minus 10 percent.
    - d. Ammeter and Voltmeter: Flush mounted in door. Meters shall indicate charging rates.
    - e. Safety Functions: Sense abnormally low battery voltage and close contacts providing low battery voltage indication on control and monitoring panel. Sense high battery voltage and loss of ac input or dc output of battery charger. Either condition shall close contacts that provide a battery-charger malfunction indication at system control and monitoring panel.
    - f. Enclosure and Mounting: NEMA 250, Type 1, wall-mounted cabinet.

## 2.4 CONTROL AND MONITORING

- A. Engine generator control shall be microprocessor based and provide automatic starting, monitoring, protection and control functions for the unit
- B. Automatic Starting System Sequence of Operation: When mode-selector switch on the control and monitoring panel is in the automatic position, remote-control contacts in one or more separate automatic transfer switches initiate starting and stopping of generator set. When mode-selector switch is switched to the on position, generator set starts. The off position of same switch initiates generator-set shutdown. (Switches with different configurations but equal functions are acceptable.) When generator set is running, specified system or equipment failures or derangements automatically shut down generator set

and initiate alarms. Operation of the local (generator set-mounted) and/or remote emergency-stop switch also shuts down generator set.

- C. Manual Starting System Sequence of Operation: Switching on-off switch on the generator control panel to the on position starts generator set. The off position of same switch initiates generator-set shutdown. When generator set is running, specified system or equipment failures or derangements automatically shut down generator set and initiate alarms. Operation of the local (generator set-mounted) and/or remote emergency-stop switch also shuts down generator set.
- D. Configuration: Operating and safety indications, protective devices, system controls, engine gages and associated equipment shall be grouped in a common control and monitoring panel. Mounting method shall isolate the control panel from generator-set vibration. AC output power circuit breakers and other output power equipment shall not be mounted in the control enclosure.
- E. Indicating and Protective Devices and Controls: As required by NFPA 110 for Level 1 system, and the following:
  - 1. AC voltmeter (3-phase, line to line and line to neutral values).
  - 2. AC ammeter (3-phases).
  - 3. AC frequency meter.
  - 4. AC kVA output (total and for each phase). Display shall indicate power flow direction.
  - 5. Ammeter-voltmeter displays shall simultaneously display conditions for all three phases.
  - 6. Emergency Stop Switch: Switch shall be a red “mushroom head” pushbutton device complete with lock-out/tag-out provisions. Depressing switch shall cause the generator set to immediately stop the generator set and prevent it from operating.
  - 7. Fault Reset Switch: Supply a dedicated control switch to reset/clear fault conditions.
  - 8. DC voltmeter (alternator battery charging).
  - 9. Engine-coolant temperature gage.
  - 10. Engine lubricating-oil pressure gage.
  - 11. Running-time meter.
  - 12. Generator-voltage and frequency digital raise/lower switches. Rheostats for these functions are not acceptable. The control shall adjustment of these parameters in a range of plus or minus 5% of the voltage and frequency operating set point (not nominal voltage and frequency values.)
  - 13. AC Protective Equipment: The control system shall include over/under voltage, over current, short circuit, loss of voltage reference, and over excitation shut down protection. There shall be an overload warning, and overcurrent warning alarm.
  - 14. Status LED indicating lamps to indicate remote start signal present at the control, existing alarm condition, not in auto, and generator set running.
  - 15. A graphical display panel with appropriate navigation devices shall be provided to view all information noted above, as well as all engine status and alarm/shutdown conditions (including those from an integrated engine emission control system). The display shall also include integrated provisions for adjustment of the gain and stability settings for the governing and voltage regulation systems.
  - 16. Panel lighting system to allow viewing and operation of the control when the generator room or enclosure is not lighted.
  - 17. DC control Power Monitoring: The control system shall continuously monitor DC power supply to the control, and annunciate low or high voltage conditions. It shall also provide an alarm indicating imminent failure of the battery bank based on degraded voltage recover on loading (engine cranking).
- F. Control Heater: Generator sets that are installed in outdoor enclosures, or are in tropical or coastal environments shall be provided with control heaters for anti-condensation protection.

- G. Common Remote Audible Alarm: Comply with NFPA 110 requirements for Level 1 systems. Include necessary contacts and terminals in control and monitoring panel.
  - 1. Overcrank shutdown.
  - 2. Coolant low-temperature alarm.
  - 3. Control switch not in auto position.
  - 4. Battery-charger malfunction alarm.
  - 5. Battery low-voltage alarm.
- H. Remote Alarm Annunciator: Comply with NFPA 110. An LED labeled with proper alarm conditions shall identify each alarm event and a common audible signal shall sound for each alarm condition.
- I. Remote Emergency-Stop Switch: Flush; wall mounted, unless otherwise indicated; and labeled. Push button shall be protected from accidental operation.

## 2.5 GENERATOR OVERCURRENT AND FAULT PROTECTION

- A. Generator Overcurrent Protection: The generator set shall be provided with a UL Listed/CSA Certified protective device that is coordinated with the alternator provided to prevent damage to the generator set on any possible overload or overcurrent condition external to the machine. The protective device shall be listed as a utility grade protective device under UL category NRGU. The control system shall be subject to UL follow-up service at the manufacturing location to verify that the protective system is fully operational as manufactured. Protector shall perform the following functions:
  - 1. Initiates a generator kW overload alarm when generator has operated at an overload equivalent to 110 percent of full-rated load for 60 seconds. Indication for this alarm is integrated with other generator-set malfunction alarms.
  - 2. Under single phase or multiple phase fault conditions, or on overload conditions, indicates an alarm conditions when the current flow is in excess of 110% of rated current for more than 10 seconds.
  - 3. Under single phase or multiple phase fault conditions, operates to switch off alternator excitation at the appropriate time to prevent damage to the alternator.
  - 4. The operator panel shall indicate the nature of the fault condition as either a short circuit or an overload.
  - 5. Senses clearing of a fault by other overcurrent devices and controls recovery of rated voltage to avoid overshoot greater than 120% of nominal voltage.
  - 6. The protective system provided shall not include an instantaneous trip function.
- B. Ground-Fault Indication: Comply with NFPA 70, "Emergency System" signals for ground-fault. Integrate ground-fault alarm indication with other generator-set alarm indications.

## 2.6 GENERATOR, EXCITER, AND VOLTAGE REGULATOR

- A. Comply with NEMA MG 1.
- B. Drive: Generator shaft shall be directly connected to engine shaft. Exciter shall be rotated integrally with generator rotor.
- C. Class H Electrical Insulation shall be used for systems of under 690V.
- D. Temperature Rise: 105 C over a 40C environment.

- E. Construction shall prevent mechanical, electrical, and thermal damage due to vibration, overspeed up to 125 percent of rating, and heat during operation at 110 percent of rated capacity.
- F. Permanent Magnet Generator (PMG) shall provide excitation power for optimum motor starting and short circuit performance on all alternators rated 30kVA and larger.
- G. Voltage Regulator: Separate from exciter, providing performance as specified. The voltage regulation system shall be microprocessor-controlled, full wave rectified, and provide a pulse-width modulated signal to the exciter. No exceptions or deviations to these requirements will be permitted.
- H. The alternator shall be provided with anti-condensation heater(s) in all applications where the generator set is provided in an outdoor enclosure, or when the generator set is installed in a coastal or tropical environment.
- I. Windings: Two-thirds pitch stator winding.
- J. Subtransient Reactance: 15 percent maximum, based on the rating of the engine generator set.

## 2.7 OUTDOOR GENERATOR-SET ENCLOSURE

- A. Description: Weather protective housing. Multiple panels shall be lockable and provide adequate access to components requiring maintenance. Instruments, control, and battery system shall be mounted within enclosure.
- B. Construction:
  - 1. Hinged Doors: With padlocking provisions. Restraint/Hold back hardware to prevent door to keep door open at 180 degrees during maintenance. Rain lips over all doors.
  - 2. Exhaust System:
    - a. Muffler Location: Within enclosure.
  - 3. Hardware: All hardware and hinges shall be stainless steel.
  - 4. A weather protective enclosure shall be provided which allows the generator set to operate at full rated load with a static pressure drop equal to or less than 0.5 inches of water.
- C. Engine Cooling Airflow through Enclosure: Housing shall provide ample airflow for engine generator operation at rated load in an ambient temperature of 40 degrees Celsius.
  - 1. Louvers: Fixed-engine, cooling-air inlet and discharge.
- D. Sound Performance: Reduce the average sound level of the engine generator while operating at full rated load to a maximum of 80 dBA measured at 7 meters from the engine generator in a free field environment.
- E. Site Provisions:
  - 1. Lifting: Complete assembly of engine generator, and enclosure shall be designed to be lifted into place as a single unit.

## 2.8 FINISHES

- A. Indoor and Outdoor Enclosures and Components: Powder-coated and baked over corrosion-resistant pretreatment and compatible primer. Manufacturer's standard color or as directed on the drawings.



## 2.9 SOURCE QUALITY CONTROL

- A. Prototype Testing: Factory test engine-generator set using same engine model, constructed of identical or equivalent components and equipped with identical or equivalent accessories.
  - 1. Tests: Comply with NFPA 110, Level 1 Energy Converters. In addition, the equipment engine, skid, cooling system, and alternator shall have been subjected to actual prototype tests to validate the capability of the design under the abnormal conditions noted in NFPA110. Calculations and testing on similar equipment which are allowed under NFPA110 are not sufficient to meet this requirement.
- B. Project-Specific Equipment Tests: Before shipment, factory test engine-generator set manufactured specifically for this Project. Perform tests at rated load and power factor. Include the following tests:
  - 1. Test engine generator set manufactured for this Project to demonstrate compatibility and functionality.
  - 2. Full load run.
  - 3. Maximum power.
  - 4. Voltage regulation.
  - 5. Steady-state governing.
  - 6. Single-step load pickup.
  - 7. Simulated safety shutdowns.
  - 8. Provide 14 days' advance notice of tests and opportunity for observation of tests by Owner's representative.

## PART 3 - EXECUTION

### 3.1 INSTALLATION

- A. Comply with packaged engine-generator manufacturers' written installation, application, and alignment instructions and with NFPA 110.

### 3.2 FIELD QUALITY CONTROL

- A. Manufacturer's Field Service: Engage a factory-authorized service representative to inspect components, assemblies, and equipment installations, including connections, and to assist in testing.

### 3.3 SERVICE AGREEMENT:

- A. The supplier shall include in the base price, a one-year service agreement. The maintenance shall be performed by factory authorized service technicians capable of servicing both the engine-generator set and the transfer switch. This agreement shall include the following:
- B. Generator supplier must have an in-house rental fleet with equipment sized to back up this project site.
- C. All engine maintenance as recommended by the service manual.
- D. All electrical controls maintenance and calibrations as recommended by the manufacturer.
- E. All auxiliary equipment as a part of the emergency systems.

Thames Street Building

- F. The supplier shall guarantee emergency service.
- G. All expendable maintenance items are to be included in this agreement.
- H. A copy of this agreement and a schedule shall be given to the Owner at the time of his acceptance, showing what work is to be accomplished and when.

END OF SECTION

SECTION 263623

AUTOMATIC TRANSFER SWITCHES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. This Section includes transfer switches rated 600 V and less, including the following:
  - 1. Automatic transfer switches
- B. Related Sections include the following:

1.3 SUBMITTALS

- A. Product Data: For each type of product indicated. Include rated capacities, weights, operating characteristics, furnished specialties, and accessories.
  - 1. Technical data on all major components of all transfer switches and other products described in this section. Data is required for the transfer switch mechanism, control system, cabinet, and protective devices specifically listed for use with each transfer switch. Include steady state and fault current ratings, weights, operating characteristics, and furnished specialties and accessories.
- B. Manufacturer and Supplier Qualification Data
  - 1. The transfer switch manufacturer shall be certified to ISO 9001 International Quality Standard and shall have third party certification verifying quality assurance in design/development, production, installation, and service, in accordance with ISO 9001.
  - 2. The manufacturer of this equipment shall have produced similar equipment for a minimum period of 10 years. When requested, an acceptable list of installations with similar equipment shall be provided demonstrating compliance with this requirement.
- C. Operation and Maintenance Data: For each type of product to include in emergency, operation, and maintenance manuals. In addition to items specified in Division 01 Section "Operation and Maintenance Data," include the following:
  - 1. Features and operating sequences, both automatic and manual.
  - 2. List of all factory settings of relays, timers and protective devices; provide setting and calibration instructions where applicable.
- D. Warranty documents demonstrating compliance with the project's contract requirements.

