**Updated** 04/28/17

# FEDERAL PROJECT

**Effective November 05, 2014**
**Supersedes January 19, 2012**

## BIDDING INSTRUCTIONS

FOR ALL PROJECTS:

1. Use pen and ink to complete all paper Bids.
2. As a minimum, the following must be received prior to the time of Bid opening:

For a Paper Bid:

a) a copy of the Notice to Contractors, b) the completed Acknowledgement of Bid Amendments form, c) the completed Schedule of Items, d) two copies of the completed and signed Contract Offer, Agreement & Award form, e) a Bid Guaranty, (if required), and f) any other certifications or Bid requirements listed in the Bid Documents as due by Bid opening.

For an Electronic Bid:

a) a completed Bid using Expedite® software and submitted via the Bid Express™ web-based service, b) an electronic Bid Guaranty (if required) or a faxed copy of a Bid Bond (with original to be delivered within 72 hours), and c) any other Certifications or Bid requirements listed in the Bid Documents as due by Bid opening.

3. Include prices for all items in the Schedule of Items (excluding non-selected alternates).
4. Bid Guaranty acceptable forms are:
   a) a properly completed and signed Bid Bond on the Department's prescribed form (or on a form that does not contain any significant variations from the Department's form as determined by the Department) for 5% of the Bid Amount or
   b) an Official Bank Check, Cashier's Check, Certified Check, U.S. Postal Money Order or Negotiable Certificate of Deposit in the amount stated in the Notice to Contractors or
   c) an electronic bid bond submitted with an electronic bid.

5. If a paper Bid is to be sent, "FedEx First Overnight" delivery is suggested as the package is delivered directly to the DOT Headquarters Building located at 16 Child Street in Augusta. Other means, such as U.S. Postal Service's Express Mail has proven not to be reliable.

IN ADDITION, FOR FEDERAL AID PROJECTS:

6. Complete the DBE Proposed Utilization form, and submit with your bid. If you are submitting your bid electronically, you must FAX the form to (207) 624-3431. This is a curable defect.

*If you need further information regarding Bid preparation, call the DOT Contracts Section at (207) 624-3410.*

*For complete bidding requirements, refer to Section 102 of the Maine Department of Transportation, Standard Specifications, November 2014 Edition.*

April 28, 2017
Supersedes November 05, 2014

# NOTICE

**The Maine Department of Transportation is attempting to improve the way Bid Amendments/Addendums are handled, and allow for an electronic downloading of bid packages from our website, while continuing to maintain an optional plan holders list.**

**Prospective bidders, subcontractors or suppliers who wish to download a copy of the bid package and receive a courtesy notification of project specific bid amendments must fill out the on-line plan holder registration form and provide an email address to the MDOT Contracts mailbox at: MDOT.contracts@maine.gov. Each bid package will require a separate request.**

**Additionally, interested parties will be responsible for reviewing and retrieving the Bid Amendments from our web site, and acknowledging receipt and incorporating those Bid Amendments in their bids using the Acknowledgement of Bid Amendment Form.**

**The downloading of bid packages from the MDOT website is not the same as providing an electronic bid to the Department. Electronic bids must be submitted via http://www.BIDX.com. For information on electronic bidding contact Rebecca Snowden at rebecca.snowden@maine.gov or Diane Barnes at diane.barnes@maine.gov.**

# NOTICE

For security and other reasons, all Bid Packages which are mailed, shall be provided in double (one envelope inside the other) envelopes. The *Inner Envelope* shall have the following information provided on it:

Bid Enclosed - Do Not Open
PIN:
Town:
Date of Bid Opening:
Name of Contractor with mailing address and telephone number:

In Addition to the usual address information, the *Outer Envelope* should have written or typed on it:

Double Envelope: Bid Enclosed
PIN:
Town:
Date of Bid Opening:
Name of Contractor:
*This should not be much of a change for those of you who use Federal Express or similar services.*

Hand-carried Bids may be in one envelope as before, and should be marked with the following information:

Bid Enclosed: Do Not Open
PIN:
Town:
Name of Contractor:

October 16, 2001

## STATE OF MAINE DEPARTMENT OF TRANSPORTATION

Bid Guaranty-Bid Bond Form

**KNOW ALL MEN BY THESE PRESENTS THAT**_____

_____, of the City/Town of _____and State of_____

as Principal, and _____as Surety, a

Corporation duly organized under the laws of the State of_____and having a usual place of

Business in _____and hereby held and firmly bound unto the Treasurer of

the State of Maine in the sum of_____,for payment which Principal and Surety bind

themselves, their heirs, executers, administrators, successors and assigns, jointly and severally.

The condition of this obligation is that the Principal has submitted to the Maine Department of Transportation, hereafter Department, a certain bid, attached hereto and incorporated as a part herein, to enter into a written contract for the construction of _____

_____

_____and if the Department shall accept said bid and the Principal shall execute and deliver a contract in the form attached hereto (properly completed in accordance with said bid) and shall furnish bonds for this faithful performance of said contract, and for the payment of all persons performing labor or furnishing material in connection therewith, and shall in all other respects perform the agreement created by the acceptance of said bid, then this obligation shall be null and void; otherwise it shall remain in full force, and effect.

Signed and sealed this_____day of _____20_____

WITNESS:

_____

_____

_____

PRINCIPAL:

By_____

By:_____

By:_____

WITNESS

_____

_____

_____

SURETY:

By_____

By:_____

Name of Local Agency: _____

SAMPLE

# NOTICE

Bidders:

Please use the attached “Request for Information” form when submitting questions concerning specific Contracts that have been advertised for Bid, include additional numbered pages as required. RFI’s may be faxed to 207-624-3431, submitted electronically through the Departments web page of advertised projects by selecting the RFI tab on the project details page or via e-mail to RFI-Contracts.MDOT@maine.gov.

These are the only allowable mechanisms for answering Project specific questions. Maine DOT will not be bound to any answers to Project specific questions received during the Bidding phase through other processes.

When submitting RFIs by Email please follow the same guidelines as stated on the “Request for Information” form and include the word “RFI” along with the Project name and Identification number in the subject line.

State of Maine
Department of Transportation

**RFI No: _____**

# REQUEST FOR INFORMATION

**Date _____ Time _____**

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**Information Requested for:**

**WIN(S): _____ Town(s): _____ Bid Date: _____**

**Question(s):**_____

_____

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Request by:

**Company Name**:_____**Phone:(_____)**_____

**Email: _____ Fax: (_____)**_____

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**Complete this form and fax to 207-624-3431, Attn: Project Manager (name listed on the "Notice to Contractors"), or Email questions to RFI-Contracts.MDOT@maine.gov, Please include the word "RFI" along with the Project Name and Identification Number in the Subject line, or electronically by using the RFI Tab located on the Individual Projects Detail page.**

# NOTICE

## Disadvantaged Business Enterprise Proposed Utilization

The Apparent Low Bidder shall submit the Disadvantaged Business Enterprise Proposed Utilization form with their bid. This is a curable bid defect.

The Contractor's Disadvantaged Business Enterprise Proposed Utilization Plan form contains additional information that is required by USDOT.

The Contractor's Disadvantaged Business Enterprise Proposed Utilization Plan form should be used.

A copy of the new Contractor's Disadvantaged Business Enterprise Proposed Utilization Plan and instructions for completing it are attached.

Note: Questions about DBE firms, or to obtain a printed copy of the DBE Directory, contact The Office of Civil Rights at (207) 624-3066.

MDOTs DBE Directory of Certified firms can also be obtained at http://www.maine.gov/mdot/civilrights/dbe.htm

# INSTRUCTIONS FOR PREPARING THE MaineDOT CONTRACTOR'S DBE/SUBCONTRACTOR UTILIZATION FORM

The Contractor Shall Extend equal opportunity to MaineDOT certified DBE firms (as listed in MaineDOT's DBE Directory of Certified Businesses) in the selection and utilization of Subcontractors and Suppliers.

SPECIFIC INSTRUCTIONS FOR COMPLETING THE FORM:

Insert Contractor name, the name of the person(s) preparing the form, and that person(s) telephone, fax number and e-mail address.

Calculate and provide percentage of your bid that will be allocated to DBE firms, Federal Project Identification Number, and location of the Project work.

In the columns, name each subcontractor, DBE and non-DBE firm to be used, provide the Unit/Item cost of the work/product to be provided by the subcontractor, give a brief description and the dollar value of the work.

Revised 1/12

# FHWA DBE GOAL NOTICE FFY 2016-18

## Maine Department of Transportation
## Disadvantaged Business Enterprise Program

Notice is hereby given that in accordance with US DOT regulation 49 CFR Part 26, the Maine Department of Transportation has established a DBE Program for disadvantaged business participation in the federal-aid highway and bridge construction program; MaineDOT contracts covered by the program include consulting, construction, supplies, manufacturing, and service contracts.

For FFY 2016-18 (October 1, 2015 through September 30, 2018) MaineDOT has established an annual DBE participation goal of **2.0%** to be achieved through race/gender neutral means. This goal has been approved by the Federal Highway Administration and remains in effect through September 30, 2018. Maine DOT must meet this goal each federal fiscal year. If the goal is not met, MaineDOT must provide a justification for not meeting the goal and provide a plan to ensure the goal is met, which may include contract goals on certain projects that contractors will be required to meet.

MaineDOT asks all contractors, consultants and subcontractors to seek certified DBE firms for projects and to work to meet the determined 2.0% goal without the need to impose contract goals. DBE firms are listed on the MaineDOT website at:

http://www.maine.gov/mdot/civilrights/dbe/

Interested parties may view MaineDOT's DBE goal setting methodology also posted on this website. If you have questions regarding this goal or the DBE program you may contact Sherry Tompkins at the Maine Department of Transportation, Civil Rights Office by telephone at (207) 624-3066 or by e-mail at: sherry.tompkins@maine.gov

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**MaineDOT CONTRACTOR'S DBE/SUBCONTRACTOR PROPOSED UTILIZATION FORM**

**All Bidders must furnish this form with their bid on Bid Opening day**

**Contractor:** _____ **Telephone:** _____ **Ext** _____

**Contact Person:** _____ **Fax:** _____

**E-mail:** _____

**BID DATE:** _____

**FEDERAL PROJECT PIN #** _____ **PROJECT LOCATION:** _____

**TOTAL ANTICIPATED DBE ____ % PARTICIPATION FOR THIS CONTRACT**

| WBE | DBE | Non DBE | Firm Name | Item Number & Description of Work | Quantity | Cost Per Unit/Item | Anticipated $ Value |
|---|---|---|---|---|---|---|---|
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| | | | | | | | |
| | | | | | | | |
| | | | | | | **Subcontractor Total>** | |
| | | | | | | **DBE Total >** | |

**NOTE: THIS INFORMATION IS USED TO TRACK AND REPORT ANTICIPATED DBE PARTICIPATION IN ALL FEDERALLY FUNDED MAINE DOT CONTRACTS. THE ANTICIPATED DBE AMOUNT IS VOLUNTARY AND WILL NOT BECOME A PART OF THE CONTRACTUAL TERMS.**

Equal Opportunity Use:

Form received: ___/___/___ Verified by: _____

FHWA ☐ FTA ☐ FAA ☐

**For a complete list of certified firms and company designation (WBE/DBE) go to http://www.maine.gov/mdot/civilrights/**

Rev. 01/15

**Maine Department of Transportation Civil Rights Office**

**Directory of Certified Disadvantaged Business Enterprises**

**Listing can be found at:**

http://www.maine.gov/mdot/civilrights/dbe.htm

**For additional information and guidance contact:**

**Civil Rights Office at (207) 624-3066**

***It is the responsibility of the Contractor to access the DBE Directory at this site in order to have the most current listing.***

## Vendor Registration

Prospective Bidders must register as a vendor with the Department of Administrative & Financial Services if the vendor is awarded a contract. Vendors will not be able to receive payment without first being registered. Vendors/Contractors will find information and register through the following link –
http://www.maine.gov/purchases/venbid/index.shtml

# STATE OF MAINE DEPARTMENT OF TRANSPORTATION
# NOTICE TO CONTRACTORS

Sealed Bids addressed to the Maine Department of Transportation, Augusta, Maine 04333 and endorsed on the wrapper "Bids for **Maintenance and Operations Building** in the city of **Portland**" will be received from contractors at the Reception Desk, Maine DOT Building, Capitol Street, Augusta, Maine, until 11:00 o'clock A.M. (prevailing time) on April 11, 2018 and at that time and place publicly opened and read. Bids will be accepted from all bidders. The lowest responsive bidder must have completed, or successfully complete, a (Building prequalification), or project specific prequalification to be considered for the award of this contract. **We now accept electronic bids for those bid packages posted on the bidx.com website. Electronic bids do not have to be accompanied by paper bids. Please note: the Department will accept a facsimile of the bid bond; however, the original bid bond must then be received at the MDOT Contract Section within 72 hours of the bid opening. Until further notice, dual bids (one paper, one electronic) will be accepted, with the paper copy taking precedence.**

Description: Maine Federal Aid Project No. 2194202 / 22998.00, WINS. 21942.02 / 22998.00

Location: In Cumberland County, Project 2194202 and 22998.00 are located at the International Marine Terminal in Portland Maine.

Outline of Work: Maintenance and Operations Building and other incidental work.

**A Mandatory pre-bid meeting will be held at the Portland International Marine Terminal at 10:00 AM on April 4, 2018. The meeting will be held within the port office building located at 460 Commercial St. in Portland, Maine. A walk through of the project site will be provided. The pre-bid meeting is mandatory and only General Contractors who are present at the meeting will be allowed to bid.**

For general information regarding Bidding and Contracting procedures, contact George Macdougall at (207) 624-3410. Our webpage at http://www.maine.gov/mdot/contractors/ contains a copy of the Schedule of Items, Plan Holders List, written portions of bid amendments, drawings, bid results and an electronic form for RFI submittal. For Project-specific information fax all questions to **Project Manager** Joel Kittredge at (207) 624-3431, use electronic RFI form or email questions to RFI-Contracts.MDOT@maine.gov, project name and identification number should be in the subject line. Questions received after 12:00 noon of Monday (or if that Monday is a state holiday, Friday) prior to bid date will not be answered. Bidders shall not contact any other Departmental staff for clarification of Contract provisions, and the Department will not be responsible for any interpretations so obtained. TTY users call Maine Relay 711.

Plans, specifications and bid forms may be seen at the Maine DOT Building in Augusta, Maine. They may be purchased from the Department between the hours of 8:00 a.m. to 4:30 p.m. by cash, credit card (Visa/Mastercard) or check payable to Treasurer, State of Maine sent to Maine Department of Transportation, Attn.: Mailroom, 16 State House Station, Augusta, Maine 04333-0016. They also may be purchased by telephone at (207) 624-3536 between the hours of 8:00 a.m. to 4:30 p.m. Full size plans $55.00 ($60.50 by mail). Half size plans $27.50 ($30.75 by mail), Bid Book $10 ($13 by mail), Single Sheets $2, payment in advance, all non-refundable.

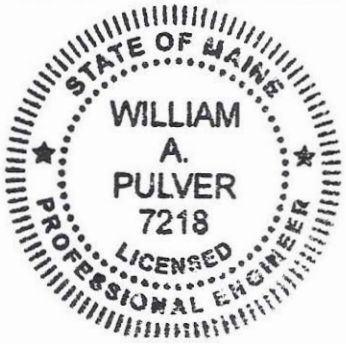
Each Bid must be made upon blank forms provided by the Department and must be accompanied by a bid bond at 5% of the bid amount or an official bank check, cashier's check, certified check, certificate of deposit, or United States postal money order in the amount of $100,000.00 payable to Treasurer, State of Maine as a Bid guarantee. A Contract Performance Surety Bond and a Contract Payment Surety Bond, each in the amount of 100 percent of the Contract price, will be required of the successful Bidder.

This Contract is subject to all applicable Federal Laws. This contract is subject to compliance with the Disadvantaged Business Enterprise program requirements as set forth by the Maine Department of Transportation.

All work shall be governed by "State of Maine, Department of Transportation, Standard Specifications, November 2014 Edition", price $10 [$15 by mail], and Standard Details, November 2014 Edition, price $10 [$15 by mail]. They also may be purchased by telephone at (207) 624-3536 between the hours of 8:00 a.m. to 4:30 p.m. Standard Detail updates can be found at http://www.maine.gov/mdot/contractors/publications/ .

The right is hereby reserved to the Maine DOT to reject any or all bids.

Augusta, Maine
March 14, 2018




WILLIAM PULVER P.E.
DEPUTY CHIEF ENGINEER

# NOTICE

All bids for Federal Projects **shall** be accompanied by the DBE Proposed Utilization form. If you are submitting an electronic bid, the DBE Utilization Form may be faxed to 207-624-3431. Failure to submit the form with the bid will be considered a curable defect.

Portland
21942.02 / 22998.00
April 14, 2011
Supersedes August 3, 2004

**SPECIAL PROVISION 102.7.3**
**ACKNOWLEDGMENT OF BID AMENDMENTS**

With this form, the Bidder acknowledges its responsibility to check for all Amendments to the Bid Package. For each Project under Advertisement, Amendments are located at http://www.maine.gov/mdot/contractors/ . It is the responsibility of the Bidder to determine if there are Amendments to the Project, to download them, to incorporate them into their Bid Package, and to reference the Amendment number and the date on the form below. The Maine DOT will not post Bid Amendments any later than noon the day before Bid opening without individually notifying all the planholders.

| Amendment Number | Date |
|---|---|
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The Contractor, for itself, its successors and assigns, hereby acknowledges that it has received all of the above referenced Amendments to the Bid Package.

CONTRACTOR

_____ _____
Date Signature of authorized representative

_____
(Name and Title Printed)

**Maine Department of Transportation**

**Proposal Schedule of Items** 

**Proposal ID:** 021942.02 **Project(s):** 021942.02, 022998.00

**SECTION:** 1 PROJECT ITEMS

**Alt Set ID:** **Alt Mbr ID:**

**Contractor:** _____

| Proposal Line Number | Item ID / Description | Approximate Quantity and Units | Unit Price Dollars | Unit Price Cents | Bid Amount Dollars | Bid Amount Cents |
|---|---|---|---|---|---|---|
| 0010 | 202.02<br>REMOVING STRUCTURES AND OBSTRUCTIONS - PROPERTY OF THE CONTRACTOR - CURB RAMP | LUMP SUM | LUMP SUM | | _____ | _____ |
| 0020 | 202.111<br>REMOVING OF CONCRETE SIDEWALK | 34.000<br>SY | _____ | _____ | _____ | _____ |
| 0030 | 202.127<br>REMOVE EXISTING BITUMINOUS PAVEMENT | LUMP SUM | LUMP SUM | | _____ | _____ |
| 0040 | 202.15<br>REMOVING MANHOLE OR CATCH BASIN | 1.000<br>EA | _____ | _____ | _____ | _____ |
| 0050 | 202.203<br>PAVEMENT BUTT JOINTS | 450.000<br>SY | _____ | _____ | _____ | _____ |
| 0060 | 203.20<br>COMMON EXCAVATION | 5,200.000<br>CY | _____ | _____ | _____ | _____ |
| 0070 | 203.24<br>COMMON BORROW | 100.000<br>CY | _____ | _____ | _____ | _____ |
| 0080 | 304.10<br>AGGREGATE SUBBASE COURSE - GRAVEL | 1,030.000<br>CY | _____ | _____ | _____ | _____ |
| 0090 | 304.15<br>AGGREGATE BASE COURSE - TYPE B | 2,200.000<br>CY | _____ | _____ | _____ | _____ |
| 0100 | 403.2071<br>19 MM POLYMER MODIFIED HOT MIX ASPHALT | 510.000<br>T | _____ | _____ | _____ | _____ |
| 0110 | 403.2081<br>12.5 MM POLYMER MODIFIED HOT MIX ASPHALT | 280.000<br>T | _____ | _____ | _____ | _____ |

**Maine Department of Transportation**

**Proposal Schedule of Items** 

**Proposal ID:** 021942.02 **Project(s):** 021942.02, 022998.00

**SECTION:** 1 PROJECT ITEMS

**Alt Set ID:** **Alt Mbr ID:**

**Contractor:** _____

| Proposal Line Number | Item ID / Description | Approximate Quantity and Units | Unit Price Dollars | Unit Price Cents | Bid Amount Dollars | Bid Amount Cents |
|---|---|---|---|---|---|---|
| 0120 | 403.209<br>HOT MIX ASPHALT 9.5 MM (SIDEWALKS, DRIVES, INCIDENTALS) | 10.000<br>T | | | | |
| 0130 | 403.2131<br>12.5 MM POLYMER MODIFIED HMA BASE | 350.000<br>T | | | | |
| 0140 | 409.15<br>BITUMINOUS TACK COAT - APPLIED | 1,100.000<br>G | | | | |
| 0150 | 419.30<br>SAW CUTTING BITUMINOUS PAVEMENT | 1,100.000<br>LF | | | | |
| 0160 | 419.40<br>SAW CUTTING CONCRETE - SIDEWALK | 5.000<br>LF | | | | |
| 0170 | 502.603<br>STRUCTURAL CONCRETE, CONDENSER PAD | LUMP SUM | LUMP SUM | | | |
| 0180 | 502.606<br>STRUCTURAL CONCRETE, SECURITY BUILDING SLAB | LUMP SUM | LUMP SUM | | | |
| 0190 | 514.06<br>CURING BOX FOR CONCRETE CYLINDERS | 1.000<br>EA | | | | |
| 0200 | 526.75<br>REMOVE CONCRETE BARRIER | 163.000<br>LF | | | | |
| 0210 | 603.159<br>12 INCH CULVERT PIPE OPTION III | 338.000<br>LF | | | | |
| 0220 | 604.18<br>ADJUSTING MANHOLE OR CATCH BASIN TO GRADE | 2.000<br>EA | | | | |

**Maine Department of Transportation**

**Proposal Schedule of Items** 

**Proposal ID:** 021942.02 **Project(s):** 021942.02, 022998.00

**SECTION:** 1 PROJECT ITEMS

**Alt Set ID:** **Alt Mbr ID:**

**Contractor:** _____

| Proposal Line Number | Item ID<br>Description | Approximate Quantity and Units | Unit Price | | Bid Amount | |
|---|---|---|---|---|---|---|
| | | | Dollars | Cents | Dollars | Cents |
| 0230 | 604.245<br>CATCH BASIN TYPE F4-C | 2.000<br>EA | | | | |
| 0240 | 604.247<br>CATCH BASIN TYPE F5-C | 1.000<br>EA | | | | |
| 0250 | 604.252<br>CATCH BASIN TYPE A5-C | 1.000<br>EA | | | | |
| 0260 | 604.3901<br>FILTER BASIN - JELLY FISH MEMBRANE SYSTEM | 1.000<br>EA | | | | |
| 0270 | 604.40<br>OIL / WATER SEPARATOR | 1.000<br>EA | | | | |
| 0280 | 607.1602<br>TEMP SECURITY FENCE MOUNTED ON JERSEY BARRIER - MOVABLE | 410.000<br>LF | | | | |
| 0290 | 607.1603<br>REMOVE AND RESET TEMP SECURITY FENCE - ON JERSEY BARRIER | 94.000<br>LF | | | | |
| 0300 | 607.243<br>REMOVE CHAIN LINK FENCE - RETAINED BY THE DEPT | 658.000<br>LF | | | | |
| 0310 | 607.25<br>REMOVE AND RESET CHAIN LINK FENCE | 130.000<br>LF | | | | |
| 0320 | 607.4921<br>REMOVE GATE & MOTORS | 1.000<br>EA | | | | |
| 0330 | 608.08<br>REINFORCED CONCRETE SIDEWALK | 180.000<br>SY | | | | |

**Maine Department of Transportation**

**Proposal Schedule of Items** 

**Proposal ID:** 021942.02 **Project(s):** 021942.02, 022998.00

**SECTION:** 1 PROJECT ITEMS

**Alt Set ID:** **Alt Mbr ID:**

**Contractor:** _____

| Proposal Line Number | Item ID / Description | Approximate Quantity and Units | Unit Price Dollars | Unit Price Cents | Bid Amount Dollars | Bid Amount Cents |
|---|---|---|---|---|---|---|
| 0340 | 608.26<br>CURB RAMP DETECTABLE WARNING FIELD | 12.000<br>SF | | | | |
| 0350 | 609.11<br>VERTICAL CURB TYPE 1 | 598.000<br>LF | | | | |
| 0360 | 609.111<br>SPECIAL GRANITE CURB - 24" | 162.000<br>LF | | | | |
| 0370 | 609.12<br>VERTICAL CURB TYPE 1 - CIRCULAR | 240.000<br>LF | | | | |
| 0380 | 609.234<br>TERMINAL CURB TYPE 1 - 4 FOOT | 7.000<br>EA | | | | |
| 0390 | 609.237<br>TERMINAL CURB TYPE 1 - 7 FOOT | 3.000<br>EA | | | | |
| 0400 | 609.2371<br>TERMINAL CURB TYPE 1- 7 FT - CIRCULAR | 1.000<br>EA | | | | |
| 0410 | 615.07<br>LOAM | 93.000<br>CY | | | | |
| 0420 | 618.13<br>SEEDING METHOD NUMBER 1 | 2.000<br>UN | | | | |
| 0430 | 619.12<br>MULCH | 2.000<br>UN | | | | |
| 0440 | 621.126<br>SMALL DECIDUOUS TREES (6 FOOT - 8 FOOT) GROUP A | 3.000<br>EA | | | | |
| 0450 | 621.5352<br>DECIDUOUS SHRUBS (18 INCH - 24 INCH) GROUP A | 20.000<br>EA | | | | |

**Maine Department of Transportation**

**Proposal Schedule of Items** 

**Proposal ID:** 021942.02 **Project(s):** 021942.02, 022998.00

**SECTION:** 1 PROJECT ITEMS

**Alt Set ID:** **Alt Mbr ID:**

**Contractor:** _____

| Proposal Line Number | Item ID / Description | Approximate Quantity and Units | Unit Price Dollars | Unit Price Cents | Bid Amount Dollars | Bid Amount Cents |
|---|---|---|---|---|---|---|
| 0460 | 627.901<br>PAVEMENT MARKINGS IN OFFICE PARKING LOT & DRIVEWAYS | LUMP SUM | LUMP SUM | | _____ | _____ |
| 0470 | 629.05<br>HAND LABOR, STRAIGHT TIME | 60.000<br>HR | _____ | _____ | _____ | _____ |
| 0480 | 631.12<br>ALL PURPOSE EXCAVATOR (INCLUDING OPERATOR) | 20.000<br>HR | _____ | _____ | _____ | _____ |
| 0490 | 631.13<br>BULLDOZER (INCLUDING OPERATOR) | 20.000<br>HR | _____ | _____ | _____ | _____ |
| 0500 | 631.172<br>TRUCK - LARGE (INCLUDING OPERATOR) | 20.000<br>HR | _____ | _____ | _____ | _____ |
| 0510 | 631.36<br>FOREPERSON | 60.000<br>HR | _____ | _____ | _____ | _____ |
| 0520 | 634.2081<br>REMOVE EXISTING HIGH MAST LIGHT STANDARD - (RETAINED BY THE DEPT.) | 1.000<br>EA | _____ | _____ | _____ | _____ |
| 0530 | 634.2082<br>REMOVE EXISTING LIGHT STANDARD - FOUNDATION (RETAINED BY THE DEPT.) | 1.000<br>EA | _____ | _____ | _____ | _____ |
| 0540 | 634.2083<br>REMOVE REEFER OUTLET PEDESTAL AND FOUNDATION - RETAINED BY DEPT. | 1.000<br>EA | _____ | _____ | _____ | _____ |
| 0550 | 639.18<br>FIELD OFFICE TYPE A | 1.000<br>EA | _____ | _____ | _____ | _____ |

**Proposal ID:** 021942.02 **Project(s):** 021942.02, 022998.00

**SECTION:** 1 PROJECT ITEMS

**Alt Set ID:** **Alt Mbr ID:**

**Contractor:** _____

| Proposal Line Number | Item ID / Description | Approximate Quantity and Units | Unit Price Dollars | Unit Price Cents | Bid Amount Dollars | Bid Amount Cents |
|---|---|---|---|---|---|---|
| 0560 | 645.271<br>REGULATORY, WARNING, CONFIRMATION AND ROUTE MARKER ASSEMBLY SIGNS, TYPE I | 14.000<br>SF | | | | |
| 0570 | 656.75<br>TEMPORARY SOIL EROSION AND WATER POLLUTION CONTROL | LUMP SUM | LUMP SUM | | | |
| 0580 | 659.10<br>MOBILIZATION | LUMP SUM | LUMP SUM | | | |
| 0590 | 801.03<br>TEST PITS | 1.000<br>EA | | | | |
| 0600 | 801.141<br>4" PVC SANITARY SEWER (SDR-35) | 17.000<br>LF | | | | |
| 0610 | 801.16<br>6 INCH PVC SANITARY SEWER (SDR-35) | 265.000<br>LF | | | | |
| 0620 | 803.173<br>SEWER MANHOLE - 4 FOOT DIAMETER | 2.000<br>EA | | | | |
| 0630 | 825.68<br>WATER LINE MODIFICATIONS - DISTRIBUTION PIPING | 1.000<br>L S | | | | |
| 0640 | 827.37<br>NATURAL GAS DISTRIBUTION | LUMP SUM | LUMP SUM | | | |
| 0650 | 832.071<br>CONTRACTOR ALLOWANCE - CITY PERMITS | LUMP SUM | LUMP SUM | | | |
| 0660 | 832.071<br>CONTRACTOR ALLOWANCE - CMP | LUMP SUM | LUMP SUM | | | |