1.4 QUALITY ASSURANCE

- A. Only approved bidders shall supply equipment provided under this contract.
- B. Manufacturer Qualifications: The equipment supplier shall maintain a service center capable of providing training, parts, maintenance and emergency repairs to equipment, including transfer switch generator sets and remote monitoring equipment (if applicable) at the site within a response period of less than (eight hours or appropriate time period designated for Project) from time of notification.
  - 1. The transfer switch shall be serviced by technicians employed by, and specially trained and certified by, the generator set supplier and the supplier shall have a service organization that is factory-certified in both generator set and transfer switch service. The supplier shall maintain an inventory of critical replacement parts at the local service organization, and in-service vehicles. The service organization shall be on call 24 hours per day, 365 days per year.
  - 2. Submit names, experience level, training certifications, and locations for technicians that will be responsible for servicing equipment at this site.
  - 3. The manufacturer shall maintain model and serial number records of each transfer switch provided for at least 20 years.
- C. Source Limitations: All transfer switches are to be obtained through one source from a single manufacturer. The generator set manufacturer shall warrant transfer switches to provide a single source of responsibility for products provided.
- D. 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 as suitable for use in emergency, legally required or optional standby use as appropriate for the connected load.
- E. The automatic transfer switch installation and application shall conform to the requirements of the following codes and standards:
  - 1. Transfer switches and enclosures shall be UL 1008 listed and labeled as suitable for use in emergency, legally required, and optional standby applications.
  - 2. NFPA 70, National Electrical Code. Equipment shall be suitable for use in systems in compliance with Articles 700, 701 and 702.
  - 3. Comply with NEMA ICS 10-1993 AC Automatic Transfer Switches
  - 4. IBC 2006 – The transfer switch(es) shall be prototype-tested and third-party certified to comply with the requirements of IBC group III or IV, Category D/F. The equipment shall be shipped with the installation instructions necessary to attain installation compliance
  - 5. IEEE 446 – Recommended Practice for Emergency and Standby Power Systems for Commercial and Industrial Applications
  - 6. IEEE 62.41, AC Voltage Surge Immunity
  - 7. IEEE 62.45, AC Voltage Surge Testing
- F. Comply with NFPA 110 – Emergency and Standby Power Systems. The transfer switch shall meet all requirements for Level 1 systems, regardless of the actual circuit level.

## Thames Street Building

- G. The manufacturer shall warrant the material and workmanship of the transfer switch equipment for a minimum of one (1) year from registered commissioning and start-up, or eighteen (18) months from date of shipment.
- H. The warranty shall be comprehensive. No deductibles shall be allowed for travel time, service hours, repair parts cost, and etc. during the minimum noted warranty period described above.

### 1.5 PROJECT CONDITIONS

- A. Interruption of Existing Electrical Service: Do not interrupt electrical service to facilities occupied by Owner or others unless permitted under the following conditions and then only after arranging to provide temporary electrical service:
  - 1. Do not proceed with interruption of electrical service without (Architect/Construction Manager/Owner's) written permission.

## PART 2 - PRODUCTS

### 2.1 MANUFACTURERS

- A. Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
  - 1. Cummins Power Generation
  - 2. Russelectric
  - 3. ASCO
  - 4. Kholer
- B. Equipment specifications for this Project are based on automatic transfer switches manufactured by Cummins Power Generation. Switches manufactured by Russelectric or ASCO that meet the requirement of this specification are acceptable, if approved not less than two weeks before scheduled bid date. Proposals must include a line-by-line compliance statement based on this specification.
- C. Transfer switches utilizing molded case circuit breakers do not meet the requirements of this specification and will not be accepted.

### 2.2 GENERAL TRANSFER-SWITCH PRODUCT REQUIREMENTS

- A. Provide transfer switches in the number and ratings that are shown on the drawings. Indicated Current Ratings: Apply as defined in UL 1008 for continuous loading and total system transfer.
- B. Fault-Current Closing and Withstand Ratings: UL 1008 WCR ratings must be specifically listed as meeting the requirements for use with protective devices at installation locations, under specified fault conditions. Withstand and closing ratings shall be based on use of the same set of contacts for the withstand test and the closing test.

## Thames Street Building

- C. Solid-State Controls: All settings should be accurate to +/- 2% or better over an operating temperature range of - 40 to + 60 degrees C (- 40 to + 140 degrees F).
- D. Resistance to Damage by Voltage Transients: Components shall meet or exceed voltage-surge withstand capability requirements when tested according to IEEE C62.41. Components shall meet or exceed voltage-impulse withstand test of NEMA ICS 1.
- E. Electrical Operation: Accomplished by a non-fused, momentarily energized solenoid or electric motor operator mechanism, mechanically and electrically interlocked in both.
- F. Switch Characteristics: Designed for continuous-duty repetitive transfer of full-rated current between active power sources.
  - 1. Switches using molded-case switches or circuit breakers, or insulated case circuit breaker components are not acceptable.
  - 2. Transfer switches shall be double-throw, electrically and mechanically interlocked, and mechanically held in the Source 1 and Source 2 positions.
  - 3. Main switch contacts shall be high-pressure silver alloy. Contact assemblies shall have arc chutes for positive arc extinguishing. Arc chutes shall have insulating covers to prevent inter-phase flashover.
  - 4. Contacts shall be operated by a high-speed electrical mechanism that causes contacts to open or close within three electrical cycles from signal.
  - 5. The transfer switch operation shall include the ability to switch to an open position (both sources disconnected) for the purpose of load shedding from the generator set.
  - 6. The power transfer mechanism shall include provisions for manual operation under load with the enclosure door closed. Manual operation may be electromechanical or mechanical, but must be coordinated with control function.
  - 7. Transfer switch shall be provided with flame retardant transparent covers to allow viewing of switch contact operation but prevent direct contact with components that could be operating at line voltage levels.
  - 8. The transfer switch shall include the mechanical and control provisions necessary to allow the device to be field-configured for operating speed. Transfer switch operation with motor loads shall be as is recommended in NEMA MG1.
    - a. Phase angle monitoring/timing equipment is not an acceptable substitute for this functionality.
- G. Control: Transfer switch control shall be capable of communicating with the genset control, other switches and remote programming devices over a high-speed network interface.
- H. Factory wiring: Transfer switch internal wiring shall be composed of pre-manufactured harnesses that are permanently marked for source and destination. Harnesses shall be connected to the control system by means of locking disconnect plug(s), to allow the control system to be easily disconnected and serviced without disconnecting power from the transfer switch mechanism
- I. Terminals: Terminals shall be pressure type and appropriate for all field wiring. Terminal arrangement and cabinet space must be such that feeder conductors can enter from the top, side or bottom of the switch, at the installer's discretion. Control wiring shall be equipped with suitable lugs, for connection to terminal strips.

- J. Enclosures: All enclosures shall be third-party certified for compliance to NEMA ICS 6 and UL 508, unless otherwise indicated:
  - 1. The enclosure shall provide wire bend space in compliance to the latest version of NFPA70, regardless of the direction from which the conduit enters the enclosure.
  - 2. Exterior cabinet doors shall provide complete protection for the system's internal components. Doors must have permanently mounted key-type latches. Bolted covers or doors are not acceptable.
  - 3. Transfer switches shall be provided in enclosures that are third party certified for their intended environment per NEMA requirements.
    - a. Transfer switches mounted in a controlled indoor environment shall be provided in NEMA Type 1 enclosures (IEC type IP30).

### 2.3 AUTOMATIC TRANSFER SWITCHES

- A. Comply with requirements for Level 1 equipment according to NFPA 110.
- B. Indicated current ratings:
  - 1. Refer to the Project drawings for specifications on the sizes and types of transfer switch equipment, withstand and closing ratings, number of poles, voltage and ampere ratings, enclosure type, and accessories.
  - 2. Main contacts shall be rated for 600 VAC minimum.
  - 3. Transfer switches shall be rated to carry 100% of rated current continuously in the enclosure supplied, in ambient temperatures of -40 to +60 degrees C (-40 to +140 degrees F), relative humidity up to 95% (non-condensing), and altitudes up to 10,000 feet (3000 meters).
- C. Manual Switch Operation: The power transfer mechanism shall include provisions for manual operation under load with the enclosure door closed. Manual operation may be electromechanical or mechanical, but must be coordinated with control function
- D. Relay Signal: Control shall include provisions for addition of a pre-transfer relay signal, adjustable from 0 to 60 seconds, to be provided if necessary for elevator operation, based on equipment provided for the project.
- E. Control: Transfer switch control shall be provided with necessary equipment and software to communicate with the genset control, other transfer switches, remote annunciation equipment, and other devices over a high-speed control network.
- F. Transfer switches that are designated on the drawings as 3-pole shall be provided with a neutral bus and lugs. The neutral bus shall be sized to carry 100% of the current designated on the switch rating.
- G. The transfer switch physically located closest to the generator and not more than 50 ft (15 meters) away, except those served by generator paralleling equipment, shall be provided with a battery charger suitable for the requirements of the application and in compliance with NFPA 110 requirements for Level 1 systems. If no transfer switch is located within this distance, a battery charger shall be installed on the generator set.

H. Automatic Transfer Switch Control Features

1. The transfer switch control system shall be configurable in the field for any operating voltage level up to 600 VAC. Voltage sensing shall be monitored based on the normal voltage at the site. Systems that utilize voltage monitoring based on standard voltage conditions that are not field configurable are not acceptable.
2. The transfer switch shall be configurable to accept a relay contact signal and a network signal from an external device for load shedding purposes. On receipt of this signal, the transfer switch shall switch to a neutral position when connected to Source 2. If Source 1 is available when the load-shed signal is received, the transfer switch shall connect to Source 1.
3. The transfer switch shall be configurable to accept a relay contact signal and a network signal from an external device to prevent transfer to the generator service.
4. The transfer switch shall provide a relay contact signal prior to transfer or re-transfer. The time period before and after transfer shall be adjustable in a range of 0 to 50 seconds.
5. The control system shall be designed and prototype tested for operation in ambient temperatures from - 40 degrees C to + 60 degrees C (- 40 to +140 degrees F). It shall be designed and tested to comply with the requirements of the noted voltage and RFI/EMI standards.
6. The control shall have optically isolated logic inputs, high isolation transformers for AC inputs and relays on all outputs, to provide optimum protection from line voltage surges, RFI and EMI.

I. Transfer Switch Control Panel: The transfer switch shall have a microprocessor-based control with a sealed membrane panel incorporating pushbuttons for operator-controlled functions, and LED lamps for system status indicators. The panel shall also include an alphanumeric display for detailed system information. Panel display and indicating lamps shall include permanent labels.

1. The indicator panel LEDs shall display:
  - a. Which source the load is connected to (Source 1 or Source 2)
  - b. Which source or sources are available
  - c. When switch is not set for automatic operation, because the control is disabled or the bypass switch is in use
  - d. When the switch is in test/exercise mode
2. The indicator shall have pushbuttons that allow the operator to activate the following functions:
  - a. Activate pre-programmed test sequence
  - b. Override programmed delays, and immediately go to the next operation
  - c. Reset the control by clearing any faults
  - d. Test all of the LEDs by lighting them simultaneously
3. The alphanumeric digital display shall be vacuum fluorescent-type, clearly visible in both bright sunlight and no-light conditions over an angle of 120 degrees, and shall display the following:
  - a. AC voltage for all phases, normal and emergency
  - b. Source status: connected or not connected.



- c. Load data, including voltage, AC current, frequency, KW, KVA, and power factor.
- 4. The display panel shall be password-protected, and allow the operator to view and make adjustments:
  - a. Set nominal voltage and frequency for the transfer switch
  - b. Adjust voltage and frequency sensor operation set points
  - c. Set up time clock functions
  - d. Set up load sequence functions
  - e. Enable or disable control functions including program transition
  - f. View real-time clock data, operation log (hours connected, times transferred, failures) and service history.
- J. Control Functions: Functions managed by the control shall include:
  - 1. Software adjustable time delays:
    - a. Engine start (prevents nuisance genset starts in the event of momentary power fluctuation): 0 to 120 seconds (default 3 sec)
    - b. Transfer normal to emergency (allows genset to stabilize before load is transferred): 0 to 120 seconds (default 3 sec)
    - c. Re-transfer emergency to normal (allows utility to stabilize before load is transferred from genset): 0 to 30 minutes (default 3 sec)
    - d. Engine cooldown: 0 to 30 minutes (default 10 min)
    - e. Programmed transition: 0 to 60 seconds (default 3 sec)
  - 2. Undervoltage sensing: three-phase normal, three-phase emergency source.
    - a. Pickup: 85 to 98% of nominal voltage (default 90%)
    - b. Dropout: 75 to 98% of nominal voltage (default 90%)
    - c. Dropout time delay: 0.1 to 1.0 seconds (default 0.5 sec)
    - d. Accurate to within +/- 1% of nominal voltage
  - 3. Over-voltage sensing: three-phase normal, three-phase emergency source.
    - a. Pickup: 95 to 99% of dropout setting (default 95%)
    - b. Dropout: 105 to 135% of nominal voltage (default 110%)
    - c. Dropout time delay: 0.5 to 120 seconds (default 3 sec)
    - d. Accurate to within +/- 1% of nominal voltage
  - 4. Over/under frequency sensing:
    - a. Pickup: +/- 5 to +/-20% of nominal frequency (default 10%)
    - b. Dropout: +/-1% beyond pickup (default 1%)
    - c. Dropout time delay: 0.1 to 15.0 seconds (default 5 sec)
    - d. Accurate to within +/- 0.2%
  - 5. Voltage imbalance sensing:
    - a. Dropout: 2 to 10% (default 4%)
    - b. Pickup: 90% of dropout

## Thames Street Building

- c. Time delay: 2.0 to 20 seconds (default 5 sec)
  - 6. Phase rotation sensing:
    - a. Time delay: 100 msec
  - 7. Loss of single-phase detection:
    - a. Time delay: 100 msec
- K. Control features shall include:
  - 1. Programmable genset exerciser: A field-programmable control shall periodically start the generator, transfer the load to generator for a preset time, then re-transfer and shut down the generator after a preset cool-down period.
    - a. Push-button programming control shall have a selection of eight different schedules for exercising generator, with or without load.
  - 2. In event of a loss of power to the control, all control settings, real-time clock setting and the engine start-time delay setting will be retained.
  - 3. The system continuously logs information including the number of hours each source has been connected to the load, the number of times transferred, and the total number of times each source has failed. An event recorder stores information, including time and date-stamp, for up to 50 events.
  - 4. Transfer Override Switch: Overrides automatic re-transfer control so automatic transfer switch will remain connected to emergency power source regardless of condition of normal source. Pilot light to indicate override status.
- L. Control Interface
  - 1. Provide one set Form C auxiliary contacts on both sides, operated by transfer switch position, rated 10 amps 250 VAC.
  - 2. The transfer switch shall be provided with a network communication card, and configured to allow network-based communication with the transfer switch and other network system components, including the generator set(s) provided for the Project.
  - 3. Unassigned Auxiliary Contacts: Two normally open, 1-pole, double-throw contacts for each switch position, rated 10A at 240 VAC.
- M. Engine Starting Contacts
  - 1. One isolated and normally closed, and one isolated and normally open; rated 10A at 32 VDC minimum.

## PART 3 - EXECUTION

### 3.1 INSTALLATION

- A. Annunciator and Control Panel Mounting: Surface, unless otherwise indicated.

## Thames Street Building

- B. Identify components according to Division 26 Section "Identification for Electrical Systems."
- C. Set field-adjustable intervals and delays, relays, and engine exerciser clock.

### 3.2 CONNECTIONS

- A. Wiring to Remote Components: Match type and number of cables and conductors to control and communication requirements of transfer switches as recommended by manufacturer. Increase raceway sizes at no additional cost to Owner if necessary to accommodate required wiring.
- B. Field control connections shall be made on a common terminal block that is clearly and permanently labeled.
- C. Transfer switch shall be provided with AL/CU mechanical lugs sized to accept the full output rating of the switch. Lugs shall be suitable for the number and size of conductors shown on the drawings.
- D. Ground equipment according to Division 26 Section "Grounding and Bonding for Electrical Systems."
- E. Connect wiring according to Division 26 Section "Low-Voltage Electrical Power Conductors and Cables."

### 3.3 SOURCE QUALITY CONTROL

- A. Prior to shipping, factory shall test and inspect components, assembled switches, and associated equipment to ensure proper operation.
- B. Factory shall check transfer time and voltage, frequency, and time-delay settings for compliance with specified requirements.
- C. Factory shall perform dielectric strength test complying with NEMA ICS 1.

### 3.4 FIELD QUALITY CONTROL

- A. Manufacturer's Field Service: The supplier of the transfer switch(es) and associated equipment shall inspect, test, and adjust components, assemblies, and equipment installations, including connections, and report results in writing.
- B. Manufacturer's representative shall perform tests and inspections and prepare test reports.
- C. After installing equipment and after electrical circuitry has been energized, installer shall test for compliance with requirements.
  - 1. Perform recommended installation tests as recommended in manufacturer's installation and service manuals.

## Thames Street Building

2. After energizing circuits, demonstrate interlocking sequence and operational function for each switch.
  - a. Simulate power failures of normal source to automatic transfer switches and of emergency source with normal source available.
  - b. Verify time-delay settings.
  - c. Verify that the transfer switch is accurately metering AC voltage and current (when provided).
  - d. Test bypass/isolation unit functional modes and related automatic transfer-switch operations.
  - e. Verify proper sequence and correct timing of automatic engine starting, transfer time delay, retransfer time delay on restoration of normal power, and engine cool-down and shutdown.

### 3.5 DEMONSTRATION

- A. After generator set installation, the generator and transfer switch supplier shall conduct a complete operation, basic maintenance, and emergency service seminar covering generator set and transfer switch equipment, for up to 10 people employed by the Owner.
  1. The seminar shall include instruction on operation of the transfer equipment, normal testing and exercise, adjustments to the control system, use of the PC based service and maintenance tools provided under this contract, and emergency operation procedures.
  2. The class duration shall be at least 8 hours in length, and include practical operation with the installed equipment.

END OF SECTION 263623

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. LER: Luminaire efficacy rating.
- D. Lumen: Measured output of lamp and luminaire, or both.
- E. 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.

## Thames Street Building

- 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.



## Thames Street Building

- 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 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.

### 3.3 STARTUP SERVICE

- A. Burn-in all lamps that require specific aging period to operate properly, prior to occupancy by Owner. Burn-in fluorescent and compact fluorescent lamps intended to be dimmed, for at least 100 hours at full voltage.

### 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 265600  
EXTERIOR LIGHTING

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes:
  - 1. Exterior LED luminaires.
  - 2. Poles and accessories.

1.2 DEFINITIONS

- A. CCT: Correlated color temperature.
- B. LER: Luminaire efficacy rating.
- C. Luminaire: Complete lighting fixture, including driver housing if provided.
- D. Pole: Luminaire support structure, including tower used for large area illumination.

1.3 ACTION SUBMITTALS

- A. Product Data: For each luminaire, pole, and support component, arranged in order of lighting unit designation. Include data on features, accessories, finishes, and the following:
  - 1. Physical description of luminaire, including materials and dimensions.
  - 2. Details of installation and construction.
  - 3. Luminaire materials.
  - 4. Photometric data based on laboratory tests of each luminaire type, complete with indicated lamps, ballasts, and accessories.
    - a. Manufacturer Certified Data: Photometric data shall be certified by manufacturer's laboratory with a current accreditation under the National Voluntary Laboratory Accreditation Program for Energy Efficient Lighting Products.
  - 5. Photoelectric relays.
  - 6. Lamps, including life, output, CCT, CRI, lumens, and energy-efficiency data.
  - 7. Materials, dimensions, and finishes of poles.

1.4 CLOSEOUT SUBMITTALS

- A. Operation and Maintenance Data: For luminaires and poles to include in emergency, operation, and maintenance manuals.

## Thames Street Building

### 1.5 QUALITY ASSURANCE

- A. Luminaire Photometric Data Testing Laboratory Qualifications: Provided by manufacturers' laboratories that are accredited under the National Volunteer Laboratory Accreditation Program for Energy Efficient Lighting Products.
- 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. Comply with IEEE C2, "National Electrical Safety Code."
- D. Comply with NFPA 70.

### 1.6 DELIVERY, STORAGE, AND HANDLING

- A. Store poles on decay-resistant-treated skids at least 12 inches (300 mm) above grade and vegetation. Support poles to prevent distortion and arrange to provide free air circulation.
- B. Retain factory-applied pole wrappings on metal poles until right before pole installation. For poles with nonmetallic finishes, handle with web fabric straps.

### 1.7 WARRANTY

- 1. Warranty Period for Luminaires: Five years from date of Substantial Completion.
- 2. Warranty Period for Luminaires Poles: Repair or replace Luminaires and lighting poles and standards that fail in finish, materials, and workmanship within manufacturer's standard warranty period, but not less than three years from date of Substantial Completion.

## 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 EXTERIOR LED LUMINAIRES

- A. LED luminaire housings shall be die cast or extruded aluminum.
- B. Luminaires shall be UL listed for wet locations per UL 1598.
- C. Luminaires shall have IES distribution and NEMA field angle classifications as indicated in luminaire schedule on project plans per IES HB-10.
- D. Luminaires shall be fully assembled and electrically tested prior to shipment from factory.

## Thames Street Building

- E. The finish color shall be as indicated in the luminaire schedule or detail on the project plans.
- F. Luminaires shall have a nameplate bearing the manufacturer's name, address, model number, date of manufacture, and serial number securely affixed in a conspicuous place.
- G. LED Light Sources
  - 1. Correlated Color Temperature (CCT) shall be in accordance with NEMA ANSLG C78.377
- H. Luminaire Power Supply Units (Drivers)
  - 1. Minimum efficiency shall be 85 percent.
  - 2. Shall be rated to operate between ambient temperatures of minus 22 degrees F and 122 degrees F
  - 3. Shall be designed to operate on the voltage system to which they are connected, typically ranging from 120 V to 480 V nominal.
  - 4. Power Factor (PF) shall be greater than or equal to 0.90.
  - 5. Total Harmonic Distortion (THD) current shall be less than or equal to 20 percent.
  - 6. Shall be mounted integral to luminaire. Remote mounting of power supply is not allowed.
  - 7. Power supplies in luminaires mounted under a covered structure, such as a canopy, or where otherwise appropriate shall be UL listed with a sound rating of A.
  - 8. Shall be dimmable, and compatible with a standard dimming control circuit of 0 - 10V or other approved dimming system.
  - 9. Shall be equipped with over-temperature protection circuit that turns light source off until normal operating temperature is achieved.

## PART 3 - EXECUTION

### 3.1 LUMINAIRE INSTALLATION

- A. Adjust luminaires that require field adjustment or aiming. Include adjustment of photoelectric device to prevent false operation of relay by artificial light sources, favoring a north orientation.

### 3.2 POLE INSTALLATION

- A. Alignment: Align pole foundations and poles for optimum directional alignment of luminaires and their mounting provisions on the pole.
- B. Clearances: Maintain the following minimum horizontal distances of poles from surface and underground features unless otherwise indicated on Drawings:
  - 1. Fire Hydrants and Storm Drainage Piping: 60 inches (1520 mm).
  - 2. Water, Gas, Electric, Communication, and Sewer Lines: 10 feet (3 m).
  - 3. Trees: 15 feet (5 m) from tree trunk.
- C. Foundation-Mounted Poles: Mount poles as recommended by pole manufacturer.

## Thames Street Building

1. Grout void between pole base and foundation. Use nonshrink or expanding concrete grout firmly packed to fill space.

D. Raise and set poles using web fabric slings (not chain or cable).

### 3.3 CORROSION PREVENTION

A. Aluminum: Do not use in contact with earth or concrete. When in direct contact with a dissimilar metal, protect aluminum by insulating fittings or treatment.

B. Steel Conduits: Comply with Section 260533 "Raceways and Boxes for Electrical Systems." In concrete foundations, wrap conduit with 0.010-inch- (0.254-mm-) thick, pipe-wrapping plastic tape applied with a 50 percent overlap.

### 3.4 GROUNDING

A. Ground metal poles and support structures according to Section 260526 "Grounding and Bonding for Electrical Systems."

1. Install grounding electrode for each pole unless otherwise indicated.
2. Install grounding conductor pigtail in the base for connecting luminaire to grounding system.

### 3.5 FIELD QUALITY CONTROL

A. Inspect each installed fixture for damage. Replace damaged fixtures and components.

B. Illumination Observations: Verify normal operation of lighting units after installing luminaires and energizing circuits with normal power source.

1. Verify operation of photoelectric controls.

END OF SECTION 265600

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. Cabling system identification products.
6. Cable management system.

1.3 DEFINITIONS

- A. BICSI: Building Industry Consulting Service International.
- B. Cross-Connect: A facility enabling the termination of cable elements and their interconnection or cross-connection.
- C. EMI: Electromagnetic interference.
- D. IDC: Insulation displacement connector.
- E. LAN: Local area network.
- F. Outlet/Connectors: A connecting device in the work area on which horizontal cable or outlet cable terminates.
- G. RCDD: Registered Communications Distribution Designer.
- H. UTP: Unshielded twisted pair.

1.4 ADMINISTRATIVE REQUIREMENTS

- A. Coordinate layout and installation of telecommunications cabling with Owner's telecommunications and LAN equipment and service suppliers.

## Thames Street Building

- B. Coordinate telecommunications outlet/connector locations with location of power receptacles at each work area.

### 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 CLOSEOUT SUBMITTALS

- A. Maintenance Data: For splices and connectors to include in maintenance manuals.

### 1.7 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. Patch-Panel Units: One of each type.
  - 2. Connecting Blocks: One of each type.
  - 3. Device Plates: One of each type.

### 1.8 QUALITY ASSURANCE

- A. Installer Qualifications: Cabling Installer must have personnel certified by BICSI on staff.
  - 1. Layout Responsibility: Preparation of Shop Drawings, Cabling Administration Drawings, and field testing program development by an RCDD.
  - 2. Installation Supervision: Installation shall be under the direct supervision of Registered Technician, who shall be present at all times when Work of this Section is performed at Project site.
  - 3. Testing Supervisor: Currently certified by BICSI as an RCDD to supervise on-site testing.