**Maine Department of Transportation**

**Proposal Schedule of Items** 

**Proposal ID:** 021942.02 **Project(s):** 021942.02, 022998.00

**SECTION:** 1 PROJECT ITEMS

**Alt Set ID:** **Alt Mbr ID:**

**Contractor:** _____

| Proposal Line Number | Item ID / Description | Approximate Quantity and Units | Unit Price Dollars | Unit Price Cents | Bid Amount Dollars | Bid Amount Cents |
|---|---|---|---|---|---|---|
| 0670 | 832.071<br>CONTRACTOR ALLOWANCE - UNITIL | LUMP SUM | LUMP SUM | | _____ | _____ |
| 0680 | 832.071<br>CONTRACTOR ALLOWANCE - FAIRPOINT | LUMP SUM | LUMP SUM | | _____ | _____ |
| 0690 | 832.071<br>CONTRACTOR ALLOWANCE - PWD | LUMP SUM | LUMP SUM | | _____ | _____ |
| 0700 | 832.071<br>CONTRACTOR ALLOWANCE - OXFORD NETWORKS | LUMP SUM | LUMP SUM | | _____ | _____ |
| 0710 | 841.48<br>BOLLARDS | 17.000<br>EA | _____ | _____ | _____ | _____ |
| 0720 | 890.07<br>BIKE RACKS | 3.000<br>EA | _____ | _____ | _____ | _____ |
| 0730 | DIV. 10<br>SPECIALTIES | LUMP SUM | LUMP SUM | | _____ | _____ |
| 0740 | DIV. 11<br>EQUIPMENT | 1.000<br>L S | _____ | _____ | _____ | _____ |
| 0750 | DIV. 13<br>SPECIAL CONSTRUCTION | 1.000<br>L S | _____ | _____ | _____ | _____ |
| 0760 | DIV. 21<br>FIRE SUPPRESSION | 1.000<br>L S | _____ | _____ | _____ | _____ |
| 0770 | DIV. 22<br>PLUMBING | LUMP SUM | LUMP SUM | | _____ | _____ |
| 0780 | DIV. 23<br>HVAC | LUMP SUM | LUMP SUM | | _____ | _____ |
| 0790 | DIV. 26<br>ELECTRICAL | LUMP SUM | LUMP SUM | | _____ | _____ |

**Maine Department of Transportation**

**Proposal Schedule of Items** 

**Proposal ID:** 021942.02 **Project(s):** 021942.02, 022998.00

**SECTION:** 1 PROJECT ITEMS

**Alt Set ID:** **Alt Mbr ID:**

**Contractor:** _____

| Proposal Line Number | Item ID / Description | Approximate Quantity and Units | Unit Price Dollars | Unit Price Cents | Bid Amount Dollars | Bid Amount Cents |
|---|---|---|---|---|---|---|
| 0800 | DIV. 27<br>COMMUNICATIONS | 1.000<br>L S | | | | |
| 0810 | DIV. 28<br>ELECTRONIC SAFETY AND SECURITY | 1.000<br>L S | | | | |
| 0820 | DIV. 3<br>CONCRETE | LUMP SUM | LUMP SUM | | | |
| 0830 | DIV. 32<br>SITE IMPROVEMENTS | 1.000<br>L S | | | | |
| 0840 | DIV. 4<br>MASONRY | LUMP SUM | LUMP SUM | | | |
| 0850 | DIV. 5<br>METALS | LUMP SUM | LUMP SUM | | | |
| 0860 | DIV. 6<br>WOOD & PLASTICS | LUMP SUM | LUMP SUM | | | |
| 0870 | DIV. 7<br>THERMAL & MOISTURE PROTECTION | LUMP SUM | LUMP SUM | | | |
| 0880 | DIV. 8<br>DOORS & WINDOWS | LUMP SUM | LUMP SUM | | | |
| 0890 | DIV. 9<br>FINISHES | LUMP SUM | LUMP SUM | | | |
| | **Section:** 1 | | **Total:** | | | |

**Total Bid:** _____

# CONTRACT AGREEMENT, OFFER & AWARD

AGREEMENT made on the date last signed below, by and between the State of Maine, acting through and by its Department of Transportation (Department), an agency of state government with its principal administrative offices located at Child Street, Augusta, Maine, with a mailing address at 16 State House Station, Augusta, Maine 04333-0016, and

_____

a corporation or other legal entity organized under the laws of the State of _____, with its principal place of business located at _____

_____

The Department and the Contractor, in consideration of the mutual promises set forth in this Agreement (the "Contract"), hereby agree as follows:

**A. The Work.**

The Contractor agrees to complete all Work as specified or indicated in the Contract including Extra Work in conformity with the Contract, **21942.02/ 22998.00** for a **Maintenance and Operations Building** in the city of **Portland**, County of **Cumberland**, Maine. The Work includes construction, maintenance during construction, warranty as provided in the Contract, and other incidental work.

The Contractor shall be responsible for furnishing all supervision, labor, equipment, tools supplies, permanent materials and temporary materials required to perform the Work including construction quality control including inspection, testing and documentation, all required documentation at the conclusion of the project, warranting its work and performing all other work indicated in the Contract.

The Department shall have the right to alter the nature and extent of the Work as provided in the Contract; payment to be made as provided in the same.

**B. Time.**

The Contractor agrees to complete all Work, except warranty work, on or before **June 14, 2019.** Further, the Department may deduct from moneys otherwise due the Contractor, not as a penalty, but as Liquidated Damages in accordance with Sections 107.7 and 107.8 of the State of Maine Department of Transportation Standard Specifications, November 2014 Edition and related Special Provisions.

**C. Price.**

The quantities given in the Schedule of Items of the Bid Package will be used as the basis for determining the original Contract amount and for determining the amounts of the required Performance Surety Bond and Payment Surety Bond, and that the amount of this offer is _____

_____

**$**_ _____ Performance Bond and Payment Bond each being 100% of the amount of this Contract.

**D. Contract.**

This Contract, which may be amended, modified, or supplemented in writing only, consists of the Contract documents as defined in the Plans, Standard Specifications, November 2014 Edition, Standard Details November 2014 Edition as updated through advertisement, Supplemental Specifications, Special Provisions, Contract Agreement; and Contract Bonds. It is agreed and understood that this Contract will be governed by the documents listed above.

**E. Certifications.**

By signing below, the Contractor hereby certifies that to the best of the Contractor's knowledge and belief:

1. All of the statements, representations, covenants, and/or certifications required or set forth in the Bid and the Bid Documents, including those in the Federal Contract Provisions Supplement, and the Contract are still complete and accurate as of the date of this Agreement.

2. The Contractor knows of no legal, contractual, or financial impediment to entering into this Contract.

3. The person signing below is legally authorized by the Contractor to sign this Contract on behalf of the Contractor and to legally bind the Contractor to the terms of the Contract.

## F. Offer.

The undersigned, having carefully examined the site of work, the Plans, Standard Specifications November 2014 Edition, Standard Details November 2014 Edition as updated through advertisement, Supplemental Specifications, Special Provisions, Contract Agreement; and Contract Bonds contained herein for construction of:

**WINS. 21942.02/ 22998.00 - Maintenance and Operations Building - in the city of Portland,**

State of Maine, on which bids will be received until the time specified in the "Notice to Contractors" do(es) hereby bid and offer to enter into this contract to supply all the materials, tools, equipment and labor to construct the whole of the Work in strict accordance with the terms and conditions of this Contract at the unit prices in the attached "Schedule of Items".

The Offeror agrees to perform the work required at the price specified above and in accordance with the bids provided in the attached "Schedule of Items" in strict accordance with the terms of this solicitation, and to provide the appropriate insurance and bonds if this offer is accepted by the Government in writing.

As Offeror also agrees:

First: To do any extra work, not covered by the attached "Schedule of Items", which may be ordered by the Resident, and to accept as full compensation the amount determined upon a "Force Account" basis as provided in the Standard Specifications, November 2014 Edition, and as addressed in the contract documents.

Second: That the bid bond at 5% of the bid amount or the official bank check, cashier's check, certificate of deposit or U. S. Postal Money Order in the amount given in the "Notice to Contractors", payable to the Treasurer of the State of Maine and accompanying this bid, shall be forfeited, as liquidated damages, if in case this bid is accepted, and the undersigned shall fail to abide by the terms and conditions of the offer and fail to furnish satisfactory insurance and Contract bonds under the conditions stipulated in the Specifications within 15 days of notice of intent to award the contract.

Third: To begin the Work as stated in Section 107.2 of the Standard Specifications November 2014 Edition and complete the Work within the time limits given in the Special Provisions of this Contract.

Fourth: The Contractor will be bound to the Disadvantaged Business Enterprise (DBE) Requirements contained in the attached Notice (Additional Instructions to Bidders) and submit a completed Contractor's Disadvantaged Business Enterprise Utilization Plan with their bid.

Fifth: That this offer shall remain open for 30 calendar days after the date of opening of bids.

Sixth: The Bidder hereby certifies, to the best of its knowledge and belief that: the Bidder has not, either directly or indirectly, entered into any agreement, participated in any collusion, or otherwise taken any action in restraint of competitive bidding in connection with its bid, and its subsequent contract with the Department.

IN WITNESS WHEREOF, the Contractor, for itself, its successors and assigns, hereby execute two duplicate originals of this Agreement and thereby binds itself to all covenants, terms, and obligations contained in the Contract Documents.

CONTRACTOR

| | |
|---|---|
| _____ | _____ |
| Date | (Signature of Legally Authorized Representative of the Contractor) |
| _____ | _____ |
| Witness | (Name and Title Printed) |

**G. Award.**

Your offer is hereby accepted. This award consummates the Contract, and the documents referenced herein.

MAINE DEPARTMENT OF TRANSPORTATION

| | |
|---|---|
| _____ | _____ |
| Date | By: David Bernhardt, Commissioner |
| _____ | |
| Witness | |

# CONTRACT AGREEMENT, OFFER & AWARD

AGREEMENT made on the date last signed below, by and between the State of Maine, acting through and by its Department of Transportation (Department), an agency of state government with its principal administrative offices located at Child Street, Augusta, Maine, with a mailing address at 16 State House Station, Augusta, Maine 04333-0016, and

_____

a corporation or other legal entity organized under the laws of the State of _____, with its principal place of business located at _____

_____

The Department and the Contractor, in consideration of the mutual promises set forth in this Agreement (the "Contract"), hereby agree as follows:

**A. The Work.**

The Contractor agrees to complete all Work as specified or indicated in the Contract including Extra Work in conformity with the Contract, **21942.02/ 22998.00** for a **Maintenance and Operations Building** in the city of **Portland**, County of **Cumberland**, Maine. The Work includes construction, maintenance during construction, warranty as provided in the Contract, and other incidental work.

The Contractor shall be responsible for furnishing all supervision, labor, equipment, tools supplies, permanent materials and temporary materials required to perform the Work including construction quality control including inspection, testing and documentation, all required documentation at the conclusion of the project, warranting its work and performing all other work indicated in the Contract.

The Department shall have the right to alter the nature and extent of the Work as provided in the Contract; payment to be made as provided in the same.

**B. Time.**

The Contractor agrees to complete all Work, except warranty work, on or before **June 14, 2019.** Further, the Department may deduct from moneys otherwise due the Contractor, not as a penalty, but as Liquidated Damages in accordance with Sections 107.7 and 107.8 of the State of Maine Department of Transportation Standard Specifications, November 2014 Edition and related Special Provisions.

**C. Price.**

The quantities given in the Schedule of Items of the Bid Package will be used as the basis for determining the original Contract amount and for determining the amounts of the required Performance Surety Bond and Payment Surety Bond, and that the amount of this offer is _____

_____

**$**_ _____ Performance Bond and Payment Bond each being 100% of the amount of this Contract.

**D. Contract.**

This Contract, which may be amended, modified, or supplemented in writing only, consists of the Contract documents as defined in the Plans, Standard Specifications, November 2014 Edition, Standard Details November 2014 Edition as updated through advertisement, Supplemental Specifications, Special Provisions, Contract Agreement; and Contract Bonds. It is agreed and understood that this Contract will be governed by the documents listed above.

**E. Certifications.**

By signing below, the Contractor hereby certifies that to the best of the Contractor's knowledge and belief:

1. All of the statements, representations, covenants, and/or certifications required or set forth in the Bid and the Bid Documents, including those in the Federal Contract Provisions Supplement, and the Contract are still complete and accurate as of the date of this Agreement.

2. The Contractor knows of no legal, contractual, or financial impediment to entering into this Contract.

3. The person signing below is legally authorized by the Contractor to sign this Contract on behalf of the Contractor and to legally bind the Contractor to the terms of the Contract.

**F. Offer.**

The undersigned, having carefully examined the site of work, the Plans, Standard Specifications November 2014 Edition, Standard Details November 2014 Edition as updated through advertisement, Supplemental Specifications, Special Provisions, Contract Agreement; and Contract Bonds contained herein for construction of:

**WINS. 21942.02/ 22998.00 - Maintenance and Operations Building - in the city of Portland,**
State of Maine, on which bids will be received until the time specified in the "Notice to Contractors" do(es) hereby bid and offer to enter into this contract to supply all the materials, tools, equipment and labor to construct the whole of the Work in strict accordance with the terms and conditions of this Contract at the unit prices in the attached "Schedule of Items".

The Offeror agrees to perform the work required at the price specified above and in accordance with the bids provided in the attached "Schedule of Items" in strict accordance with the terms of this solicitation, and to provide the appropriate insurance and bonds if this offer is accepted by the Government in writing.

As Offeror also agrees:

First: To do any extra work, not covered by the attached "Schedule of Items", which may be ordered by the Resident, and to accept as full compensation the amount determined upon a "Force Account" basis as provided in the Standard Specifications, November 2014 Edition, and as addressed in the contract documents.

Second: That the bid bond at 5% of the bid amount or the official bank check, cashier's check, certificate of deposit or U. S. Postal Money Order in the amount given in the "Notice to Contractors", payable to the Treasurer of the State of Maine and accompanying this bid, shall be forfeited, as liquidated damages, if in case this bid is accepted, and the undersigned shall fail to abide by the terms and conditions of the offer and fail to furnish satisfactory insurance and Contract bonds under the conditions stipulated in the Specifications within 15 days of notice of intent to award the contract.

Third: To begin the Work as stated in Section 107.2 of the Standard Specifications November 2014 Edition and complete the Work within the time limits given in the Special Provisions of this Contract.