### 1.9 DELIVERY, STORAGE, AND HANDLING

- A. Test cables upon receipt at Project site.
  - 1. Test each pair of UTP cable for open and short circuits.

PART 2 - PRODUCTS

2.1 HORIZONTAL CABLING DESCRIPTION

- A. The maximum allowable horizontal cable length is 295 feet (90 m). This maximum allowable length does not include an allowance for the length of 16 feet (4.9 m) to the workstation equipment or in the horizontal cross-connect.

2.2 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.

2.3 UTP CABLE

- A. Manufacturers: Subject to compliance with requirements, provide products by the following:
  - 1. ADC.
  - 2. Belden Inc.
  - 3. CommScope, Inc.
  - 4. Genesis Cable Products; Honeywell International, Inc.
  - 5. Mohawk; a division of Belden Networking, Inc.
  - 6. 3M Communication Markets Division.
  - 7. Tyco Electronics Corporation; AMP Products.
- B. 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 6**.
  - 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.
- C. Jacket Colors:



## Thames Street Building

- a. Yellow for video
- b. Blue for data

### 2.4 UTP CABLE HARDWARE

- A. Manufacturers: Subject to compliance with requirements, provide products by the following:
  1. ADC.
  2. American Technology Systems Industries, Inc.
  3. Belden Inc.
  4. Dynacom Inc.
  5. Hubbell Premise Wiring.
  6. Leviton Commercial Networks Division.
  7. Molex Premise Networks; a division of Molex, Inc.
  8. Panduit Corp.
  9. Siemon Co. (The).
  10. Tyco Electronics Corporation; AMP Products.
- B. 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.
- C. Connecting Blocks: 110-style IDC for **Category 6**. 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.
- D. Cross-Connect: Modular array of connecting blocks arranged to terminate building cables and permit interconnection between cables.
  1. Number of Terminals per Field: One for each conductor in assigned cables.
- E. Patch Panel: Modular panels housing multiple-numbered jack units with IDC-type connectors at each jack for permanent termination of pair groups of installed cables.
- F. Jacks and Jack Assemblies: Modular, color-coded, eight-position modular receptacle units with integral IDC-type terminals.
- G. Patch Cords: Factory-made, four-pair cables in 36-inch (900 mm) lengths; terminated with eight-position modular plug at each end.
  1. Patch cords shall have bend-relief-compliant boots and color-coded icons to ensure **Category 6** performance. Patch cords shall have latch guards to protect against snagging.

### 2.5 COAXIAL CABLE

- A. Manufacturers: Subject to compliance with requirements, provide products by the following:
  1. Alpha Wire Company.
  2. Belden Inc.

## Thames Street Building

3. Coleman Cable, Inc.
  4. CommScope, Inc.
  5. Draka Cableteq USA.
- B. 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.
- C. 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.

### 2.6 COAXIAL CABLE HARDWARE

- A. Manufacturers: Subject to compliance with requirements, provide products by the following:
1. Emerson Network Power Connectivity Solutions.
  2. Leviton Commercial Networks Division.
  3. Siemon Co. (The).
- B. Coaxial-Cable Connectors: F Type.

### 2.7 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.

### 2.8 GROUNDING

- A. Comply with J-STD-607-A.

### 2.9 IDENTIFICATION PRODUCTS

- A. Comply with TIA/EIA-606-A and UL 969 for labeling materials, including label stocks, laminating adhesives, and inks used by label printers.

## 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. MUTOA shall not be used as a cross-connect point.
  - 5. Terminate conductors; no cable shall contain unterminated elements. Make terminations only at indicated outlets, terminals, cross-connects, and patch panels.
  - 6. 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.
  - 7. Install lacing bars to restrain cables, to prevent straining connections, and to prevent bending cables to smaller radii than minimums recommended by manufacturer.
  - 8. 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.
  - 9. 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.
  - 10. Cold-Weather Installation: Bring cable to room temperature before unreeling. Heat lamps shall not be used for heating.
  - 11. In the communications equipment room, install a 10-foot- (3-m-) long service loop on each end of cable.
  - 12. Pulling Cable: Comply with BICSI ITSIM, Ch. 4, "Pulling Cable." Monitor cable pull tensions.

## Thames Street Building

### 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. Open-Cable Installation:

1. Install cabling with horizontal and vertical cable guides in telecommunications spaces with terminating hardware and interconnection equipment.
2. Suspend UTP cable not in a wireway or pathway a minimum of 8 inches (200 mm) above ceilings by cable supports not more than 60 inches (1524 mm) apart.
3. Cable shall not be run through structural members or in contact with pipes, ducts, or other potentially damaging items.

### E. Group connecting hardware for cables into separate logical fields.

### F. 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).

## Thames Street Building

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.

### 3.4 IDENTIFICATION

- A. Cable Schedule: Post in prominent location in each equipment room and wiring closet. List incoming and outgoing cables and their designations, origins, and destinations. Protect with rigid frame and clear plastic cover. Furnish an electronic copy of final comprehensive schedules for Project.
- B. Cabling Administration Drawings: Show building floor plans with cabling administration-point labeling. Identify labeling convention and show labels for telecommunications closets, terminal hardware and positions, horizontal cables, work areas and workstation terminal positions, grounding buses and pathways, and equipment grounding conductors. Follow convention of TIA/EIA-606-A. Furnish electronic record of all drawings, in software and format selected by Owner.
- C. Cable and Wire Identification:
  1. Label each cable within 4 inches (100 mm) of each termination and tap, where it is accessible in a cabinet or junction or outlet box, and elsewhere as indicated.
  2. Each wire connected to building-mounted devices is not required to be numbered at device if color of wire is consistent with associated wire connected and numbered within panel or cabinet.
  3. Label each terminal strip and screw terminal in each cabinet, rack, or panel.
    - a. Individually number wiring conductors connected to terminal strips, and identify each cable or wiring group being extended from a panel or cabinet to a building-mounted device shall be identified with name and number of particular device as shown.
    - b. Label each unit and field within distribution racks and frames.
  4. Identification within Connector Fields in Equipment Rooms and Wiring Closets: Label each connector and each discrete unit of cable-terminating and connecting hardware. Where similar jacks and plugs are used for both voice and data communication cabling, use a different color for jacks and plugs of each service.
- D. Labels shall be preprinted or computer-printed type with printing area and font color that contrasts with cable jacket color but still complies with requirements in TIA/EIA-606-A.
  1. Cables use flexible vinyl or polyester that flex as cables are bent.

## Thames Street Building

### 3.5 FIELD QUALITY CONTROL

- A. Testing Agency: Engage a qualified testing agency to perform tests and inspections.
- B. Perform the following tests and inspections:
  - 1. Visually confirm **Category 6**, marking of outlets, cover plates, outlet/connectors, and patch panels.
  - 2. Visually inspect cable placement, cable termination, grounding and bonding, equipment and patch cords, and labeling of all components.
  - 3. UTP Performance Tests:
    - a. Test for each outlet and MUTOA. Perform the following tests according to TIA/EIA-568-B.1 and TIA/EIA-568-B.2:
      - 1) Wire map.
      - 2) Length (physical vs. electrical, and length requirements).
      - 3) Insertion loss.
      - 4) Near-end crosstalk (NEXT) loss.
      - 5) Power sum near-end crosstalk (PSNEXT) loss.
      - 6) Equal-level far-end crosstalk (ELFEXT).
      - 7) Power sum equal-level far-end crosstalk (PSELFEXT).
      - 8) Return loss.
      - 9) Propagation delay.
      - 10) Delay skew.
- C. Document data for each measurement. Data for submittals shall be printed in a summary report that is formatted like Table 10.1 in BICSI TDMM, or transferred from the instrument to the computer, saved as text files, and printed and submitted.
- D. End-to-end cabling will be considered defective if it does not pass tests and inspections.
- E. Prepare test and inspection reports.

### 3.6 DEMONSTRATION

- A. Train Owner's maintenance personnel in cable-plant management operations, including changing signal pathways for different workstations, rerouting signals in failed cables, and keeping records of cabling assignments and revisions when extending wiring to establish new workstation outlets.

END OF SECTION 271500

SECTION 283111

DIGITAL, ADDRESSABLE FIRE-ALARM SYSTEM

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Fire-alarm control unit.
2. Manual fire-alarm boxes.
3. System smoke detectors.
4. Nonsystem smoke detectors.
5. Nonsystem combination smoke/CO detectors
6. Heat detectors.
7. Notification appliances.
8. Magnetic door holders.
9. Remote annunciator.
10. Addressable interface device.
11. Digital alarm communicator transmitter.
12. Emergency Responder Radio Coverage Testing

1.2 SYSTEM DESCRIPTION

- A. Noncoded, addressable system, with multiplexed signal transmission, dedicated to fire-alarm service only.

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.

## Thames Street Building

### 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 EMERGENCY RESPONDER RADIO COVERAGE TESTING

- A. Employ the services of Radio Communications Management, Inc. (207) 797-7503 for the following:



## Thames Street Building

1. Perform signal strength measurements for City of Portland Fire Department.
2. Compile data and provide a report for submission to City of Portland Fire Department.

### 1.8 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 SYSTEMS OPERATIONAL DESCRIPTION

- A. Fire-alarm signal initiation shall be by one or more of the following devices:
  1. Manual stations.
  2. Heat detectors.
  3. Smoke detectors.
  4. Duct smoke detectors.
  5. Automatic sprinkler system water flow.
  6. Heat detectors in elevator shaft and pit.
  7. Commercial kitchen hood fire suppression operation.
- B. Fire-alarm signal shall initiate the following actions:
  1. Continuously operate alarm-notification appliances.
  2. Identify alarm at the fire-alarm control unit and remote annunciators.
  3. Transmit an alarm signal to the remote alarm receiving station.
  4. Release fire and smoke doors held open by magnetic door holders.
  5. Switch heating, ventilating, and air-conditioning equipment controls to fire-alarm mode.
  6. Recall elevators to primary or alternate recall floors.
  7. Record events in the system memory.
  8. Actuate Fire/Smoke Dampers associated with duct smoke detectors.
  9. Open elevator shaft smoke damper.
- C. Supervisory signal initiation shall be by one or more of the following devices and actions:
  1. Valve supervisory switch.
  2. Elevator shunt-trip supervision.

## Thames Street Building

- D. System trouble signal initiation shall be by one or more of the following devices and actions:
1. Open circuits, shorts, and grounds in designated circuits.
  2. Opening, tampering with, or removing alarm-initiating and supervisory signal-initiating devices.
  3. Loss of primary power at fire-alarm control unit.
  4. Ground or a single break in fire-alarm control unit internal circuits.
  5. Abnormal ac voltage at fire-alarm control unit.
  6. Break in standby battery circuitry.
  7. Failure of battery charging.
  8. Abnormal position of any switch at fire-alarm control unit or annunciator.
- E. System Trouble and Supervisory Signal Actions: Initiate notification appliance and annunciate at fire-alarm control unit and remote annunciators.

### 2.2 FIRE-ALARM CONTROL UNIT

- A. General Requirements for Fire-Alarm Control Unit:
1. Field-programmable, microprocessor-based, modular, power-limited design with electronic modules, complying with UL 864 and listed and labeled by an NRTL.
    - a. System software and programs shall be held in flash electrically erasable programmable read-only memory (EEPROM), retaining the information through failure of primary and secondary power supplies.
    - b. Include a real-time clock for time annotation of events on the event recorder and printer.
  2. Addressable control circuits for operation of mechanical equipment.
- B. Alphanumeric Display and System Controls: Arranged for interface between human operator at fire-alarm control unit and addressable system components including annunciation and supervision. Display alarm, supervisory, and component status messages and the programming and control menu.
1. Annunciator and Display: Liquid-crystal type, 3 line(s) of 80 characters, minimum.
  2. Keypad: Arranged to permit entry and execution of programming, display, and control commands.
- C. Circuits:
1. Initiating Device, Notification Appliance, and Signaling Line Circuits: NFPA 72, Class A.
    - a. Initiating Device Circuits: Style D.
    - b. Notification Appliance Circuits: Style Z.
    - c. Signaling Line Circuits: Style 6.
    - d. Install no more than 50 addressable devices on each signaling line circuit.
- D. Elevator Recall:

## Thames Street Building

1. Smoke detectors at the following locations shall initiate automatic elevator recall.
    - a. Elevator lobby detectors except the lobby detector on the designated floor.
    - b. Smoke detector in elevator machine room.
    - c. Smoke detectors in elevator hoistway.
  2. Elevator lobby detectors located on the designated recall floors shall be programmed to move the cars to the alternate recall floor.
  3. Water-flow alarm connected to sprinkler in an elevator shaft and elevator machine room shall shut down elevators associated with the location without time delay.
    - a. Water-flow switch associated with the sprinkler in the elevator pit may have a delay to allow elevators to move to the designated floor.
- E. Door Controls: Door hold-open devices that are controlled by smoke detectors at doors in smoke barrier walls shall be connected to fire-alarm system.
- F. Transmission to Remote Alarm Receiving Station: Automatically transmit alarm, supervisory, and trouble signals to a remote alarm station.
- G. Primary Power: 24-V dc obtained from 120-V ac service and a power-supply module. Initiating devices, notification appliances, signaling lines, trouble signals, and supervisory signals shall be powered by 24-V dc source.
  1. Alarm current draw of entire fire-alarm system shall not exceed 80 percent of the power-supply module rating.
- H. Secondary Power: 24-V dc supply system with batteries, automatic battery charger, and automatic transfer switch.
  1. Batteries: Sealed lead calcium.
- I. Instructions: Computer printout or typewritten instruction card mounted behind a plastic or glass cover in a stainless-steel or aluminum frame. Include interpretation and describe appropriate response for displays and signals. Briefly describe the functional operation of the system under normal, alarm, and trouble conditions.