Fourth: The Contractor will be bound to the Disadvantaged Business Enterprise (DBE) Requirements contained in the attached Notice (Additional Instructions to Bidders) and submit a completed Contractor's Disadvantaged Business Enterprise Utilization Plan with their bid.

Fifth: That this offer shall remain open for 30 calendar days after the date of opening of bids.

Sixth: The Bidder hereby certifies, to the best of its knowledge and belief that: the Bidder has not, either directly or indirectly, entered into any agreement, participated in any collusion, or otherwise taken any action in restraint of competitive bidding in connection with its bid, and its subsequent contract with the Department.

IN WITNESS WHEREOF, the Contractor, for itself, its successors and assigns, hereby execute two duplicate originals of this Agreement and thereby binds itself to all covenants, terms, and obligations contained in the Contract Documents.

CONTRACTOR

| | |
|---|---|
| _____ | _____ |
| Date | (Signature of Legally Authorized Representative of the Contractor) |
| _____ | _____ |
| Witness | (Name and Title Printed) |

**G. Award.**

Your offer is hereby accepted. This award consummates the Contract, and the documents referenced herein.

MAINE DEPARTMENT OF TRANSPORTATION

| | |
|---|---|
| _____ | _____ |
| Date | By: David Bernhardt, Commissioner |
| _____ | |
| Witness | |

# CONTRACT AGREEMENT, OFFER & AWARD

AGREEMENT made on the date last signed below, by and between the State of Maine, acting through and by its Department of Transportation (Department), an agency of state government with its principal administrative offices located at Child Street Augusta, Maine, with a mailing address at 16 State House Station, Augusta, Maine 04333-0016, and **(Name of the firm bidding the job)** a corporation or other legal entity organized under the laws of the State of Maine, with its principal place of business located at **(address of the firm bidding the job)**

The Department and the Contractor, in consideration of the mutual promises set forth in this Agreement (the "Contract"), hereby agree as follows:

SAMPLE

**A. The Work.**

The Contractor agrees to complete all Work as specified or indicated in the Contract including Extra Work in conformity with the Contract, PIN No.**1224.00**, for the **Hot Mix Asphalt Overlay** in the town/city of **South Nowhere,** County of **Washington**, Maine. The Work includes construction, maintenance during construction, warranty as provided in the Contract, and other incidental work.

The Contractor shall be responsible for furnishing all supervision, labor, equipment, tools supplies, permanent materials and temporary materials required to perform the Work including construction quality control including inspection, testing and documentation, all required documentation at the conclusion of the project, warranting its work and performing all other work indicated in the Contract.

The Department shall have the right to alter the nature and extent of the Work as provided in the Contract; payment to be made as provided in the same.

**B. Time.**

The Contractor agrees to complete all Work, except warranty work, on or before **November 15, 2006.** Further, the Department may deduct from moneys otherwise due the Contractor, not as a penalty, but as Liquidated Damages in accordance with Sections 107.7 and 107.8 of the State of Maine Department of Transportation Standard Specifications, November 2014 Edition and related Special Provisions.

**C. Price.**

The quantities given in the Schedule of Items of the Bid Package will be used as the basis for determining the original Contract amount and for determining the amounts of the required Performance Surety Bond and Payment Surety Bond, and that the amount of this offer is **____(Place bid here in alphabetical form such as One Hundred and Two dollars and 10 cents)_____ $_ (repeat bid here in numerical terms, such as $102.10)_____** Performance Bond and Payment Bond each being 100% of the amount of this Contract.

**D. Contract.**

This Contract, which may be amended, modified, or supplemented in writing only, consists of the Contract documents as defined in the Plans, Standard Specifications, November 2014 Edition, Standard Details November 2014 Edition, Supplemental Specifications, Special Provisions, Contract Agreement; and Contract Bonds. It is agreed and understood that this Contract will be governed by the documents listed above.

SAMPLE

**E. Certifications.**

By signing below, the Contractor hereby certifies that to the best of the Contractor's knowledge and belief:

1. All of the statements, representations, covenants, and/or certifications required or set forth in the Bid and the Bid Documents, including those in Appendix A to Division 100 of the Standard Specifications November 2014 Edition (Federal Contract Provisions Supplement), and the Contract are still complete and accurate as of the date of this Agreement.

2. The Contractor knows of no legal, contractual, or financial impediment to entering into this Contract.

3. The person signing below is legally authorized by the Contractor to sign this Contract on behalf of the Contractor and to legally bind the Contractor to the terms of the Contract.

**F. Offer.**

The undersigned, having carefully examined the site of work, the Plans, Standard Specifications, November 2014 Edition, Standard Details November 2014 Edition, Supplemental Specifications, Special Provisions, Contract Agreement; and Contract Bonds contained herein for construction of:

**PIN 1234.00 South Nowhere, Hot Mix Asphalt Overlay ,**

State of Maine, on which bids will be received until the time specified in the "Notice to Contractors" do(es) hereby bid and offer to enter into this contract to supply all the materials, tools, equipment and labor to construct the whole of the Work in strict accordance with the terms and conditions of this Contract at the unit prices in the attached "Schedule of Items".

The Offeror agrees to perform the work required at the price specified above and in accordance with the bids provided in the attached "Schedule of Items" in strict accordance with the terms of this solicitation, and to provide the appropriate insurance and bonds if this offer is accepted by the Government in writing.

SAMPLE

As Offeror also agrees:

First: To do any extra work, not covered by the attached "Schedule of Items", which may be ordered by the Resident, and to accept as full compensation the amount determined upon a "Force Account" basis as provided in the Standard Specifications, November 2014 Edition, and as addressed in the contract documents.

Second: That the bid bond at 5% of the bid amount or the official bank check, cashier's check, certificate of deposit or U. S. Postal Money Order in the amount given in the "Notice to Contractors", payable to the Treasurer of the State of Maine and accompanying this bid, shall be forfeited, as liquidated damages, if in case this bid is accepted, and the undersigned shall fail to abide by the terms and conditions of the offer and fail to furnish satisfactory insurance and Contract bonds under the conditions stipulated in the Specifications within 15 days of notice of intent to award the contract.

Third: To begin the Work as stated in Section 107.2 of the Standard Specifications November 2014 Edition and complete the Work within the time limits given in the Special Provisions of this Contract.

Fourth: The Contractor will be bound to the Disadvantaged Business Enterprise (DBE) Requirements contained in the attached Notice (Additional Instructions to Bidders) and submit a completed Contractor's Disadvantaged Business Enterprise Utilization Plan with their bid.

Fifth: That this offer shall remain open for 30 calendar days after the date of opening of bids.

Sixth: The Bidder hereby certifies, to the best of its knowledge and belief that: the Bidder has not, either directly or indirectly, entered into any agreement, participated in any collusion, or otherwise taken any action in restraint of competitive bidding in connection with its bid, and its subsequent contract with the Department.

IN WITNESS WHEREOF, the Contractor, for itself, its successors and assigns, hereby execute two duplicate originals of this Agreement and thereby binds itself to all covenants, terms, and obligations contained in the Contract Documents.

CONTRACTOR

| | |
|---|---|
| _____ | **(Sign Here)** |
| Date | (Signature of Legally Authorized Representative of the Contractor) |
| ____(**Witness Sign Here)** | **(Print Name Here)** |
| Witness | (Name and Title Printed) |

SAMPLE

**G. Award.**

Your offer is hereby accepted. This award consummates the Contract, and the documents referenced herein.

MAINE DEPARTMENT OF TRANSPORTATION

| | |
|---|---|
| Date | By: David Bernhardt, Commissioner |
| (Witness) | |

BOND # _____

CONTRACT PERFORMANCE BOND
(Surety Company Form)

KNOW ALL MEN BY THESE PRESENTS: That _____ _____ **in the State of** _____, as principal, and…….....,
a corporation duly organized under the laws of the State of ..... and having a usual place of business ..... .....,
as Surety, are held and firmly bound unto the Treasurer of the State of Maine in the sum of _____ **and 00/100 Dollars ($ )**, to be paid said Treasurer of the State of Maine or his successors in office, for which payment well and truly to be made, Principal and Surety bind themselves, their heirs, executors and administrators, successors and assigns, jointly and severally by these presents.

The condition of this obligation is such that if the Principal designated as Contractor in the Contract to construct Project Number _____ in the Municipality of _____ promptly and faithfully performs the Contract, then this obligation shall be null and void; otherwise it shall remain in full force and effect.

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

Signed and sealed this ..... day of ....., 20….. .

| WITNESSES: | SIGNATURES: |
|---|---|
| | CONTRACTOR: |
| Signature..... | .....…..... |
| Print Name Legibly ..... | Print Name Legibly ...…….... |
| | SURETY: |
| Signature ..... | ....…….... |
| Print Name Legibly ..... | Print Name Legibly ..... |
| SURETY ADDRESS: | NAME OF LOCAL AGENCY: |
| ..... | ADDRESS ..... |
| ..... | ...…….... |
| ..... | .....…….... |
| TELEPHONE..... | .....…….... |

SAMPLE

BOND # _____

CONTRACT PAYMENT BOND
(Surety Company Form)

KNOW ALL MEN BY THESE PRESENTS: That _____ _____ **in the State of** _____, as principal, and.....…..... a corporation duly organized under the laws of the State of ..... and having a usual place of business in .....……., as Surety, are held and firmly bound unto the Treasurer of the State of Maine for the use and benefit of claimants as herein below defined, in the sum of _____ **and 00/100 Dollars ($ )** for the payment whereof Principal and Surety bind themselves, their heirs, executors and administrators, successors and assigns, jointly and severally by these presents.

The condition of this obligation is such that if the Principal designated as Contractor in the Contract to construct Project Number _____ in the Municipality of _____ promptly satisfies all claims and demands incurred for all labor and material, used or required by him in connection with the work contemplated by said Contract, and fully reimburses the obligee for all outlay and expense which the obligee may incur in making good any default of said Principal, then this obligation shall be null and void; otherwise it shall remain in full force and effect.

A claimant is defined as one having a direct contract with the Principal or with a Subcontractor of the Principal for labor, material or both, used or reasonably required for use in the performance of the contract.

Signed and sealed this ..... day of ...…….....…., 20 ... .

| | |
|---|---|
| WITNESS: | SIGNATURES: |
| | CONTRACTOR: |
| Signature……..... | .....…..... |
| Print Name Legibly .....…….. | Print Name Legibly ….…..... |
| | SURETY: |
| Signature..... | ...…..... |
| Print Name Legibly ..... | Print Name Legibly ….…..... |
| SURETY ADDRESS: | NAME OF LOCAL AGENCY: |
| ...…..... | ADDRESS ….…..... |
| ..... | …….…..... |
| TELEPHONE ..... | …….…..... |

SAMPLE

General Decision Number: ME180092 02/02/2018 ME92

Superseded General Decision Number: ME20170092

State: Maine

Construction Type: Building

County: Cumberland County in Maine.

BUILDING CONSTRUCTION PROJECTS (does not include single family homes or apartments up to and including 4 stories).
Note: Under Executive Order (EO) 13658, an hourly minimum wage of $10.35 for calendar year 2018 applies to all contracts subject to the Davis-Bacon Act for which the contract is awarded (and any solicitation was issued) on or after January 1, 2015. If this contract is covered by the EO, the contractor must pay all workers in any classification listed on this wage determination at least $10.35 per hour (or the applicable wage rate listed on this wage determination, if it is higher) for all hours spent performing on the contract in calendar year 2018. The EO minimum wage rate will be adjusted annually. Please note that this EO applies to the above-mentioned types of contracts entered into by the federal government that are subject to the Davis-Bacon Act itself, but it does not apply to contracts subject only to the Davis-Bacon Related Acts, including those set forth at 29 CFR 5.1(a)(2)-(60). Additional information on contractor requirements and worker protections under the EO is available at www.dol.gov/whd/govcontracts.

| Modification Number | Publication Date |
|---|---|
| 0 | 01/05/2018 |
| 1 | 02/02/2018 |

* CARP1996-002 04/01/2017

Maine Zone 1 Building Rate (Z1B sub union)

| | Rates | Fringes |
|---|---|---|
| CARPENTER (Includes Drywall Hanging and Metal Stud Installation) | $ 23.00 | 18.94 |

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ELEC0567-001 06/01/2017

| | Rates | Fringes |
|---|---|---|
| ELECTRICIAN | | |
| Teledata Technicians | $ 23.61 | 15.37 |

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* ELEV0004-006 01/01/2018

| | Rates | Fringes |
|---|---|---|
| ELEVATOR MECHANIC | $ 57.62 | 32.65 |

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IRON0007-035 09/16/2017

| | Rates | Fringes |
|---|---|---|
| IRONWORKER (ORNAMENTAL, REINFORCING AND STRUCTURAL) | $ 24.79 | 21.59 |

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LABO0976-007 07/01/2016

| | Rates | Fringes |
|---|---|---|
| LABORER: Common or General (Industrial Work Only) | $ 19.96 | 16.62 |

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SUME2014-025 01/31/2017

| | Rates | Fringes |
|---|---|---|
| BRICKLAYER | $ 21.13 | 6.73 |
| CEMENT MASON/CONCRETE FINISHER | $ 17.65 | 5.01 |
| Electrician, Excludes Teledata Work | $ 26.68 | 12.85 |
| INSULATOR - MECHANICAL (Duct, Pipe & Mechanical System Insulation) | $ 20.14 | 2.29 |
| LABORER: Common or General | $ 14.31 | 1.81 |
| LABORER: Demolition | $ 18.20 | 5.05 |
| LABORER: Mason Tender - Brick | $ 19.16 | 3.56 |
| MILLWRIGHT | $ 22.17 | 7.75 |
| OPERATOR: Backhoe/Excavator/Trackhoe | $ 31.38 | 5.91 |
| OPERATOR: Crane | $ 23.33 | 0.00 |
| PAINTER (Brush and Roller) | $ 14.97 | 2.46 |
| PAINTER: Spray | $ 17.47 | 2.22 |
| PLUMBER, Includes HVAC Pipe Installation | $ 21.60 | 3.88 |
| ROOFER | $ 19.86 | 2.31 |
| SHEET METAL WORKER, Includes HVAC Duct Installation | $ 17.39 | 2.48 |

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WELDERS - Receive rate prescribed for craft performing operation to which welding is incidental.

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Note: Executive Order (EO) 13706, Establishing Paid Sick Leave for Federal Contractors applies to all contracts subject to the Davis-Bacon Act for which the contract is awarded (and any solicitation was issued) on or after January 1, 2017. If this contract is covered by the EO, the contractor must provide employees with 1 hour of paid sick leave for every 30 hours they work, up to 56 hours of paid sick leave each year. Employees must be permitted to use paid sick leave for their own illness, injury or other health-related needs, including preventive care; to assist a family member (or person who is like family to the employee) who is ill, injured, or has other

health-related needs, including preventive care; or for reasons resulting from, or to assist a family member (or person who is like family to the employee) who is a victim of, domestic violence, sexual assault, or stalking. Additional information on contractor requirements and worker protections under the EO is available at www.dol.gov/whd/govcontracts.