### 2.3 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.

## 2.4 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.

## 2.5 NONSYSTEM SMOKE DETECTORS

- A. The smoke alarm shall be Kidde model PE120 or approved equal. It shall be powered by a 120VAC, 60Hz, 80mA source along with a 9V battery backup. The unit shall incorporate a photoelectric sensor with nominal sensitivity of 2.06%/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. All devices in an apartment shall have the ability to 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. 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 must test 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, (chapter 11 2002 edition), NFPA 101 (One and two family dwellings) Federal Housing Authority (FHA), Housing and Urban Development (HUD). It shall also include a 10-year manufacture’s limited warranty.

## 2.6 NONSYSTEM COMBINATION CO/SMOKE DETECTORS

- A. The combination smoke and carbon monoxide alarm shall be Kidde Unit Number KN-COPE-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% - 85% relative humidity.
- B. The unit shall incorporate a photoelectric smoke sensor with nominal sensitivity of 2.05%/ft. The 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 Detectors.
- C. The combination alarm shall be installed on the surface of any wall or ceiling following the UL/NFPA/Manufacturer’s recommended placement guidelines. 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. 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 smoke and CO and cause the unit to go into both modes of alarm. This sequence tests the unit's electronics to ensure proper operation. 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
  - F. The combination alarm shall have two methods of warning for danger: a piezoelectric horn that is rated at 85 decibels at 10 feet and a voice warning that identifies the danger. For a CO incident, the horn will sound in the repetitive manner – four (4) fast beeps, a short pause, four (4) fast beeps, a short pause. In between, the unit will announce "Warning Carbon Monoxide!" In a Smoke incident, the horn will sound in the repetitive manner – three (3) beeps, a pause, three (3) beeps, a pause. In between, the unit will announce "Fire! Fire!" The unit shall incorporate 2 LED's. A green LED will be steady on when AC power is present, flash every 30 seconds when in the battery only mode, every 16 seconds to indicate alarm memory, and every 2 seconds to indicate the Hush "mode is active. A red LED will flash in unison with the sounder pattern. The unit shall include the Smart Hush™ feature that silences the unit for approximately 8 minutes if a nuisance alarm condition occurs. The Green LED on the alarm will flash every 2 seconds while in Smart Hush™ and will automatically reset itself. It also provides voice annunciation of "Hush Activated" when Smart Hush™ is activated and "Hush Cancelled" when the Hush cycle ends.
- 2.7 The unit shall also indicate a low battery warning utilizing each of the following methods: a brief alarm chirp, the voice announcement of "Low Battery!" The unit shall at a minimum meet the requirements of UL 2034, UL217, NFPA72.
- A. General Requirements for Heat Detectors: Comply with UL 521.
- 2.8 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.

## Thames Street Building

2. Integral Addressable Module: Arranged to communicate detector status (normal, alarm, or trouble) to fire-alarm control unit.

### 2.9 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. 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.

### 2.10 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.

2.11 REMOTE ANNUNCIATOR

- A. Description: Annunciator functions shall match those of fire-alarm control unit for alarm, supervisory, and trouble indications. Manual switching functions shall match those of fire-alarm control unit, including acknowledging, silencing, resetting, and testing.
  - 1. Mounting: Flush cabinet, NEMA 250, Type 1.
- B. Display Type and Functional Performance: Alphanumeric display and LED indicating lights shall match those of fire-alarm control unit. Provide controls to acknowledge, silence, reset, and test functions for alarm, supervisory, and trouble signals.

2.12 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.

2.13 DIGITAL ALARM COMMUNICATOR TRANSMITTER

- A. Digital alarm communicator transmitter shall be acceptable to the remote central station and shall comply with UL 632 and be listed and labeled by an NRTL.
- B. Functional Performance: Unit shall receive an alarm, supervisory, or trouble signal from fire-alarm control unit and automatically capture one telephone line and dial a preset number for a remote central station. When contact is made with central station, signals shall be transmitted. If service on line is interrupted for longer than 45 seconds, transmitter shall initiate a local trouble signal and transmit the signal indicating loss of telephone line to the remote alarm receiving station over the remaining line. Transmitter shall automatically report telephone service restoration to the central station. If service is lost on both telephone lines, transmitter shall initiate the local trouble signal.
- C. Local functions and display at the digital alarm communicator transmitter shall include the following:
  - 1. Verification that both telephone lines are available.
  - 2. Programming device.
  - 3. LED display.
  - 4. Manual test report function and manual transmission clear indication.
  - 5. Communications failure with the central station or fire-alarm control unit.
- D. Digital data transmission shall include the following:
  - 1. Address of the alarm-initiating device.
  - 2. Address of the supervisory signal.
  - 3. Address of the trouble-initiating device.
  - 4. Loss of ac supply or loss of power.



## Thames Street Building

5. Low battery.
  6. Abnormal test signal.
  7. Communication bus failure.
- E. Secondary Power: Integral rechargeable battery and automatic charger.
- F. Self-Test: Conducted automatically every 24 hours with report transmitted to central station.

### 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.

## Thames Street Building

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. 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.

## Thames Street Building

- 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 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, and turf/grasses.
3. Excavating and backfilling for buildings and structures.
4. Drainage course for concrete slabs-on-grade.
5. Subbase course for concrete walks/pavements.
6. Subbase course for asphalt paving.

#### 1.2 REFERENCES

- ##### A.
- Refer to the Soil and Groundwater Management Plan, Portland Gateway Development Site prepared by Ransom Consulting, Inc. on July 14, 2015 which was submitted to and approved by the Maine Department of Environmental Protection.

#### 1.3 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. Borrow Soil: Satisfactory soil imported from off-site for use as fill or backfill.

##### D. Drainage Course: Aggregate layer supporting the slab-on-grade that also minimizes upward capillary flow of pore water.

##### E. 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 Engineer. 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 Engineer. Unauthorized excavation, as well as remedial work directed by Engineer, shall be without additional compensation.

- F. Fill: Soil materials used to raise existing grades.
- G. Structures: Buildings, footings, foundations, retaining walls, slabs, tanks, curbs, mechanical and electrical appurtenances, or other man-made stationary features constructed above or below the ground surface.
- H. 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.
- I. 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.
- J. Utilities: On-site underground pipes, conduits, ducts, and cables as well as underground services within buildings.

#### 1.4 SUBMITTALS

- A. Material test reports.

#### 1.5 FIELD CONDITIONS

- A. Utility Locator Service: Notify utility locator service for area where Project is located before beginning earth-moving operations.

### PART 2 - PRODUCTS

#### 2.1 SOIL MATERIALS

- A. All soil materials, including but not limited to, common borrow, sub-base, base course, fill, stone, and aggregates shall be in accordance with Maine Department of Transportation Standard Specifications, most recent edition.

### 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 WALKS AND PAVEMENTS

- A. Excavate surfaces under walks and pavements to indicated lines, cross sections, elevations, and subgrades.

### 3.4 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 Engineer, without additional compensation.

### 3.5 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.
- B. Soil must be managed in accordance with the Soil Management Plan referenced in Section 1.

### 3.6 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.

### 3.7 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.

### 3.8 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:
  - 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 a 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 75 percent.

### 3.9 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 ½-inch.
- C. Grading inside Building Lines: Finish subgrade to a tolerance of ½-inch when tested with a 10-foot straightedge.

### 3.10 SUBBASE AND BASE COURSES UNDER PAVEMENTS AND WALKS

- A. Place subbase course on subgrades free of mud, frost, snow, or ice.

- B. On prepared subgrade, place subbase course under pavements and walks as follows:
  1. Shape subbase course to required crown elevations and cross-slope grades.
  2. Place subbase 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 at optimum moisture content to required grades, lines, cross sections, and thickness to not less than 95 percent of maximum dry unit weight.

### 3.11 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 D 698.

### 3.12 FIELD QUALITY CONTROL

- A. Special Inspections: Owner will engage a qualified special inspector to perform inspections, as necessary.
- B. Testing Agency: Owner will engage a qualified geotechnical engineering testing agency to perform tests and inspections, as necessary.
- 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. 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.

### 3.13 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.

3.14 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 32 14 00  
UNIT PAVING**

PART 1 - GENERAL

1.01 GENERAL PROVISIONS:

- A. The Conditions of the Contract and all Sections of Division 1 are hereby made a part of this Section.

1.02 DESCRIPTION OF WORK:

- 1. Provide paving units where shown and as detailed on the drawings.
- 2. Related Work: 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:
  - 1. SECTION 03 30 00 – CAST-IN-PLACE CONCRETE
  - 2. SECTION 31 20 00 - EARTHWORK
  - 3. SECTION 32 12 16 - ASPHALT PAVING
  - 4. SECTION 32 13 13 – CONCRETE PAVING
  - 5. SECTION 32 30 00 – SITE IMPROVEMENTS
- 3. Alternates, Allowance, Unit Prices: Refer to Section 01 23 00 to determine extent, if any, work of this Section will be affected by any Alternates, Allowances, or Unit Prices.

1.03 QUALITY ASSURANCE, SUBMITTALS:

- 1. Comply with requirements of DIVISION 1- GENERAL REQUIREMENTS.
- 2. Paver installation to be performed by a professional firm with a proven history of successful projects of similar scope.
- 3. Submittals: Provide submittals as follows:
  - 1. Product Data:
    - a. Concrete Pavers
    - b. Edge Restraint
  - 2. Samples:
    - a. Unit or units representative of full color image, size, shape and texture of pavers.
    - b. Edge restraint.

1.04 DELIVERY, STORAGE AND HANDLING

- 1. Protect pavers before and during construction from physical damage and contamination from soil and other materials that may cause staining.

## 20 THAMES STREET – PORTLAND, ME

### 1.05 JOB CONDITIONS

1. Cold Weather Protection:
  - a. Frozen Materials: Do not use frozen materials or materials mixed or coated with ice or frost.
  - b. Frozen Work: Do not install when subgrade, base, or setting bed is frozen. Remove and replace work damaged by frost or freezing.

## PART 2 - PRODUCTS

### 2.01 BRICK PAVERS

- A. Pine Hall Pathway Paver Brick Paving Units: Provide full depth clay brick paving units as manufactured by Pine Hall Brick Company, Madison, North Carolina, (distributed locally by Lachance Brick Item # 193623, Pine Hall Pathway Paver Brick) or approved equal.
- B. Unit clay paver shall conform to the requirements of ASTM C902, Class SX, Type 1, Application PX. General specifications are per ASTM C-216.
  1. Size: The units shall be standard 4" x 8" (or standard modular) size having dimensions of (2 1/4" x 3 5/8" x 7 5/8") w/ square edges.
  2. Color: Paver color shall conform to brick pavers as manufactured by Pine Hall Brick Company, Madison, North Carolina, (distributed locally by Lachance Brick).
  3. 10,000 psi minimum compressive strength and below 6% cold water absorption.
  4. Pattern: Running Bond per City of Portland Standard pattern.

### 2.02 CONCRETE PAVERS

- A. Genest Tradeport Stone Concrete Paver units: Provide full depth (80mm) concrete paver units as manufactured by Genest, 36 Wilson Street, P.O. Box 151, Sanford, Maine 04073, or approved equal.
  1. General specifications are per ASTM C-936.
  2. Sizes (3): 7 7/8"x7 7/8"x3 1/8", 7 7/8"x11 13/16"x3 1/8", & 7 7/8"x15 3/4"x3 1/8" (80mm)
  3. Color: Granite Blend
  4. Finish: Traditional, non-antiqued edge
  5. Pattern: Mixed - Running Bond with a single stretcher frame course, as shown on plans.
  6. Compressive strength: 8000 PSI min.

### 2.03 EDGE RESTRAINT

1. Provide injection molded plastic edge restraint (Industrial Grade) as manufactured by Pave-Edge Corporation or approved equal.
2. Edge restraint spikes to be 12" x 3/8" diameter galvanized steel.