Unlisted classifications needed for work not included within the scope of the classifications listed may be added after award only as provided in the labor standards contract clauses (29CFR 5.5 (a) (1) (ii)).

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The body of each wage determination lists the classification and wage rates that have been found to be prevailing for the cited type(s) of construction in the area covered by the wage determination. The classifications are listed in alphabetical order of "identifiers" that indicate whether the particular rate is a union rate (current union negotiated rate for local), a survey rate (weighted average rate) or a union average rate (weighted union average rate).

Union Rate Identifiers

A four letter classification abbreviation identifier enclosed in dotted lines beginning with characters other than "SU" or "UAVG" denotes that the union classification and rate were prevailing for that classification in the survey. Example: PLUM0198-005 07/01/2014. PLUM is an abbreviation identifier of the union which prevailed in the survey for this classification, which in this example would be Plumbers. 0198 indicates the local union number or district council number where applicable, i.e., Plumbers Local 0198. The next number, 005 in the example, is an internal number used in processing the wage determination. 07/01/2014 is the effective date of the most current negotiated rate, which in this example is July 1, 2014.

Union prevailing wage rates are updated to reflect all rate changes in the collective bargaining agreement (CBA) governing this classification and rate.

Survey Rate Identifiers

Classifications listed under the "SU" identifier indicate that no one rate prevailed for this classification in the survey and the published rate is derived by computing a weighted average rate based on all the rates reported in the survey for that classification. As this weighted average rate includes all rates reported in the survey, it may include both union and non-union rates. Example: SULA2012-007 5/13/2014. SU indicates the rates are survey rates based on a weighted average calculation of rates and are not majority rates. LA indicates the State of Louisiana. 2012 is the year of survey on which these classifications and rates are based. The next number, 007 in the example, is an internal number used in producing the wage determination. 5/13/2014 indicates the survey completion date for the classifications and rates under that identifier.

Survey wage rates are not updated and remain in effect until a new survey is conducted.

Union Average Rate Identifiers

Classification(s) listed under the UAVG identifier indicate that no single majority rate prevailed for those classifications; however, 100% of the data reported for the classifications was union data. EXAMPLE: UAVG-OH-0010 08/29/2014. UAVG indicates that the rate is a weighted union average rate. OH indicates the state. The next number, 0010 in the example, is an internal number used in producing the wage determination. 08/29/2014 indicates the survey completion date for the classifications and rates under that identifier.

A UAVG rate will be updated once a year, usually in January of each year, to reflect a weighted average of the current negotiated/CBA rate of the union locals from which the rate is based.

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WAGE DETERMINATION APPEALS PROCESS

1.) Has there been an initial decision in the matter? This can be:

* an existing published wage determination
* a survey underlying a wage determination
* a Wage and Hour Division letter setting forth a position on a wage determination matter
* a conformance (additional classification and rate) ruling

On survey related matters, initial contact, including requests for summaries of surveys, should be with the Wage and Hour Regional Office for the area in which the survey was conducted because those Regional Offices have responsibility for the Davis-Bacon survey program. If the response from this initial contact is not satisfactory, then the process described in 2.) and 3.) should be followed.

With regard to any other matter not yet ripe for the formal process described here, initial contact should be with the Branch of Construction Wage Determinations. Write to:

Branch of Construction Wage Determinations
Wage and Hour Division
U.S. Department of Labor
200 Constitution Avenue, N.W.
Washington, DC 20210

2.) If the answer to the question in 1.) is yes, then an interested party (those affected by the action) can request review and reconsideration from the Wage and Hour Administrator (See 29 CFR Part 1.8 and 29 CFR Part 7). Write to:

Wage and Hour Administrator
U.S. Department of Labor
200 Constitution Avenue, N.W.
Washington, DC 20210

The request should be accompanied by a full statement of the interested party's position and by any information (wage payment data, project description, area practice material, etc.) that the requestor considers relevant to the issue.

3.) If the decision of the Administrator is not favorable, an interested party may appeal directly to the Administrative Review Board (formerly the Wage Appeals Board). Write to:

Administrative Review Board
U.S. Department of Labor
200 Constitution Avenue, N.W.
Washington, DC 20210

4.) All decisions by the Administrative Review Board are final.

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END OF GENERAL DECISION

STATE OF MAINE
DEPARTMENT OF TRANSPORTATION
AUGUSTA, MAINE

SPECIAL PROVISIONS
AND
TECHNICAL SPECIFICATIONS
FOR:

# PORTLAND INTERNATIONAL MARINE TERMINAL

# MAINE INTERMODAL PORT PRODUCTIVITY PROJECT MAINTENANCE & OPERATIONS CENTER

PROJECT STATE WIN # 021942.02

Portland, Maine

February 28, 2018

**PROJECT MANUAL**

**TABLE OF CONTENTS**

**PROCUREMENT AND CONTRACTING REQUIREMENTS**

**DIVISION 00 SPECIAL PROVISIONS**

| | |
|---|---|
| 101 | Contract Interpretation (Definitions) |
| 102 | Bidding (Pre-Bid Meeting) |
| 104 | General Rights and Responsibilities (Staging Area) |
| 104 | General Rights and Responsibilities (Progress Meetings) |
| 104 | General Rights and Responsibilities (Utility Coordination) |
| 104 | General Rights and Responsibilities (Coordination with Terminal Manager) |
| 105 | General Scope of Work (Submittal Requirements) |
| 105 | General Scope of Work (Permit Requirements) |
| 105 | General Scope of Work (Contractor Access to Restricted Areas) |
| 105 | General Scope of Work (Summary of Project Requirements) |
| 107 | Time |
| 401 | Hot Mix Asphalt (Special Seasonal Limitations) |
| 403 | Hot Mix Asphalt |
| 419 | Sawing and Sealing Joints in Bituminous Pavement |
| 502 | Structural Concrete (Condenser Pad, Guard House Slab) |
| 502 | Structural Concrete (QC/QA Acceptance Methods) |
| 607 | Fences |
| 621 | Landscape |
| 627 | Pavement Markings |
| 634 | Highway Lighting |
| 827 | Natural Gas Distribution |
| 832 | Contractor Allowances |
| 841 | Bollards |
| 890 | Bike Rack |

**DIVISION 01 GENERAL REQUIREMENTS**

| | |
|---|---|
| 01 41 00 | Special Inspections |

**DIVISION 02 EXISTING CONDITIONS**

| | |
|---|---|
| 02 41 14 | Selective Demolition for Earthwork |

**DIVISION 03 CONCRETE**

| | |
|---|---|
| 03 30 00 | Cast-In-Place Concrete |
| 03 35 43 | Polished Concrete Finishing |

**DIVISION 04 MASONRY**

| | |
|---|---|
| 04 20 00 | Unit Masonry |
| 04 24 00 | Exterior Stone Cladding |

**DIVISION 05 METALS**

05 12 00 Structural Steel
05 20 00 Open Web Steel Joists
05 30 00 Metal Decking
05 40 00 Cold Formed Metal Framing
05 50 00 Metal Fabrications

**DIVISION 06 WOOD AND PLASTICS**

06 10 13 Roof and Miscellaneous Rough Carpentry
06 40 00 Architectural Woodwork

**DIVISION 07 THERMAL AND MOISTURE**

07 21 00 Thermal Insulation
07 22 16 Nail Board Insulation
07 26 16 Below-Grade Vapor Retarders
07 27 13 Air Barriers
07 41 13 Metal Roof Panels
07 42 13 Metal Wall Panels
07 54 23 EPDM Membrane Roofing
07 62 00 Sheetmetal Flashing and Trim
07 84 13 Penetration Firestopping
07 92 00 Joint Sealants

**DIVISION 08 OPENINGS**

08 11 13 Hollow Metal Doors and Frames
08 14 16 Flush Wood Doors
08 30 00 Coiling Overhead Doors
08 31 13 Access Doors and Frames
08 41 13 Aluminum-Framed Entrances and Storefronts
08 51 13 Aluminum Windows
08 71 00 Door Hardware
08 80 00 Glass and Glazing

**DIVISION 09 FINISHES**

09 29 00 Gypsum Board
09 30 00 Tiling
09 51 13 Acoustical Panel Ceilings
09 564 26 Wood Panel Ceilings
09 65 13 Resilient Base and Accessories
09 68 00 Carpeting
09 91 00 Interior Painting

**DIVISION 10 SPECIALTIES**

10 14 00 Signs
10 21 13 Solid Plastic Toilet Compartments
10 28 00 Toilet and Bath Accessories
10 44 13 Fire Extinguisher Cabinets
10 44 13 Fire Extinguishers
10 51 13 Metal Lockers
10 95 00 Building Specialties

**DIVISION 11 EQUIPMENT**

11 31 00 Residential Appliances

**DIVISION 12 NOT USED**

**DIVISION 13 EQUIPMENT**

13 34 23.16 Fabricated Guard Booths

**DIVISION 14 - 20 NOT USED**

**DIVISION 21 FIRE SUPRESSION**

21 13 13 Wet-Pipe Sprinkler Systems

**DIVISION 22 PLUMBING**

22 00 00 Plumbing

**DIVISION 23 HVAC**

23 00 00 HVAC System
23 05 00 Supplemental General Mechanical Requirements
23 05 93 Testing Adjusting and Balancing for HVAC
23 07 00 Insulation
23 09 00 Automatic Temperature Controls
23 30 00 Ductwork and Accessories

**DIVISION 24 - 25 NOT USED**

**DIVISION 26 ELECTRICAL**

26 00 00 General Electrical Requirements
26 05 19 Low Voltage Power Conductors
26 05 26 Grounding
26 05 29 Supporting Devices
26 05 33 Raceway and Boxes for Electrical Systems
26 05 53 Electrical Identification
26 06 20.16 Panelboard Schedule
26 06 50.16 Lighting Fixture Schedule
26 09 43 Lighting Controls
26 27 26 Wiring Devices
26 28 16 Enclosed Switches and Circuit Breakers
26 29 13 Enclosed Motor Controllers
26 51 00 Interior Lighting

**DIVISION 27 COMMUNICATIONS**

27 00 00 General Communications Requirements
27 10 00 Structured Cabling

**DIVISION 28 ELECTRONIC SAFETY AND SECURITY**

28 00 00 General Electronic Safety and Security Requirements
28 13 00 Door Access Control System
28 31 13 Fire Detection and Alarm Control
28 33 00 Surveillance System

**DIVISION 29 - 30 NOT USED**

**DIVISION 31 SITE WORK**

31 00 00 Earthwork
31 25 00 Temp Sediment and Erosion Controls
31 50 00 Excavation Support and Protection

**DIVISION 32 SITE IMPROVEMENTS**

32 31 00 Heavy Duty Swing Gate System

**DIVISION 33 STORM DRAINAGE**

33 11 00 Water Utility Distribution
33 31 00 Sanitary Utility Sewerage Piping
33 39 13 Sanitary Utility Sewerage Manholes
33 41 10 Storm Utility Drainage Piping
33 49 00 Storm Drainage Structures

**APPENDICES**

Appendix A Permits
Appendix B Geotechnical Report

END OF TABLE OF CONTENTS

# SPECIAL PROVISION
# SECTION 101
# CONTRACT INTERPRETATION
# (Definitions)

## 101.2 Definitions

This Subsection is added by inclusion of the following:

| | |
|---|---|
| Terminal Manager: | Maine Port Authority (MPA). Contact: Michael Carter, 207-200-2430 |
| Port Operations Area: | The existing 8-acre site located east of the Casco Bay Bridge and defined by the existing 8-ft high barbed-wire security fence. This area, which is also known as the Terminal, is designated as an MTSA 105 regulated site under the jurisdiction of Homeland Security. Workers entering this area must have TWIC credentials or must be escorted by someone with TWIC credentials. |
| Contractor Work Area: | The area designated on the plans where the primary work will will be performed by the Contractor. This area is approximately 50,000 sq. ft. in size. A combination of temporary and permanent barbed wire security fence will separate the Contractor Work Area from the Port Operations Area. The Contractor Work area will be accessed from Commercial Street. |
| Contractor Staging Area: | The area designated on the Plans within the Contractor Work Area that will be used to store materials and equipment. |

# SPECIAL PROVISION
## SECTION 102
## BIDDING
## (Pre-Bid Meeting)

The following Subsection is added:

102.3.1 Pre-Bid Meeting

A mandatory pre-bid meeting will be held at the Portland International Marine Terminal at **10:00 AM on Wednesday, April 4, 2018**. The meeting will be held within the port office building located at 460 Commercial Street in Portland, Maine where the project will be presented to all Bidders. A walk-through of the project site will be provided. The pre-bid meeting is deemed mandatory to ensure that all Bidders fully understand the specifics of the project. Only General Contractors (GC) who are present at the meeting will be allowed to bid. Subcontractors do not need to be present to provide bids to the GC.

# SPECIAL PROVISION
# SECTION 104
# GENERAL RIGHTS AND RESPONSIBILITIES
# (Staging Area)

## 104.3.15 Contractor's General Authority and Responsibilities

This Subsection is added by inclusion of the following:

The Contractor's primary staging area shall be located within the Contractor's Work Area as noted in the Plans..

The staging area shall also accommodate the Contractor's field office. The Contractor shall coordinate with the Terminal Manager and with approval of the Resident to ensure that the staging area location is of sufficient size to accommodate all field offices, equipment, and delivered materials.

The MaineDOT will also have a field office trailer for this project, which shall be placed in close proximity to the Contractor's field office.

Meeting rooms, restroom facilities, and break rooms within the IMT office building will not be available to the Contractor.

# SPECIAL PROVISION
# SECTION 104
# GENERAL RIGHTS AND RESPONSIBILITIES
# (Progress Meetings)

## 104.4.3 Progress Meetings

This Subsection is amended by the addition of the following:

Progress meetings shall be held weekly or at an interval deemed necessary by the Resident. The time and location of the meetings shall be determined by the Resident; this time and place shall be agreeable to all parties: the Resident, the Terminal Manager, and the Contractor. As the project progresses, the Resident may reduce the frequency of the meetings.

**SPECIAL PROVISIONS**
**SECTION 104**
**Utilities**

## UTILITY COORDINATION

The contractor has primary responsibility for coordinating their work with utilities after contract award. The contractor shall communicate directly with the utilities regarding any utility work necessary to maintain the contractor's schedule and prevent project construction delays. The contractor shall notify the resident of any issues.

**THE CONTRACTOR SHALL PLAN AND CONDUCT WORK ACCORDINGLY.**

## MEETING

A Preconstruction Utility Conference, as defined in Subsection 104.4.6 of the Standard Specifications **is** required.

## GENERAL INFORMATION

These Special Provisions outline the arrangements that have been made by the Department for utility and/or railroad work to be undertaken in conjunction with this project. The following list identifies all known utilities or railroads having facilities presently located within the limits of this project or intending to install facilities during project construction.

Utilities have been notified and will be furnished a project specification.

**Overview:**

| Utility/Railroad | Aboveground | Underground |
|---|---|---|
| **Central Maine Power Company** | **X** | **X** |
| **Time Warner Cable** | **X** | **X** |
| **Fairpoint** | **X** | **X** |
| **Portland Water District** | | **X** |
| **Unitil Gas Co** | | **X** |
| **Portland Sewer District** | | **X** |
| **Oxford Networks** | **X** | **X** |

Temporary utility adjustments are **not** anticipated.

Unless otherwise specified, any underground utility facilities shown on the project plans represent approximate locations gathered from available information. The Department cannot certify the level of accuracy of this data. Underground facilities indicated on the topographic sheets (plan views) have been collected from historical records and/or on-site designations provided by the respective utility companies. Underground facilities indicated on the cross-sections have been carried over from the plan view data and may also include further approximations of the elevations (depths) based upon straight-line interpolation from the nearest manholes, gate valves, or test pits.

Fire hydrants shall not be disturbed until all necessary work has been accomplished to provide proper fire protection.

Utility working days are Monday through Friday. Times are estimated on the basis of a single crew for each utility. Any times and dates mentioned are **estimates only** and are dependent upon favorable weather, working conditions, and freedom from emergencies. The Contractor shall have no claim against the Department if they are exceeded.

The Contractor shall not excavate around any pole, guy anchor or street light to a depth that compromises the stability of the pole. CMP will hold the poles if needed during excavation that may compromise their integrity.

The Contractor and Utility will coordinate and communicate their work. The Contractor must give the utilities at least 2 weeks' prior notification on when the utilities may be needed for inspection or oversite. If this communication breaks down, then the Contractor shall notify the Utility Coordinator.

## Utilities

This site contains both above ground and below ground utilities. Adjustments are needed to all these utilities as per plans and specs. The contractor shall review the specs, details and pay items for all utilities. There are also, in some cases, allowances for cost related to these utilities that the contractor should also pay special attention. Coordination for any utility work will be the responsibility of the Contractor and payment for this coordination shall be considered incidental to the Mobilization item.

## DIG SAFE

The Contractor shall be responsible for determining the presence of underground utility facilities prior to commencing any excavation work and shall notify utilities of proposed excavation in accordance with M.R.S.A. Title 23 §3360-A, Maine "Dig Safe" System. The contractor is also reminded that all utilities on the project may not be members of Dig Safe.

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## SUBSURFACE

There are many underground utilities and drainage pipes that run throughout the project. These consist of power, water, sewer, gas, communication cables and storm drains. The Contractor shall, through the digsafe process, determine where these utilities currently exist. The Contractor may have to work in close proximity to these utilities. Payment for coordinating with, and working around any utility will be considered incidental to the item or mobilization item. It is the intent of the department to make field changes, as much as possible, so not to impact existing utilities. The **Contractor** is urged to use the test pit item provided or equipment rental (Residents choice), in advance, to determine if a conflict exist and a field re-design is necessary. Contractor should complete these conflict checks before ordering materials that may have long lead times. The Contractor should expect some delays when in these areas and extra time should be allowed. No additional time or money will be granted for redesign. The Contractor shall plan and schedule his work in such a manner that the utilities that are located on this project will not be harmed, damaged or impacted in any way. The Contractor and Utility will coordinate and communicate their work plans in an effort not to interfere with each other's progress or the completion of the project. This work will be done by the Contractors Superintendent and the Utility contact listed below.

## SAFE PRACTICES AROUND UTILITY FACILITIES

The Contractor shall be responsible for complying with M.R.S.A. Title35-A, Chapter 7-A Sections 751 - 761 Overhead High-Voltage Line Safety Act. Prior to commencing any work that may come within ten (10) feet of any aerial electrical line; the Contractor shall notify the aerial utilities as per section 757 of the above act.

## UTILITY LOCATION MARKINGS

The Contractor will be responsible for maintaining the buried utility location markings following the initial locating by the appropriate utility or their designated representative.

## UTILITY SIGNING

Any utility working within the construction limits of this project shall ensure that the traveling public is adequately protected at all times. All work areas shall be signed, lighted, and traffic flaggers employed as determined by field conditions. All traffic controls shall be in accordance with the latest edition of the Manual on Uniform Traffic Control Devices for Streets and Highways, as issued by the Federal Highway Administration.

**Utility Contact Information**

| | | |
|---|---|---|
| Central Maine Power Co. | Jason Ward | 242-5398 |
| City of Portland (sanitary sewer) | John Emerson | 874-8468 |
| Fair Point Communications | Marty Pease | 797-1119 |
| Time Warner Cable | Mark Pelletier | 253-2324 |
| Portland Water District | Christian Rodriguez | 774-5961 |
| Unitil | Joe Renda | 541-2568 |
| City of Portland (lighting) | Kevin Thomas | 756-8291 |
| Oxford Networks | Michael Ellingwood | 333-3471 |

# SPECIAL PROVISION
# SECTION 104
# GENERAL RIGHTS AND RESPONSIBILITIES
# (Coordination with Terminal Manager)

The following Subsection is added:

104.4.11 Coordination with Terminal Manager

The Portland International Marine Terminal (IMT) is an active container terminal with various container movements anticipated to occur on a weekly basis. Successful completion of the proposed project will require coordination between the Contractor and the Terminal Manager on a weekly basis via project meetings to be held on-site. At these meetings, the Contractor will be required to provide an update on the progress of the project and will make requests to work within Port Operations limits. In a similar manner, the Terminal Manager will provide a weekly vessel schedule to the Contractor and will advise when access is not available, or if the temporary fencing needs to be relocated along the southerly boundary of the Primary Construction Zone. The general location of the proposed temporary fencing is positioned so that both port operations and construction activities can occur simultaneously without interruption or needing adjustments.

Within the Terminal, the Contractor will require special access through the use of TWIC cards and Terminal ID's as described in Section 105 of these Special Provisions.

Construction Schedule:

The Contractor will be required to submit a detailed written construction schedule. This schedule will be monitored closely and shall be updated weekly during construction meetings. When the Contractor is prepared to commence work on site, in addition to the construction schedule, the Contractor shall provide on a regular basis a written day by day summary of the Construction activities that will occur for the upcoming three-week period. This summary will also highlight activities that will have an impact on the use of facilities in the construction and adjacent areas.

Pollution Control:

All operations carried out by the Contractor during the life of this contract shall comply with provisions and regulations for the control of air and noise pollution. The contractor shall make all applications and notices and comply with all appropriate provisions of the rules and regulations of Federal, State, and Local Agencies. The Contractor will also closely monitor debris and trash that is generated on site and ensure that it is properly contained and maintained. Trash must be removed regularly and as a minimum, at least weekly.

Construction Management Plan:

The Contractor shall submit a Construction Management Plan to the Resident for review and approval. The Resident will forward the Plan to the City of Portland for their files. The Contractor shall anticipate modifications to the Construction Management Plan based on comments from either the Resident or the City of Portland. A copy of the Engineer's Construction Management Plan used in the site plan permit application for the City of Portland is provided in the Appendix for the Contractor's information and use.

December 17, 2010
Supersedes December 30, 2009

# SPECIAL PROVISION
# SECTION 104
# GENERAL RIGHTS AND RESPONSIBILITIES
(Electronic Payroll Submission)
(Payment Tracking)

104.3.8.1 Electronic Payroll Submission The prime contractor and all subcontractors and lower-tier subcontractors will submit their certified payrolls electronically on this contract utilizing the Elation System web based reporting. There is no charge to the contracting community for the use of this service. The submission of paper payrolls will not be allowed or accepted. Additional information can be found at http://www.maine.gov/mdot/contractors/ under the first "Notice".

104.3.8.2 Payment Tracking The prime contractor and all subcontractors and lower-tier subcontractors will track and confirm the delivery and receipt of all payments through the Elation System

# SPECIAL PROVISION
# SECTION 105
# GENERAL SCOPE OF WORK
# (Submittal Requirements)

105.7.4 Submittal Requirements

This Subsection is amended by the addition of the following:

At the onset of the project, the Contractor shall provide to the Resident a submittal log, which identifies the manner by which all submittals will be organized and referenced throughout the project. The Contractor shall update the submittal log on a weekly basis or to the satisfaction of the Resident. RFIs and other correspondence may be organized in a similar manner at the discretion of the Resident.

The Contractor shall make all submittals including but not limited to RFIs, Designs, Shop Drawings, and Working Drawings in electronic format via email and in PDF file format. All submittals shall be accompanied by a cover sheet, which identifies the submittal number, subject, and date. Revisions to submittals should maintain the original submittal number but receive a designation which indicates the submittal has been revised.

Submittals which require the review of the Engineer of Record will be reviewed in electronic format using red-line markups to easily identify comments, corrections, or revisions. Submittal reviews will be returned in electronic format only. If hardcopies are needed by the Contractor, it will be the responsibility of the Contractor to print hardcopies for its own use.

# SPECIAL PROVISION
# SECTION 105
# GENERAL SCOPE OF WORK
# (Permit Requirements)

105.8.2 Permit Requirements

This Subsection is amended by the addition of the following:

The Contractor is required to identify and obtain permits for the various construction activities within the project. All necessary permits shall be identified, obtained, and paid for by the Contractor under Pay Item 832.071, Contractor Allowance for City Permits.

1. Building Construction Permit
2. Street Opening Permit
3. Excavator License to work within City Right of Way

Project certification documents have been obtained by the MaineDOT and are provided in Appendix A and include the following:

- City of Portland Planning Authority Site Plan Permit Approval
- Notice of Intent to comply with Maine Construction General Permit

# SPECIAL PROVISION
# SECTION 105
# GENERAL SCOPE OF WORK
# (Contractor Access to Restricted Areas)

The following Subsection is added:

105.11.1 Contractor Access to Restricted Areas

The Contractor is advised that the Terminal is identified as a Marine Transportation Security Act (MTSA) 105 site defined by Homeland Security, and is essentially comprised of two separate container storage areas with different levels of restricted access. The first area is designated the International Container Storage Area, and comprises approximately 8 acres on the east side of the terminal. The second area is designated the Domestic Container Storage Area and Chassis Yard and comprises approximately 12 acres on the west side of the Terminal.

Upon commencement of the project, the Contractor will establish its working areas within the Terminal as shown in the Contract drawings. Once the Contractor Work Zone is established, the Contractor will not be allowed to breech the temporary fencing perimeter in order to work in the restricted zones. Work by the Contractor in the restricted zone, namely the Port Operation Area, will be possible by the Contractor only on a scheduled basis and by employees with the proper security clearance, such as with TWIC Cards (Transportation Worker Identification Credential) and Terminal ID's. Scheduling by the Contractor should be made on a weekly basis to ensure that access can be readily granted by the Terminal Manager. Similarly, the Terminal Manager will notify the Contractor on a weekly basis of scheduled vessel activity so that both container operations and construction work can occur simultaneously and without interruption.

The following activities may occur within the Port Operation Areas and therefore will require that the Contractor plan its efforts accordingly:

- Installing barrier mounted temporary security fence.
- Installing and connecting natural gas and sanitary sewer to existing utilities.
- Removal of existing terminal entrance vehicle gate and coordination of new vehicle gates.
- Removal and installation of Hot Mix Asphalt
- Delivery of removed and retained items identified on the Demolition Plan.

The Contractor will be required to obtain the proper Port Security clearance for its employees and subcontractors to the extent that these employees will be required to access the Port Operations Area. To ensure compliance with MTSA 105 at all times, the Contractor shall assume that all of its intended employees who will be working on the project will be required to have security clearance to be present within these otherwise restricted zones, and will maintain on its person at all times the Port Security badges it receives from the Port Authority (at the discretion of the Authority). Employees will be required to return the temporary Terminal ID's upon completion of the project or the completion of their portion of the work. Employees shall adhere to the restrictions placed on such temporary access, and will be required to acknowledge a basic understanding of these requirements upon completion of a 15-minute presentation by the Terminal Manager. While the presentation is routine in nature, the importance of site security at an international waterfront facility will be emphasized. Contact information for TWIC cards and Port Authority badges will be provide to the Contractor upon commencement of the project. Anticipate a 4-week lead time to obtain TWIC credentials.

# SPECIAL PROVISION
# SECTION 105
# GENERAL SCOPE OF WORK
# (Summary of Project Requirements)

The following Subsection is added:

105.11.2 Summary of Project Requirements

The Contractor is advised that this project occurs within a secured/restricted facility as determined by Homeland Security, and contains security equipment for both the Terminal and City of Portland which must remain functional at all times. The manner by which the project requirements shall be addressed by the Contractor are presented in each special provision contained herein, but other approaches may be suggested by the Contractor, which are subject to review and approval by the Owner.

A summary of the project requirements is summarized below:

Site Security:

- Galaxy Integrated Technologies of Brighton, Massachusetts is the contractor responsible for servicing and monitoring the security system for the Portland IMT and the City of Portland. The Contractor shall coordinate with Galaxy at the onset of the project.

International Container Storage Areas – Port Operations Work Area

- Temporary fencing, which will define the Contractor's Work Area, must be placed within close proximity to the lines shown on the Plans, in order to provide ample working space for Port Operations. The location of the temporary fencing may be slightly shifted throughout the project as needed and on a short term scheduled basis, by either the Port Operator or the Contractor to accomplish specific task.

# SPECIAL PROVISION 105
# GENERAL SCOPE OF WORK
## Equal Opportunity and Civil Rights
(Disadvantaged Business Enterprises Program)

105.10.1.1 Disadvantaged Business Enterprises Program The Maine Department of Transportation (MaineDOT) has established a Disadvantaged Business Enterprise (DBE) program in accordance with regulations of the United States Department of Transportation (USDOT), 49 CFR Part 26. The MaineDOT receives federal financial assistance from USDOT, and as a condition of receiving this assistance, the Department has signed an assurance that it will comply with 49 CFR Part 26.The MaineDOT is responsible for determining the eligibility of and certifying DBE firms in Maine.

A DBE is defined as a for-profit business that is owned and controlled by one or more socially and economically disadvantaged person(s). For the purpose of this definition:

1. "Socially and economically disadvantaged person" means an individual who is a citizen or lawful permanent resident of the United States and who is Black, Hispanic, Native American, Asian, Female; or a member of another group or an individual found to be disadvantaged by the Small Business Administration pursuant to Section 3 of the Small Business Act.
2. "Owned and controlled" means a business which is:
    a. A sole proprietorship legitimately owned and controlled by an individual who is a disadvantaged person.
    b. A partnership or limited liability company in which at least 51% of the beneficial ownership interests legitimately are held by a disadvantaged person(s).
    c. A corporation or other entity in which at least 51% of the voting interest and 51% of the beneficial ownership interests legitimately are held by a disadvantaged person(s).