### 2.04 SETTING BED AND SAND JOINTS

1. Setting bed shall consist of six parts Concrete sand conforming to ASTM C33 and one part

mortar cement, equally mixed prior to placement.

2. Joint sand to be concrete / sharp sand, washed and free of foreign material.

### PART 3 - EXECUTION

#### 3.01 GENERAL

1. Place setting bed and edge restraints (if necessary).
2. Set Pavers in configurations/patterns as shown on drawings.
3. Compact and sand sweep fill joints to provide tight, interlocking surface.  
DO NOT USE PLATE COMPACTOR OVER PLANKSTONE PAVING UNITS.
4. Units with excessive chips, cracks, voids, discoloration, or other defects which may affect finished work, will not be used and will be rejected.

#### 3.02 INSTALLATION OF UNIT PAVERS

##### A. Base:

1. Contractor shall inspect and verify that bituminous base for all work covered in this Section has been placed and compacted in the amounts specified in the Drawings and Specifications (See SECTION 31 12 16 – ASPHALT PAVING).
2. Commencement of work by the Contractor signifies acceptance of base conditions. Any deviations or abnormalities in base preparation are to be reported to the Architect immediately.

##### B. Setting Bed

1. Place and screed setting bed to grades and lines as required. Thickness after paver installation to be no less than 3/4" and no greater than 1 1/2".
2. Do not use water saturated or frozen sand.
3. Do not use sand to compensate for improperly installed or compacted base or for making up any unevenness or irregularity in the base course surface as this will show through to the finished surface of the pavers over time.
4. Do not walk on or otherwise disturb screeded setting bed surface prior to paver installation.

##### C. Pavers

1. Set pavers hand-tight using specified colors, shapes and textures in patterns and configurations shown.

2. Trim and cut pavers as required using a motor driven masonry saw with a blade designed specifically for the cutting of paving units. Only the minimum number of cuts will be used. Small pieces used to create what could have been a larger, uncut whole will not be accepted.
3. See manufacturer's specifications for typical spacing to be maintained between pavers.
4. Gaps between pavers and adjoining objects of greater than 3/8" to be filled with sand. Joints greater than 3/8" are not allowed and pavers shall be cut as required to meet this requirement.
5. After pavers are set, compact into place.
6. Sweep joints as specified (lightly water when sand/cement used). Repeat process to fill joints. Damp sand may be spread over paver surface and allowed to dry before filling joints.
7. Do not compact closer than 3' to an unrestrained paver edge.
8. All work must be compacted up to 3' from stopping point by the end of each work day. Cover and protect setting bed and uncompacted pavers until resumption of work.

D. Tolerances

1. Unless specified otherwise, finished surface elevations are not to deviate more than 1/4" under a 10' long straight edge in any direction.
2. Surface elevation of pavers are to be 1/8" to 1/4" above adjoining curbs, inlets, walks, etc. (and may be 1/8" to 1/4" above final grades in general) to allow for characteristic minor settling.

3.03 REPAIR, PROTECTION, CLEANUP

1. Replace units that are chipped, broken, stained, or in any other way do not conform to or may adversely affect the adjoining work.
2. Work area to be left in a neat and orderly manner upon completion of work, free from debris and swept clean.
3. Finished work is not to be used for storage of materials, unapproved vehicle movement or other operations which may damage, stain or otherwise mar the paver surface.

3.04 INSPECTION AND ACCEPTANCE

4. When paver installation is complete, Architect will, upon request, inspect work to determine acceptability.
5. Work that does not comply with requirements will be removed and replaced as specified

and as shown on drawings, at no additional cost to Owner.

6. Architect will, upon completion and request, inspect replaced areas to determine acceptability.

END OF SECTION 321400

**SECTION 32 30 00  
SITE IMPROVEMENTS**

PART 1 - GENERAL

1.01 GENERAL PROVISIONS

- A. The CONDITIONS OF THE CONTRACT and all Sections of Division 1 are hereby made a part of this Section.

1.02 DESCRIPTION OF WORK

- A. Work Included: Provide labor, materials and equipment necessary to complete the work of this Section, and without limiting the generality thereof furnish and install the following:
  - 1. Site Signage
  - 2. Bench
  - 3. Bollard Light
- B. Related Work Specified Elsewhere: Carefully examine all Contract Documents for requirements which affect the work of this Section. Other Specification Sections which directly relate to work of this Section include, but are not limited to following:
  - 1. Granular fill setting base and backfill material: SECTION 31 20 00 - EARTHWORK.
  - 2. Excavation and backfill: Section 31 20 00 - EARTHWORK.
- C. Alternates: Refer to SECTION 01 21 00 and SECTION 01 23 00, to determine extent, if any, to which work of this Section will be affected by any Allowances or Alternates, if accepted.

1.03 QUALITY ASSURANCE / SUBMITTALS:

- A. Quality Assurance: Conform to requirements of SECTION 01330 - SUBMITTALS PROCEDURES.
- B. Submittals: Provide as follows:
  - 1. Product Data:
    - a. All manufactured equipment.
    - b. Metal fasteners, anchors, other accessories.
  - 2. Shop Drawings: All items where installation methods are not fully described in product data.

1.04 REFERENCE STANDARDS:

- C. MDOT: Where specified, comply with applicable provision of State of Maine Department of Transportation Standard Specifications for Highways and Bridges, hereinafter referred to as MDOT.
- D. Earthwork: Conform to requirements of SECTION 31 20 00 - EARTHWORK.
- E. Handle products in accordance with manufacturer's instructions.
- F. Store products in manufacturer's original packaging until ready for installation.
- G. Protect products from impacts and abrasion during storage

PART 2 - PRODUCTS & EXECUTION

2.01 BASIC MATERIALS:

- A. Reinforcement: ASTM A 615, Grade 60, deformed, hot-dipped galvanized.
  - 1. Provide minimum reinforcement ration of 3 percent.
- B. Galvanizing: Hot-dipped galvanized after fabrication, conforming to:
  - 1. ASTM A 386 for assembled products.
  - 2. ASTM A 153 for iron and steel hardware.

2.02 BASIC INSTALLATION REQUIREMENTS:

- A. Install all materials and equipment in compliance with manufacturer's recommendations, and as indicated on Drawings.
- B. Provide concrete bases and supports as indicated and required.

2.03 SITE SIGNAGE

- A. Provide site signage as indicated on the plans.
  - 1. Conform to MDOT and ADA Standards for all site signage.

2.04 BENCH

- A. Benches shall be "[Vector Seating System](http://www.forms-surfaces.com/vector-seating-system)" by Forms and Surfaces  
[www.forms-surfaces.com/vector-seating-system](http://www.forms-surfaces.com/vector-seating-system)  
30 Pine Street, Pittsburg, PA 15223 (1.800.451.0410)

Sales Representative: Dan Delongchamp  
direct number: 617-780-4134



email: [daniel.delongchamp@forms-surfaces.com](mailto:daniel.delongchamp@forms-surfaces.com)

1. 'L' Shape Vector Benches shall be:  
Type A: 4' standalone with 2' add-on at 90 degrees (2 required).  
Type B: 6' standalone with 4' add-on at 90 degrees (1 required).  
All bench combinations shall be set at 90° to each other, as shown on L1.0 & L2.1.
2. Bench frame: shall be powder coated aluminum, color to be Slate.
3. Bench top: shall be FSC 100% Jatoba hardwood slats with Penofin hardwood formula "Transparent Natural". NO seatbacks, arm rests, or seat dividers.
4. Bench side panel: None.
5. Bench LED under mount accent light: Yes - 3000K warm white.  
Provide building controlled stub-up connection at bench legs for bench LED lighting power.
6. Bench shall be surface mounted per manufacturer's recommendations with manufacturer supplied hardware to subsurface concrete slab utilizing a custom paver mount bracket as shown on L2.1.
7. Contractor shall submit shop drawings of bench for approval.

## 2.05 LIGHT BOLLARD

- A. Light bollards shall be "LED Light Column Bollard" series 600 by Forms and Surfaces  
[www.forms-surfaces.com/light-column-bollard](http://www.forms-surfaces.com/light-column-bollard)  
30 Pine Street, Pittsburg, PA 15223 (1.800.451.0410)

Sales Representative: Dan DeLongchamp  
direct number: 617-780-4134  
email: [daniel.delongchamp@forms-surfaces.com](mailto:daniel.delongchamp@forms-surfaces.com)

1. Light bollards shall be stainless steel construction (column, head cap, and escutcheon) with satin finish.
2. Light bollards shall have white frosted acrylic lens with no shield.
3. LED light engine shall be 17W, 3000k warm white.
4. Light bollards shall be located and installed as shown on L1.0 and L2.1.
5. Light bollards shall be surface mounted per manufacturer's recommendations with manufacturer supplied J-bolts and other required hardware to subsurface concrete footing. See detail on sheet L2.0

END OF SECTION 323000

**SECTION 32 93 00  
PLANTS**

PART 1 - GENERAL

1.01 GENERAL PROVISIONS:

A. Work Included: Provide labor, materials, and equipment necessary to complete work of this Section, and without limiting the generality thereof furnish and install the following:

1. Planting of trees, shrubs, perennials, and ground covers.

- a. The term "Plants" as used herein refers to trees, shrubs, perennials, and ground covers except as otherwise indicated.
- b. Include restoration/replacement of existing plant materials indicated to be preserved that are damaged through any Work of Contract.

2. Fine grading.

3. Topsoil, including placing, spreading, furnishing of additional topsoil from off-site as required.

B. Planting List: A complete list of plants, including schedule of sized and other requirements, is shown on Drawings. In the event that material omissions occur in the Plant List, the planting plans shall govern.

C. Related Work Specified Elsewhere:

1. Subgrade Elevations: Excavation, backfilling, and grading required to establish elevations as indicated: SECTION 31 20 00 – EARTHWORK.

- a. Fine cutting and grading are included under this SECTION 32 90 00.

1.03 QUALITY ASSURANCE; SUBMITTALS:

A. General: Comply with requirements of SECTION 01 40 00 - QUALITY ASSURANCE; SUBMITTALS.

B. Subcontracting: For coordination purposes subcontract planting and seeding work to a single firm specializing in both categories of work.

NOTE: Placing and spreading of topsoil, furnishing of topsoil from off site as required is specifically made part of the landscape subcontract.

C. Source Quality Control:

1. General: Ship planting materials with certificates of inspection required by specifications and governing authorities. Comply with regulations applicable to landscape materials.
  2. Do not make substitutions. If specified material is not obtainable, submit non-availability to Architect, together with proposal for use of equivalent material. When authorized, adjustment of contract amount will be made.
  3. Analysis and Standards: Package standard products with manufacturers certified analysis. For other materials, provide analysis by recognized laboratory made in accordance with methods established by the Association of Official Agriculture Chemists, wherever applicable.
  4. Imported Topsoil: Before delivery of imported topsoil, furnish Architect with written statement giving location of properties from which topsoil is to be obtained, names and addresses of owners, depth to be stripped, crops grown during past 2 years.
  5. **Topsoil Testing: Provide soils testing by an approved soil testing laboratory, for both existing stockpiled topsoil and any topsoil imported from other sources. Submit the following materials certification for each source of topsoil used:**
    - a. **pH Factor.**
    - b. **Mechanical Analysis.**
    - c. **Percentage of Organic Content.**
    - d. **Gradation analysis**
    - e. **Recommendations on type and quantity of additives required to establish satisfactory pH factor, proper drainage characteristics, and supply of nutrients to bring topsoil to satisfactory level for planting.**
  6. Plants: Provide plants of quantity, size, genus, species, and variety shown and scheduled for landscape work and complying with recommendations and requirements of ANSI Z60.1 "American Standard for Nursery Stock". Provide healthy, vigorous stock, grown in recognized nursery in accordance with good horticultural practice and free of disease, insects, eggs, larvae and defects such as knots, sun-scald, injuries, abrasions, or disfigurement.
    - a. Label each tree with securely attached waterproof tag bearing legible designation of botanical and common name.
    - b. Label at least one shrub and ground cover plant of each variety with a securely attached waterproof tag bearing legible designation of botanical and common name.
    - c. Where formal arrangements or consecutive order of trees or shrubs are shown, select stock for uniform height and spread, and label with number to assure symmetry in planting.
  7. Sizes: Provide plants of sizes shown or specified. Trees of larger size may be used if acceptable to Architect, and if sizes of roots or balls are increased proportionately.
  8. Climate: Provide plants grown in similar climate and environmental conditions as Project Site.
- D. Inspection: Architect may inspect plants either at place of growth or at site before planting, for compliance with requirements for genus, species, variety, size and quality. Architect retains

right to further inspect plants for size and condition of balls and root systems, insects, injuries and latent defects, and to reject unsatisfactory or defective material at any time during the progress of work. Remove rejected plants immediately from Project site.

E. Certification: Submit certificates of inspection as required by Contract Documents and governmental authorities.

1. Provide written certification of place of growth to Project Landscape Architect

F. Materials Samples: Submit following material samples: Mulch

G. Planting Schedule: Submit proposed planting schedule, indicating dates for each type of landscape work during normal seasons for such work in area of site. Correlate with specified maintenance periods to provide maintenance from date of substantial completion. Once accepted, revise dates only as approved in writing, after documentation of reason for delays.