The disadvantaged group owner(s) or stockholder(s) must possess control over management, interest in capital, and interest in earnings commensurate with the percentage of ownership. If the disadvantaged group ownership interests are real, substantial and continuing and not created solely to meet the requirements of this program, a firm is considered a bona fide DBE.

105.10.1.2 Commercially Useful Function MaineDOT will count expenditures of a DBE contractor toward DBE goals only if the DBE is performing a commercially useful function on that contract. A DBE performs a commercially useful function when it is responsible for execution of the work of the contract and is carrying out its responsibilities by actually performing, managing, and supervising the work involved. Credit will only be given when the DBE meets all conditions for a CUF. Credit for labor will be in accordance with the responsibilities outlined in the contract. To perform a commercially useful function, the DBE must also be responsible, with respect to materials and supplies used on the Contract, for negotiating price, determining quality and quantity, ordering the materials, and installing (where applicable) and paying for the material itself. To determine whether a DBE is performing a commercially useful function, MaineDOT will evaluate the amount of work subcontracted, industry practices, whether the amount the firm is to be paid under the Contract is commensurate with the work it is actually performing and DBE credit claimed for its performance of the work, and other relevant factors.

Rented equipment used by the DBE must not be rented from the Prime Contractor on a job that the DBE is subcontracted with that Prime Contractor for regular course of business.

A current listing of certified DBEs that may wish to participate in the highway construction program and the scope of work for which they are certified can be found at http://www.maine.gov/mdot/disadvantaged-business-enterprises/pdf/directory.pdf. Credit will be given for the value described by a DBE performing as:

A. A prime contractor; 100% of actual value of work performed by own workforces.
B. An approved subcontractor; 100% of work performed by own workforces.
C. An owner-operator of construction equipment; 100% of expenditures committed.
D. A manufacturer; 100% of expenditures committed. The manufacturer must be a firm that operates or maintains a factory or establishment that produces on the premises the materials or supplies obtained by the Contractor. Brokers and packagers shall not be regarded as manufacturers.
E. A regular dealer; 60% of expenditures committed. A regular dealer is defined as a firm that owns, operates, or maintains a store, warehouse or other establishment in which the materials or supplies required for the performance of the contract are bought, kept in stock, and regularly sold to the public. For purposes of this provision a "Broker" is a DBE that has entered into a legally binding relationship to provide goods or services delivered or performed by a third party. Brokers and packagers shall not be regarded as regular dealers.
F. A bona fide service provider; 100% of reasonable fees or commissions. Eligible services include professional, technical, consultant, or managerial, services and assistance in the procurement of essential personnel, facilities, equipment, materials or supplies required for the performance of the contract. Eligible services also include agencies providing bonding and insurance specifically required for the performance of the contract.
G. A trucking, hauling or delivery operation. 100% of expenditures committed when trucks are owned, operated, licensed and insured by the DBE and used on the contract and, if applicable, includes the cost of the self supplied materials and supplies.100% of expenditures committed when the DBE leases trucks from another DBE firm including an owner-operator. 100% of reasonable fees or commissions the DBE receives as a result of a lease arrangement for trucks from a non-DBE, including an owner-operator.
H. Any combination of the above.

105.10.1.3 Race-neutral Goals The Maine DOT is required to set an annual goal (approved on a three year basis) for DBE participation in Federal-aid projects. In order to fulfill that goal, bidders are encouraged to utilize DBE businesses certified by the MaineDOT. MaineDOT seeks to meet the established DBE goal solely through race-neutral means. *Race-neutral* DBE participation occurs when a DBE is awarded a prime contract through customary competitive procurement procedures, is awarded a subcontract on a contract that does not carry a DBE contract goal, or wins a subcontract from a prime contractor that did not consider its DBE status in making the award. A DBE/subcontractor Utilization Proposed Form is required to be included in bid documents.

MaineDOT will analyze each project and create a Project Availability Target (PAT), based on a number of factors including project scope, available DBE firms, firms certified in particular project work, etc. Each bid will request that the contractor attempt to meet the PAT. This PAT is developed to assist contractors to better understand what the MaineDOT expectations are for a

specific project. The PAT is NOT a mandate but an assessment of what this particular project can bear for DBE participation. The Department anticipates that each contractor will make the best effort to reach or exceed this PAT for the project.

105.10.1.4 Race-conscious Project Goals If it is determined by the Department that the annual DBE goal will not be met through *race-neutral* means, the Department may implement *race-conscious contract goals* on some projects. Race-conscious contract goals are goals that are enforceable by the Department and require that the prime contractor use good faith effort to achieve the goal set by the Department for that particular project. If race conscious means are implemented on a project, the Prime must comply with the requirements of 49 CFR.

At the time of the bid opening, all Bidders shall submit with their bid a Disadvantaged Business Enterprise (DBE) Commitment Form provided by the Department. This form will list the DBE and non-DBE firms that are proposed to be used during the execution of the Work. The list shall show the name of the firm, the item/material/type of work involved and the dollar amount of work to be performed. The dollar total of each commitment shall be totaled and a percentage determined.

If the project goal is not met, acceptable documentation showing all good faith efforts made to obtain participation may be required in order to award the project. Failure to provide the required listing with the dollar participation total or acceptable documentation of good faith efforts to obtain DBE participation within 3 days after the bid opening date will be considered a lack of responsiveness on the part of the low bidder. Rejection of the low bid under these circumstances will require the low bidder to surrender the Proposal Guaranty to the Department. The submission and approval of the above forms does not constitute a formal subcontract.

If for any reason during the progress of the Work the Contractor finds that DBEs included on the list are unable to perform the proposed work, the Contractor, with written release by the committed DBE or approval of the Department, may substitute other DBE firms for those named on the list. If the Contractor is able to clearly document their inability to find qualified substitute firms to meet the project goal, the Contractor may request in writing approval to substitute the DBE with a non-DBE firm. If at any time during the life of the Contract it is determined that the Contractor is not fulfilling the goal or commitment(s) and is not making a good faith effort to fulfill the DBE requirement, the Department may withhold progress payments. If good faith effort is determined by the Department, failure to meet the DBE contract goal will not be a detriment to the bid award. Fulfillment of the goal percentage shall be determined by dividing the dollars committed to the DBEs by the actual contract dollars. These requirements are in addition to all other Equal Employment Opportunity requirements on Federal-aid contracts.

105.10.1.5 Certification of DBE attainment on Contracts The MaineDOT must certify that it has conducted post-award monitoring of all contracts to ensure that DBEs had done the work for which credit was claimed. The certification is for the purpose of ensuring accountability for monitoring which the regulation already requires. The MaineDOT will certify these contracts through review of CUF forms, Elations sub-contract payment tracking as well as occasional on-site reviews of projects and through the project's final closeout documentation provided by our Contracts Section.

105.10.1.6 Bidders' List Survey Pursuant to 49 CFR 26.11 the MaineDOT is required to "create and maintain" a bidders list and gather bidder information on our construction/consultant projects, Contractors will maintain information on all subcontract bids submitted by DBE and Non-DBE firms and provide that information to the Department. The Following information is required:

Firm Name
Firm Address
Firm status (DBE or non-DBE)
Age of firm (years)
And the annual gross receipts amount as indicated by defined brackets, i.e. $500,000 to $800,000, rather than requesting exact figures.

Not only is this information critical in determining the availability of DBE businesses relative to other businesses that do similar work, but the Federal Highway Administration requires that we obtain this information.

Portland
21942.02
March, 7, 2018

MaineDOT DBE Project Attainment Target (PAT)
for this Project is N/A %

The MaineDOT seeks to meet the specified annual Disadvantaged Business Enterprise (DBE) usage goal set out by 49 CFR 26.45 through the efforts of contractors seeking to employ qualified DBE subcontractors. We seek to meet this goal by race neutral means and do not, at this time, use contract specific requirements for each project. We do however, understand the capacity of Maine's DBE community and the unique characteristics a project may have that would differ from the broad annual goal.

Taking this into consideration, the MaineDOT will review each project and develop an anticipated attainment or Project Attainment Target (PAT) based on several factors that are project specific. Those factors include:

- □ Scope of Work
- □ DBE availability according to Specification Item
- □ Geographic location
- □ DBE capacity

This PAT is developed to assist contractors to better understand the DBE participation that the MaineDOT can reasonably expect for a specific project. The PAT is NOT a mandate but an assessment of the DBE opportunities that this project could meet or exceed. MaineDOT anticipates that each contractor will make the best effort to reach or exceed the PAT for this project.

# SPECIAL PROVISION
# SECTION 107
# TIME

## 107.1 Contract Time and Contract Completion Date

This Subsection is amended by the addition of the following:

**The specified Contract completion Date is Friday, June 14, 2019.**

## 107.3.2 Night Work

This Subsection is amended by the addition of the following:

The Contractor shall be aware of the close proximity of the local residences. The Contractor shall conduct operations so as not to generate loud noises greater than 80 dB within 500 ft of any building used for residential purposes between the hours of 10:00pm and 7:00am unless otherwise approved. Local requirements concerning noise may impose additional restrictions and must be complied with by the Contractor. See Section 17 - 18 of the City of Portland Ordinance.

## 107.4.2 Schedule of Work Required

This Subsection is deleted and replaced with the following:

Within 21 Days of Contract Execution and before beginning any on-site activities, the Contractor shall provide the Department with its Schedule of Work. The Contractor shall plan the Work, including the activity of Subcontractor's, vendors, and suppliers, such that all Work will be performed in Substantial Conformity with its Schedule of Work. The Schedule must include sufficient time for the Department to perform its functions as indicated in this Contract, including QA inspection and testing, approval of the Contractor's TCP, SEWPCP, and QCP, and review of design submittals, product data, and working drawings.

At a minimum, the Schedule of Work shall include a bar chart which shows the major Work activities, milestones, durations, and a timeline. Milestones to be included in the schedule include: (A) start of Work, (B) beginning and ending of planned Work suspensions, (C) Completion of Physical Work, and (D) Completion. If the Contractor Plans to Complete the Work before the specified Completion Date, the Schedule shall so indicate.

Any restrictions that affect the Schedule of Work such as paving restrictions must be charted with the related activities to demonstrate that the Schedule of Work complies with the Contract.

The Department will review the Schedule of Work and provide comments to the Contractor within 20 days of receipt of the schedule. The Contractor will make the requested changes to the schedule and issue the finalized version to the Department.

## 107.4.2 Project Payment Schedule

This Subsection is amended by the addition of the following:

The Contractor shall also provide the Department with a Quarterly Projected Payment Schedule that estimates the value of the Work as scheduled, including requests for payment of Delivered Materials. The Projected Payment Schedule must be in accordance with the Contractor's Schedule of Work and price submitted by the Contractor's Bid. The Contractor shall submit the Projected Payment Schedule as a condition of Award.

107.4.7 Limitations of Operations

The Contractor shall note that the International Marine Terminal is in operation 24 hours/day, 7 days/week. It is anticipated that Contractor's construction activities during reworking of the existing electrical service, reworking the primary entrance to the IMT and final paving operations in the spring of 2019 will impact Terminal Operations.

The Contractor shall coordinate and schedule these construction activities four weeks in advance with the Terminal Manager and the Resident so that impacts to Terminal Operations are minimized during construction. Coordination shall consist of weekly meetings and distribution of the construction schedule.

Closure of the primary entrance to the IMT during entrance rehabilitation including removal existing pavement, installation of the guard house, removal and replacement of the entrance gates, installation and connection of the natural gas and sanitary sewer to existing utilities and installation of Base and Intermediate layers of Hot Mix Asphalt will be limited to one continuous 30 day period.

Placement of the Hot Mix Asphalt Wearing Surface at the primary entrance will be coordinated separately in the spring of 2019.

The cost of these limits of operations shall be considered incidental to the Contract and no additional compensation will be made.

107.8.2 Limitations of Operations

Append Section 107.8 with the following:

The Contractor shall conduit operations in such a manner that the new Maintenance and Operations Building will be ready for occupancy on December 28, 2018. Supplemental liquidated damages will be assessed at the rate of Five Hundred Dollars ($500.00) per day for every calendar day the new building is not open for occupancy after December 28, 2018.

107.9 Project Closeout

The following is in addition to the requirements of Section 107.9:

The Contractor shall maintain at the site a set of Contract Plans and these Special Provisions, upon which shall be recorded accurately as the work progresses the actual dimensions and locations of all his work, indicating thereon all variations from the Contract Documents. The record shall include the work of all Subcontractors. Record drawings shall be reviewed by the Resident, and the Contractor shall make all necessary changes according to the Resident's review.

Prior to final acceptance of the Work, all recorded data shall be transferred by the Contractor, to a complete set of reproducible record specifications of the Contract Drawings showing "As-Built" conditions. The As-Built drawings shall be presented using neatly color-coded markups to identify changes, modifications, or deletions to the proposed work.

The additional project closeout requirements noted in this special provision shall be considered incidental to the contract and no separate payment will be made.

# SPECIAL PROVISION
# SECTION 401 - HOT MIX ASPHALT PAVEMENT

The Standard Specification 401 – Hot Mix Asphalt Pavement, has been modified with the following revisions. All sections not revised by this Supplemental Specification shall be as outlined in Section 401 of the Standard Specifications.

401.07 Hot Mix Asphalt Plant

401.071 General Requirements HMA plants shall conform to AASHTO M156-97.

a. Truck Scales When the hot mix asphalt is to be weighed on scales meeting the requirements of Section 108 - Payment, the scales shall be inspected and sealed by the State Sealer as often as the Department deems necessary to verify their accuracy.

Plant scales shall be checked prior to the start of the paving season, and each time a plant is moved to a new location. Subsequent checks will be made as determined by the Resident. The Contractor will have at least ten 50 pound masses for scale testing.

b. Additives Additives (WMA, anti-strip, etc.) not directly introduced into the binder at the terminal shall be introduced into the HMA plant per the supplier's recommendations and shall be approved by the Asphalt Pavement Engineer, Pavement Quality Manager, or their authorized representative. The system for introducing additives shall be interlocked with the aggregate feed or weigh system to maintain correct proportions for all rates of production and batch sizes. Additive introduction systems shall be controlled by a proportioning device to the amount required on the JMF plus or minus 0.1% of the target. Additive introduction systems shall be interlocked with the plant and the recordation (batch tickets or drum recordation) shall display the additive and the weight and percentage added.

c. Stockpiles HMA plants shall have sufficient space for stockpiles, with a minimum of supply for 2 days production of all aggregate products used in MaineDOT approved mix designs currently under production for the facility at all times. A minimum stockpile supply of 100 ton (70 yards) shall be maintained at all times no matter the production rate for the HMA plant. Stockpiles shall be separated and built to minimize segregation.