H. Maintenance Instruction: Submit typewritten instructions recommending procedures to be established by Owner for maintenance of landscape work for one full year. Submit prior to expiration of required maintenance period(s).

#### 1.04 DELIVERY, STORAGE AND HANDLING:

A. Packaged Materials: Deliver packaged materials in original, unopened and undamaged containers showing weight, analysis and name manufacturer. Protect materials from deterioration during delivery, and while stored at site.

B. Plants: Provide freshly dug or established container grown plants. Spray deciduous plants in foliage with an approved anti-desiccant immediately after digging to prevent dehydration. Do not prune prior to delivery unless otherwise approved by Project Landscape Architect. Do not bend or bind-tie plants in such a manner as to damage bark, break branches or destroy natural shape. Provide protective covering during delivery. Do not drop balled and burlapped stock during delivery.

1. Deliver plants after preparations for planting have been completed and plant immediately. If planting is delayed more than 6 hours after delivery, set plants in shade, protect from weather and mechanical damage, and keep roots moist by covering with mulch, burlap or other acceptable means of retaining moisture.

2. Do not remove container grown stock from containers until planting time.

C. Topsoil: Provide only dry, loose topsoil complying with requirements for planting mixes. Frozen or muddy topsoil will not be permitted.

#### 1.05 JOB CONDITIONS:

A. General: Proceed with and complete landscape work as rapidly as portions of site become available, working within seasonal limitations for each kind of landscape work required.

B. Utilities: Determine location of underground utilities and perform work in a manner which will

avoid possible damage. Hand excavate, as required. Maintain grade stakes set by others until removal is mutually agreed upon by parties concerned.

1. Do not plant within 4 feet of utility lines unless approved by Project Landscape Architect
- C. Excavation: When conditions detrimental to plant growth are encountered, such as rubble fill, bedrock, adverse drainage conditions, or obstructions, notify Architect before planting.
- D. Planting Season: Unless variance is requested in writing and approved by Architect, perform planting during only during following periods:
  1. Planting: April 15 to July 1, August 15 to November 15.
- E. Coordination with Lawns: Commence planting after final grades are established and prior to planting lawns, unless otherwise acceptable to Project Landscape Architect. If planting occurs after lawn work, protect lawn areas and promptly repair damage to lawns resulting from planting operations.

1.06 SPECIAL PROJECT WARRANTY:

- A. Planting: Warranty plants for a period of one year after date of substantial completion of planting work, against defects including death and unsatisfactory growth.
- B. Warranty shall not include damage or loss of plants caused by fires, floods, freezing rains, lightening storms, or winds over 75 miles per hour, winter kill caused by extreme cold and severe winter conditions not typical of planting area; acts of vandalism or negligence on part of Owner.
- C. Replace, in accordance with Drawings and Specifications, all plants that are dead or, as determined by Architect, are in an unhealthy or unsightly condition, and have lost their natural shape due to dead branches or other causes due to the Contractor's negligence during or at the termination of warranty period. Such replacement(s) shall be at no cost to Owner.
  1. Plants shall be free of dead branches and dead branch tips and shall bear foliage of a normal density, size and color.
  2. Make necessary repairs to grades, lawn areas and paving required because of plant replacements. Such repairs shall be done at no cost to Owner.
  3. Warranty of replacement plants shall extend for an additional period of one year from date of their acceptance after replacement. If replacement plants are not acceptable during, or at end of extended warranty period, Owner may elect subsequent replacement or credit for each item.

PART 2 - PRODUCTS

2.01 PRODUCTS

- A. General: Topsoil may be available on site for re-use in landscape work. If sufficient quantity of topsoil is not available, Contractor shall provide topsoil as required to complete landscape work.
- B. Topsoil Material: Fertile, friable, natural topsoil of loamy character, without admixture of subsoil material, obtained from a well-drained arable site, reasonably free from clay, lumps, coarse sands, stones, plants, roots, sticks, and other foreign materials greater than 1” in any dimension, with acidity range of between pH 5.0 and 7.0, and shall contain not less than 6% organic matter by weight as determined by loss on ignition of moisture-free samples dried at 65 degrees C.

- 1. Use only topsoil which is representative of topsoil soil test report as specified under Paragraph QUALITY ASSURANCE; SUBMITTALS.
- 2. Obtain topsoil only from local sources or from areas having similar soil characteristics to that found at project site. Obtain topsoil only from naturally, well-drained sites where topsoil occurs in a depth of not less than 4 inches; do not obtain from bogs or marshes.
  - a. Use only material from sources identified to and approved by Architect, and listed in the topsoil soils test report.
  - b. Topsoil, whether stripped or imported from off-site shall be a sandy loam or loam soil as defined by the USDA Soil Conservation Service, Soil Classification System, and have the following mechanical analysis:

Textural Class	% of Total Weight	Average %
Sand (0.05- 2.0 mm)	45 to 75%	60%
Silt (0.002- 0.05 mm)	15 to 35%	25%
Clay (< 0.002 mm)	5 to 25%	15%

2.02 SOIL AMENDMENTS:

- A. Fertilizer: Provide a complete fertilizer and a standard product complying with the State and United States fertilizer laws. Deliver to site in original unopened containers which shall bear the manufacturer's name and guaranteed statement of analysis. At least 40 percent by weight of the nitrogen content of fertilizer shall be derived from organic materials.
  - 1. For plants, provide fertilizer with not less than 5% total nitrogen, 10% available phosphoric acid and 16% soluble potash, with coloring agent.
  - 2. Provide fertilizer material that is completely soluble in water.
  - 3. Slow Release Fertilizers: Provide slow release fertilizers contained in perforated polyethylene bag with microporous holes, each containing 4 ounces of water soluble fertilizer effective for eight years, containing following:

- a. Nitrogen: 25 percent.
- b. Phosphate: 10 percent.
- c. Potash: 5 percent.
- d. Product: one of the following; or approved equal:
  - (1) Agriform Planting Tablets, by Sierra Chemical Co., Milpitas, CA 95035.
  - (2) EZY-Grow Fertilizer Packet, EZY-Grow Landscape Specialties.
  - (3) Unique fertilizer, Inc. Deptford, NJ 08096
- B. Superphosphate: Finely ground phosphate rock as commonly used for agricultural purposes, containing not less than 18 percent available phosphoric acid.
- C. Sand: Clean, washed sand, free of toxic materials.
- D. Ground Limestone: Dolomitic limestone and contain not less than 85 percent of total carbonates and magnesium, ground to such fineness that 50 percent will pass a 100 mesh sieve and 90 percent will pass through a 20 mesh sieve. Coarser material will be accepted provided the specified rates of application are increased proportionately on the basis of quantities passing the 100 mesh sieve.
- E. Humus: Reed peat, sedge peat or moss peat furnished air dried, finely shredded, and suitable for horticultural use.
- F. Compost: Well rotted manure or composted organic waste materials and containing no chemicals or ingredients harmful to plants or humans. The material must pass through a 3/8" screen be friable, and free of stones, sticks, and all objectionable debris.
- G. Mulch for Plants: Organic mulch free from deleterious materials and suitable for top dressing of plants and consisting of following:
  - 1. Shredded bark mulch not larger than 4 inches in length and ½ inch in width, free of wood chips and sawdust. Mulch shall be dark brown/black in color and aged a minimum of 12 months prior to placing.

2.03 TREES AND SHRUBS:

- A. Quality: Provide plants of size, genus, species and variety shown or scheduled for landscape work and complying with recommendations and requirements of ANSI Z60.1 "American Standard for Nursery Stock".
- B. Plants: Provide plants typical of their species or variety; normal, densely-developed branches and vigorous, fibrous root systems. Provide only sound, healthy, vigorous plants free from defects, disfiguring knots, sunscald injuries, frost cracks, abrasions of bark, plant diseases, insect eggs, borers, and all forms of infestation. All plants shall have a fully developed form without voids and open spaces. Plants held in storage will be rejected if they show signs of growth during storage.
  - 1. Dig balled and burlapped plants with firm, natural balls of earth of sufficient diameter and depth to encompass the fibrous and feeding root system necessary for full recovery of the

- plant. Cracked or mushroomed balls are not acceptable.
2. Container-grown stock: Grown in a container for sufficient length of time for root system to have developed to hold its soil together, firm and whole.
    - a. No plants loose in container.
    - b. Container stock not pot bound.
  3. Plants planted in rows shall be matched in form.
  4. Plants larger than those specified in Plant List may be used when acceptable to Architect at no additional cost to Owner.
    - a. If use of larger plants is acceptable, increase spread of roots or root ball in proportion to size of plant.
    - b. When "clump" is specified, provide a plant having a minimum of two stems originating from a common base at ground line.
  5. Measurements for Trees:
    - a. Caliper: Taken 6 inches above ground for trees up to 4 inches caliper and 12 inches above ground for larger sizes.
    - b. Height and Spread: Dimensions specified refer to main body of plant and not from branch tip-to-tip. Take measurements with branches in normal position. Height of trees, measured from crown of roots to top of top branch, shall not be less than minimum size designated in Plant List.
  6. No pruning wounds shall be present with a diameter of more than 1 inch and such wounds must show vigorous bark on all edges.
  7. Evergreen Trees: Branched to ground.
  8. Shrubs and Small Plants: Meet requirements for spread and height indicated on Plant List.
    - a. Take measurement for height from ground level to average height of top of plant, not longest branch.
    - b. Single stemmed or thin plants will not be acceptable.
    - c. Side Branches: Generous, well-twigged, and plant as a whole well-bushed to ground.
  - C. Deciduous Trees: Provide trees of height and caliper scheduled or shown and with branching configuration recommended by ANSI Z60.1 for type and species required. Provide single stem trees except where special forms are shown or listed.
    1. Provide balled and burlapped (B&B) deciduous trees.
  - D. Deciduous Shrubs: Provide shrubs of the height scheduled or shown and with not less than minimum number of canes required by ANSI Z60.1 for type and height of shrub required.
    1. Provide balled and burlapped (B&B) deciduous shrubs, except where indicated on Plans provide container grown stock.



2. Container grown deciduous shrubs will be acceptable in lieu of balled and burlapped deciduous shrubs subject to specified limitations for container grown stock.
- E. Coniferous and Broad-leaved Evergreens: Provide evergreens of sizes shown or listed. Dimensions indicate minimum spread for spreading a semi-spreading type evergreens and height for other types, such as globe, dwarf, cone, pyramidal, broad up-right, and columnar. Provide normal quality evergreens with well-balanced form complying with requirements for other size relationships to the primary dimension shown.
  1. Provide balled and burlapped (B&B) evergreens.

2.04 MISCELLANEOUS LANDSCAPE MATERIALS:

- A. Anti-Erosion Mulch: Provide clean, seed-free salt hay or threshed straw of wheat, rye, oats or barley.
- B. Anti-Desiccant: Emulsion-type, film-forming agent designed to permit transpiration but retard excessive loss of moisture from plants. Deliver in manufacturer's fully identified containers and mix in accordance with manufacturer's instructions.
- C. Stakes and Guys: provide stakes and deadmen of sound new hardwood, treated softwood, or redwood, free of knot holes and other defects. Provide wire ties and guys of 2-strand, twisted, pliable galvanized iron wire not lighter than 12 ga. with zinc-coated turnbuckles. Provide not less than ½ inch rubber or plastic hose, cut to required lengths, material and size to protect tree trunks from damage by wires. Hose color to be black.  
Size: 2 inches by 2 inches, unless otherwise indicated.
- E. **Drip Irrigation Bags: Provide new tree watering bags (by DeWitt, Tregator, or approved equal) for all new and transplanted trees. Bags shall be heavy duty, green coated polypropylene with nylon webbing and UV stabilization, poly straps, nylon zippers, and micro-perforated release points along bottom seam. Attach / install per manufacturer's recommendations. Use single bag for trees up to 3" caliper (holds 20 gallons) and use two bags per tree for trees 3-5" caliper (holds 40 gallons). Bags should typically be filled 1-2 times per week for most trees but climatic conditions may require more frequent filling. Bags shall remain in place until end of warranty period when contractor is responsible for their removal.**

PART 3 - EXECUTION

3.01 PREPARATION

- A. General: Layout individual plant locations and areas for multiple plantings. Stake locations and outline areas and secure Architect's acceptance before start of planting work. Make minor adjustments as may be requested.
- B. Planting Soil (Topsoil) Depths: Unless indicated otherwise, provide planting soil depths not less than following:

1. Trees: 6 inches.
2. Shrubs: 10 inches

C. Preparation of Planting Soil:

1. Before mixing, clean topsoil of roots, plants, sods, stones, clay lumps, and other extraneous materials harmful or toxic to plant growth.
2. Mix specified soil amendments and fertilizers with topsoil at rates specified. Delay mixing of fertilizer if planting will not follow placing of planting soil within a few days.
  - a. For planting: One part manure, 8 parts topsoil, 3 parts humus.
  - b. Refer to Paragraph SOIL AMENDMENTS.
3. For pit and trench type backfill, mix planting soil prior to backfilling, and stockpile at Site.
4. For planting beds mix planting soil either prior to planting or apply on surface of topsoil and mix thoroughly before planting.
  - a. Mix lime with dry soil prior to mixing of fertilizer.
  - b. Prevent lime from contacting roots of acid-loving plants.
  - c. Apply phosphoric acid fertilizer (other than that constituting a portion of complete fertilizers) directly to subgrade before applying planting soil and tilling.
  - d. Provide following soil ratio: One part compost, 8 parts topsoil, 3 parts humus.

D. Preparation of Planting Beds:

1. Loosen subgrade of planting bed areas to a minimum depth of 6 inches using a cultimulcher or similar equipment. Remove stones over 1-1/2 inch in any dimension, and sticks, stones, rubbish and other extraneous matter.
2. Spread planting soil mixture to minimum depth required to meet lines, grades and elevations shown, after light rolling and natural settlement. Place approximately ½ of total amount of planting soil required. Work into top of loosened subgrade to create a transition layer, then place remainder of the planting soil.

E. Excavation for Plants: Excavate pits, beds and trenches with vertical sides and with bottom of excavation slightly raised at center to provide proper drainage. Loosen hard subsoil in bottom of excavation.

1. For balled and burlapped (B&B) plants, make excavations at least half again as wide as the ball diameter and equal to the ball depth, plus following allowance:
  - a. Allow for 3 inch setting layer of planting soil mixture.
2. For container grown stock, excavate as specified for balled and burlapped stock, adjusted to size of container width and depth.
3. Dispose of subsoil removed from planting excavations. Do not mix with planting soil or use as backfill.

4. Fill excavations for trees and shrubs with water and allow percolating out before planting.

3.02 FERTILIZING PLANTS:

A. Water Soluble Fertilizer:

1. Provide first feeding only during first watering during backfilling of plant, unless otherwise directed or approved by Project Landscape Architect
2. Completely dissolve and mix fertilizer at rate of 6 pounds of fertilizer concentrate to 100 gallons of water.
3. Pour resulting solution in plant pit as approved or directed by Project Landscape Architect
4. Apply fertilizer concentrate at following rates for each application:
  - a. Plants up to 2 feet in height: 4 quarts.
  - b. Plants 2 feet and up to 6 feet in height: 6 quarts.
  - c. Plants 6 feet to 12 feet: 12 quarts.
  - d. Plants over 12 feet: 16 quarts.

B. Slow Release Fertilizer Packets: Fertilize all woody plants except evergreen seedlings with slow release packets at time of planting, unless otherwise directed by Project Landscape Architect

1. Place packets equidistantly within planting pit adjacent to ball or root mass, but not in direct contact with roots, in placement depth of 6 to 8 inches. Do not cut, rip or damage packets.
2. If it becomes necessary to remove and replace dead or unhealthy plants, replace packets with new ones.
2. Place at following application rates:

<u>Type of Plant</u> _____	<u>No. of Packets</u>
<u>Evergreen Trees</u>	
3 Feet to 6 Feet	3
Over 6 Feet	4
<u>Deciduous Trees</u>	
6 Feet to 12 Feet or under four Inches Caliper	3
Over 4 Inches Caliper	4

<u>Type of Plant</u> _____	<u>No. of</u>
<u>Shrubs</u>	
Under 3 Feet Height or Spread	2

## 3 Feet and Over in Height of Spread 3

## 3.03 PLANTING TREES AND SHRUBS:

- A. Set balled and burlapped (B&B) stock on layer of compacted planting soil mixture, plumb and in center of pit or trench with top of ball at same elevation as adjacent finished landscape grades. Remove burlap from sides of balls; retain on bottoms. When set, place additional soil mixture backfill around base and sides of ball, and work each layer to settle backfill and eliminate voids and air pockets. When excavation is approximately 2/3-full, water thoroughly before placing remainder of backfill. Repeat watering until no more is absorbed. Water again after placing final layer of planting soil mixture. Refilling around trunks or stems will not be acceptable.
  - 1. Face plants to give best appearance or relationship to each other or adjacent structure; or as directed by Project Landscape Architect
- B. Set container grown stock as specified for balled and burlapped stock, except cut cans on 2 sides with an approved can cutter; remove bottoms of wooden boxes after partial backfilling so as not to damage root balls.
- C. Form ring of soil around the edge of each planting pit to retain water. After water has been absorbed, fill plant hole with planting mixture and tamp lightly to grade. Bring any settlement to grade with planting mixture.
- D. Form shallow saucers capable of holding water about each plant by placing mound of topsoil around edge of each filled in pit in accordance with Drawings.
- E. Dish top of backfill to allow for mulching.
- F. Mulch pits, trenches and planted areas immediately after planting. Provide not less than following thickness of mulch and work into top of backfill and finish level with adjacent finish grades. Thoroughly water mulched areas. After mulching, rake mulch to uniform, finished surface.
  - 1. Provide 3 inch to 4 inch thickness of mulch.
- G. Apply anti-desiccant using power spray to provide an adequate film over trunks, branches, stems, twigs and foliage.
  - 1. If deciduous plants are moved in full-leaf, spray with anti-desiccant at nursery before moving and again 2 weeks after planting.
- H. Pruning:
  - 1. Prune branches of deciduous stock, after planting, to balance loss of roots and preserve natural character appropriate of the particular plant requirements. In general, remove 1/4 to 1/3 of leaf bearing buds, proportion shall in all cases be made acceptable to Project Landscape Architect. Remove or cut back broken, damaged, and unsymmetrical growth of

new wood.

3. Multiple leader plants: Preserve leader which will best promote symmetry of plant. Cut branches flush with trunk of main branch, at a point beyond a lateral shoot or bud a distance of not less than ½ diameter of supporting branch. Make cut on an angle.

3. Prune evergreens only to remove broken or damaged branches.

I. Remove and replace excessively pruned or malformed stock resulting from improper pruning.

J. Trunks of Trees: Wrap tree trunks of 2 inch caliper and larger. Start at ground and cover trunk to height of first branches and securely attach. Inspect tree trunks for injury, improper pruning and insect infestation and take corrective measures before wrapping.

K. Guying and Staking: Guy and stake trees immediately after planting as indicated.

3.04 MAINTENANCE:

A. Begin maintenance immediately after planting.

B. Maintain plants by pruning, cultivating and weeding as required for healthy growth. Restore planting saucers. Tighten and repair stake and guy supports and reset plants to proper grades or vertical position as required. Restore or replace damaged wrappings. Spray as required to keep trees and shrubs free of insects and disease.

1. Replacements: Replace all plants that are damaged or fail to achieve satisfactory growth or are otherwise defective.

C. Keep planting areas free of weeds, grass and other undesired vegetative growth.

D. Maintain plants until Final Acceptance of Project as a minimum but in no case less than 60 days after substantial completion of planting work.

3.05 CLEANUP AND PROTECTION:

A. During planting work, keep pavements clean and work area in an orderly condition.

B. Protect planting work and materials from damage due to planting operations, operations by other contractors and trades and trespassers. Maintain protection during installation and maintenance periods. Treat, repair or replace damaged planting work as directed.

3.06 INSPECTION AND ACCEPTANCE

A. When planting work is completed, including maintenance, Architect will, upon request, make an inspection to determine acceptability.

1. Landscape work may be inspected for acceptance in parts agreeable to Architect, provided

work offered for inspection is complete, including maintenance.

- B. Where inspected planting work does not comply with requirements, replace rejected work and continue specified maintenance until re-inspected by Architect and found to be acceptable. Remove rejected plants and materials promptly from Project Site.
  - 1. Replacements are subject to same requirements as original plants, including maintenance and maintenance periods. Plants designated for spring planting only may be replaced only during the spring planting season unless otherwise approved or directed by Project Landscape Architect

END OF SECTION 329300

## SECTION 334100 - STORM UTILITY DRAINAGE PIPING

### PART 1 - GENERAL

#### 1.1 SUMMARY

- A. Section Includes:
  - 1. Pipe and fittings.
  - 2. Encasement for piping.
  - 3. Manholes.
  - 4. Cleanouts.
  - 5. Nonpressure transition couplings.
  - 6. Expansion joints.
  - 7. Catch basins.
  - 8. Stormwater inlets.
  - 9. Pipe outlets.

#### 1.2 ACTION SUBMITTALS

- A. Product Data: For each type of product indicated.
- B. Shop Drawings:
  - 1. Manholes and catch basins: Include plans, elevations, sections, details, frames, and covers.

#### 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 (1:500) and vertical scale of not less than 1 inch equals 5 feet (1:50). 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.

## PART 2 - PRODUCTS

### 2.1 PE PIPE AND FITTINGS

- A. Corrugated PE Drainage Pipe and Fittings NPS 3 to NPS 10 (DN 80 to DN 250): 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 (DN 300 to DN 1500): 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.

### 2.2 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.

### 2.3 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 Plastic Pipes: ASTM F 477, elastomeric seal or ASTM D 5926, PVC.
  - 2. 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 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.

2.4 MANHOLES

A. Standard Precast Concrete Manholes:

1. Description: ASTM C 478 (ASTM C 478M), precast, reinforced concrete, of depth indicated, with provision for sealant joints.
2. Diameter: 48 inches (1200 mm) 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 (150-mm) minimum thickness for floor slab and 4-inch (102-mm) minimum thickness for walls and base riser section, and separate base slab or base section with integral floor.
5. Riser Sections: 4-inch (102-mm) 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 (ASTM C 990M), bitumen or butyl rubber.
8. Resilient Pipe Connectors: ASTM C 923 (ASTM C 923M), 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 (13-mm) 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 (300- to 400-mm) intervals. Omit steps if total depth from floor of manhole to finished grade is less than 48 inches.

B. Manhole Frames and Covers:

1. Description: Ferrous; 24-inch (610-mm) ID by 7- to 9-inch (175- to 225-mm) riser with 4-inch- (102-mm-) minimum width flange and 26-inch- (660-mm-) diameter cover. Include indented top design with lettering cast into cover, using wording equivalent to "STORM SEWER."
2. Material: ASTM A 536, Grade 60-40-18 ductile iron unless otherwise indicated.

2.5 CONCRETE

A. General: Cast-in-place concrete according to ACI 318, ACI 350/350R (ACI 350M/350RM), 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 (27.6 MPa) 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. Ballast and Pipe Supports: Portland cement design mix, 3000 psi (20.7 MPa) 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.

## 2.6 CATCH BASINS

### A. Standard Precast Concrete Catch Basins:

- 1. Description: ASTM C 478 (ASTM C 478M), precast, reinforced concrete, of depth indicated, with provision for sealant joints.
- 2. Base Section: 6-inch (150-mm) minimum thickness for floor slab and 4-inch (102-mm) minimum thickness for walls and base riser section, and separate base slab or base section with integral floor.
- 3. Riser Sections: 4-inch (102-mm) minimum thickness, 48-inch (1200-mm) 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 (ASTM C 990M), 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 (150- to 225-mm) total thickness, that match 24-inch- (610-mm-) diameter frame and grate.
- 8. Steps: Individual FRP steps; FRP ladder; or ASTM A 615/A 615M, deformed, 1/2-inch (13-mm) 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 (300- to 400-mm) intervals. Omit steps if total depth from floor of catch basin to finished grade is less than 60 inches (1500 mm).
- 9. Pipe Connectors: ASTM C 923 (ASTM C 923M), 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 (610 by 610 mm) minimum unless otherwise indicated.
- 2. Grate Free Area: Approximately 50 percent unless otherwise indicated.

## PART 3 - EXECUTION

### 3.1 EARTHWORK

- A. Excavation, trenching, and backfilling are specified in Section 312000 "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 NPS 6 (**DN 150**) 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 36-inch (**915-mm**) 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 (**ASTM C 14M**) 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 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 3 inches (**76 mm**) above finished surface elsewhere unless otherwise indicated.

### 3.5 CATCH BASIN INSTALLATION

- A. Set frames and grates to elevations indicated.

### 3.6 STORMWATER OUTLET INSTALLATION

- A. Construct riprap of broken stone, as indicated.
- B. Install outlets that spill onto grade, anchored with concrete, where indicated.
- C. Install outlets that spill onto grade, with flared end sections that match pipe, where indicated.

### 3.7 IDENTIFICATION

- A. Materials and their installation are specified in Section 312000 "Earth Moving." Arrange for installation of green warning tape directly over piping and at outside edge of underground structures.
  - 1. Use detectable warning tape over nonferrous piping and over edges of underground structures.

### 3.8 FIELD QUALITY CONTROL

- A. Inspect interior of piping to determine whether line displacement or other damage has occurred. Inspect after approximately 24 inches (610 mm) 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 Gardiner Public Works.

- 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