401.18 Quality Control Method A, B & C The Contractor shall operate in accordance with the approved Quality Control Plan (QCP) to assure a product meeting the contract requirements. The QCP shall meet the requirements of Section 106.6 - Acceptance and this Section. The Contractor shall not begin paving operations until the Department approves the QCP in writing.

The QCP shall address any items that affect the quality of the Hot Mix Asphalt Pavement including, but not limited to, the following:

a. JMF(s)
b. Hot mix asphalt plant details
c. Stockpile Management (to include provisions for how the requirements of 401.071c will be met)
d. Make and type of paver(s)
e. Make and type of rollers including weight, weight per inch of steel wheels, and average contact pressure for pneumatic tired rollers
f. Name of QCP Administrator, and certification number
g. Name of Process Control Technician(s) and certification number(s)
h. Name of Quality Control Technicians(s) and certification number(s)
i. Mixing & transportation including process for ensuring that truck bodies are clean and free of debris or contamination that could adversely affect the finished pavement
j. Testing Plan
k. Laydown operations including longitudinal joint construction, procedures for avoiding paving in inclement weather, type of release agent to be used on trucks tools and rollers, compaction of shoulders, tacking of all joints, methods to ensure that segregation is minimized, procedures to determine the maximum rolling and paving speeds based on best engineering practices as well as past experience in achieving the best possible smoothness of the pavement. Solvent based agents developed to strip asphalts from aggregates will not be allowed as release agents.
l. Examples of Quality Control forms including a daily plant report, daily paving report, and delivery slip template for any plant to be utilized.
m. Silo management and details (can show storage for use on project of up to 36 hours)
n. Provisions for varying mix temperature due to extraordinary conditions or production limitations. If a warm-mix technology is utilized, a proposed target production temperature range (not to exceed 50°F) will be provided for each mix design.
o. Name and responsibilities of the Responsible onsite Paving Supervisor.
p. Method for calibration/verification of Density Gauge
q. A note that all testing will be done in accordance with AASHTO and the MaineDOT Policies and Procedures for HMA Sampling and Testing.
r. A detailed description of RAP processing, stockpiling and introduction into the plant as well as a note detailing conditions under which the percent of RAP will vary from that specified on the JMF.
s. A detailed procedure outlining when production will be halted due to QC or Acceptance testing results.
t. A plan to address the change in PGAB source or supplier and the potential co-mingling of differing PGAB's.
u. A procedure to take immediate possession of acceptance samples once released by MaineDOT and deliver said samples to the designated acceptance laboratory.
v. Provisions for how the QCP will be communicated to the Contractor's field personnel

The Contractor shall cease paving operations whenever one of the following occurs on a lot in progress:

a. Method A: The Pay Factor for VMA, Voids @ $N_d$, Percent PGAB, composite gradation, VFB, fines to effective binder or density using all Acceptance or all Quality Control tests for the current lot is less than 0.85. No ceasing of paving operations shall be required for fines to effective binder if the mean test value is equal to the LSL or USL and s = 0.
b. Method B: The Pay Factor for VMA, Voids @ $N_d$, Percent PGAB, composite gradation, VFB, fines to effective binder or density using all Acceptance or all Quality Control tests for the current lot is less than 0.90. No ceasing of paving operations shall be required for fines to effective binder if the mean test value is equal to the LSL or USL and s = 0.
c. Method C: The Pay Factor for Percent PGAB, percent passing the nominal maximum sieve, percent passing 2.36 mm sieve, percent passing 0.300 mm sieve, percent passing 0.075 mm sieve or density using all Acceptance or all available Quality Control tests for the current lot is less than 0.85. No ceasing of paving operations shall be required for percent passing the nominal maximum sieve, percent passing 2.36 mm sieve, percent passing 0.300 mm sieve, or percent passing 0.075 mm sieve if the mean test value is equal to the LSL or USL and s = 0.
d. The Coarse Aggregate Angularity or Fine Aggregate Angularity value falls below the requirements of Table 3: Aggregate Consensus Properties Criteria in Section 703.07 for the design traffic level.
e. Each of the first 2 control tests for a Method A or B lot fall outside the upper or lower limits for VMA, Voids @ Nd, or Percent PGAB; or under Method C, each of the first 2 control tests for the lot fall outside the upper or lower limits for the nominal maximum, 2.36 mm, 0.300 mm or 0.075 mm sieves, or percent PGAB.
f. The Flat and Elongated Particles value exceeds 10% by ASTM D4791.
g. There is any visible damage to the aggregate due to over-densification other than on variable depth shim courses.
h. The Contractor fails to follow the approved QCP.

401.203 Method C Lot Size will be the entire production per JMF for the project, or if so agreed at the Pre-paving Conference, equal lots of up to 4500 tons, with unanticipated over-runs of up to 1500 ton rolled into the last lot. Sublot sizes shall be 750 ton for mixture properties, 500 ton for base or binder densities and 250 ton for surface densities. The minimum number of sublots for mixture properties shall be 4, and the minimum number of sublots for density shall be five.

TABLE 7: METHOD C ACCEPTANCE LIMITS

| Property | USL and LSL |
|---|---|
| Passing 4.75 mm and larger sieves | Target +/-7% |
| Passing 2.36 mm to 1.18 mm sieves | Target +/-5% |
| Passing 0.60 mm | Target +/-4% |
| Passing 0.30 mm to 0.075 mm sieve | Target +/-2% |
| PGAB Content | Target +/-0.4% |
| % TMD (In place density) | 95.0% +/- 2.5% |

Pay Adjustment Method C

The Department will use density, Performance Graded Asphalt Binder content, and the percent passing the nominal maximum, 2.36 mm, 0.300 mm and 0.075 mm sieves for the type of HMA represented in the JMF. If the PGAB content falls below 0.80, then the PGAB pay factor shall be 0.55.

Density: For mixes having a density requirement, the Department will determine a pay factor using Table 7: Method C Acceptance Limits:

PA = (density PF- 1.0)(Q)(P)x0.50

PGAB Content and Gradation The Department will determine a pay factor using Table **7**: Method C Acceptance Limits. The Department will calculate the price adjustment for Mixture Properties as follows:

PA = (% Passing Nom. Max PF-1.0)(Q)(P)X0.05+(% passing 2.36 mm PF-1.0)(Q)(P)X0.05+(%passing 0.30 mm PF-1.0)(Q)(P)X0.05+(%passing 0.075 mm PF-1.0)(Q)(P)X0.10+(PGAB PF-1.0)(Q)(P)X0.25

401.223 Process for Dispute Resolution (Methods A B & C only)

TABLE 10: DISPUTE RESOLUTION VARIANCE LIMITS

| | |
|---|---|
| PGAB Content | +/-0.4% |
| $G_{mb}$ | +/-0.030 |
| $G_{mm}$ | +/-0.020 |
| Voids @ $N_d$ | +/-0.8% |
| VMA | +/-0.8% |
| Passing 4.75 mm and larger sieves | +/- 4.0% |
| Passing 2.36 mm to 0.60 mm sieves | +/- 3.0% |
| Passing 0.30 mm to 0.15 | +/- 2.0 % |
| 0.075 mm sieve | +/- 0.8% |

# SPECIAL PROVISION SECTION 401
# HOT MIX ASPHALT
(Special Seasonal Limitations)

The following section of Section 400 has been revised as follows:

401.06 Weather and Seasonal Limitations The following language has been added to Section 401.06:

The Contractor may place Hot Mix Asphalt Pavement used as the base or intermediate base layers up until November 1st , provided that the air temperature as determined by an approved thermometer (placed in the shade at the paving location) is 40°F or higher.

The Contractor may place Hot Mix Asphalt Pavement used as the base or intermediate base layers up until November 15th , provided that the air temperature as determined by an approved thermometer (placed in the shade at the paving location) is 40°F or higher, and the HMA is produced with one of the WMA technologies listed below and approved for use by the Department.

a. The use of organic WMA additives

b. The use of powdered or pelletized WMA additives

c. The use of manufactured liquid chemical WMA additives

The WMA additives shall be mixed with the aggregate or asphalt in the HMA plant at a rate recommended by the manufacturer. The additives shall be introduced into the hot mix plant mixing chamber by mechanical means that can be controlled and tied directly to the hot mix asphalt plants rate of production. The WMA additives may be mixed with the asphalt at the asphalt terminal a rate recommended by the manufacturer in a manner to assure complete dispersion throughout the load. Should the WMA additives be added at the terminal, additive type, and total additive amounts shall be listed on the loading invoice.

The use of a controlled asphalt foaming system, utilizing an injection system to introduce water to the asphalt stream and "expand" the asphalt prior to mixing with the aggregate in asphalt mixture plant, will not be permitted to produce mix past the deadline. The WMA must be produced at the normal production temperatures specified in section 401.04.

## SPECIAL PROVISION
## SECTION 403
## HOT MIX ASPHALT OVERLAY

| Desc. of Course | Grad. Design | Item Number | Bit Cont. % of Mix | Total Thick | No. Of Layers | Comp. Notes |
|---|---|---|---|---|---|---|
| **4 inch HMA Areas** | | | | | | |
| **Pavement Area 1 – Parking and Box Truck Lot** | | | | | | |
| Wearing | 12.5mm | 403.2081 | N/A | 1 ½" | 1 | 5,9,30 |
| Base | 12.5mm | 403.2131 | N/A | 2 ½" | 1 | 5,9,15,30,33 |
| **9 inch HMA Areas** | | | | | | |
| **Pavement Area 2 – Reach Stacker / Container Lot** | | | | | | |
| Wearing | 12.5mm | 403.2081 | N/A | 1 ½" | 1 | 5,9,30 |
| Intermediate | 12.5mm | 403.2131 | N/A | 1 ½" | 1 | 5,9,15,30,33 |
| Base | 19.0mm | 403.2071 | N/A | 6" | 2 | 5,9,15,30,33 |
| **6 inch HMA Areas** | | | | | | |
| **Pavement Area 3 – Container Lot Entryway** | | | | | | |
| Wearing | 12.5mm | 403.2081 | N/A | 1 ½" | 1 | 5,9,30 |
| Intermediate | 12.5mm | 403.2131 | N/A | 1 ½" | 1 | 5,9,15,30,33 |
| Base | 19.0mm | 403.2071 | N/A | 3" | 1 | 5,9,15,30,33 |
| **Sidewalks, Islands, Misc.** | | | | | | |
| Wearing | 9.5mm | 403.209 | N/A | 2" | 1/more | 1,2,3,10,11,14 |

## COMPLEMENTARY NOTES

1. The required PGAB for this mixture will meet a **PG 64-28** grading.
2. The density requirements are waived.
3. The design traffic level for mix placed shall be <0.3 million ESALS.
5. The aggregate qualities shall meet the design traffic level of 3 to <10 million ESALS for mix placed under this contract. The design, verification, Quality Control, and Acceptance tests for this mix will be performed at **75 gyrations**.
9. Section 106.6 Acceptance, (2) Method C. The Contractor may request a contract modification to change to testing method "A" prior to work starting on this item.
10. Section 106.6 Acceptance, (2) Method D.
11. The combined aggregate gradation required for this item shall be classified as a 9.5mm "**fine graded "** mixture, (using the Primary Control Sieve control point) as defined in 703.09.
14. The combined aggregate gradation required for this item shall be classified as a 9.5mm Thin Lift Mixture (TLM) mixture, using the Aggregate Gradation Control Points as defined in 703.09..
15. The entire HMA base pavement section (consisting of all base and intermediate base layers) shall be completed before winter suspension. Any base or intermediate base HMA placed after the seasonal limitations shown in Special Provision 401 – Special Seasonal Limitations shall be considered temporary and removed and replaced the following construction season. The Department will not be responsible for costs or time related to the placement, removal or replacement of temporary pavement.

30. The required PGAB shall be a storage-stable, homogeneous, polymer modified asphalt binder that meets **PG 64E-28** grading requirements in AASHTO M 332. All polymer modified asphalt grades utilized on the Project shall be treated with an approved liquid anti-strip. PG binders shall be treated with a minimum 0.50 percent anti-strip by weight of asphalt binder used unless otherwise recommended by the anti-strip manufacturer. The PGAB and anti-strip blend shall meet the **PG 64E-28** requirements. The Contractor shall provide supporting test data showing the PGAB and anti-strip blend meet the required criteria.
33. See Special Provision 401 – Special Seasonal Limitations., for project specifics.

## Tack Coat

A tack coat of emulsified asphalt, RS-1, RS-1h, CRS-1 or CRS-1h, Item 409.15 shall be applied to any existing pavement at a rate of approximately 0.030 gal/yd², and on milled pavement approximately 0.05 gal/yd² prior to placing a new course. A fog coat of emulsified asphalt shall be applied between shim /base courses and surface course as well as to any bridge membrane prior to the placement of HMA layers at a rate not to exceed 0.030 gal/yd². Tack used will be paid for at the contract unit price for Item 409.15 Bituminous Tack Coat.

# SPECIAL PROVISION
# SECTION 419
# SAWING AND SEALING JOINTS IN BITUMINOUS PAVEMENT

## 419.01 Description

This work consists of sawing bituminous concrete pavement as shown on the Plans, as specified herein or as approved by the Resident.

## 419.102 General

The bituminous concrete pavement to be sawed shall be accurately marked before cutting. The marking shall be in accordance with the locations as shown on the Plans or as approved by the Resident. Cutting shall be with an approved power driven saw with an abrasive blade.

Unless otherwise noted or directed, the sawcut shall be vertical, a minimum of 3/8 inch wide, and extend to a depth sufficient to create a clean cut line but no less than 2 inches, or as approved by the Resident.

Residue or debris from the sawing operation shall be removed immediately and legally disposed of by the Contractor.

## 419.03 Method of Measurement

Sawing Bituminous Pavement will be measured by the linear foot of pavement actually cut and accepted. No additional payment will be made for variations in the pavement thickness.

## 419.04 Basis of Payment

Sawing Bituminous Pavement will be paid for at the Contract unit price per linear foot which shall be full compensation for all materials, tools, equipment, labor, and all incidentals necessary for the completion of the work to the satisfaction of the Resident. The disposal of sawcut residue shall be incidental to the pay item.

Payment will be made under:

| Pay Item | | Pay Unit |
|---|---|---|
| 419.30 | Sawing Cutting Bituminous Pavement | Linear Foot |

# SPECIAL PROVISION
# SECTION 419
# SAW CUTTING CONCRETE SIDEWALK

## 419.01 Description

This work consists of saw cutting concrete sidewalk as shown on the Plans, as specified herein or as approved by the Resident.

## 419.102 General

The concrete sidewalk to be sawed shall be accurately marked before cutting. The marking shall be in accordance with the locations as shown on the Plans or as approved by the Resident. Cutting shall be with an approved power driven saw with an abrasive blade and shall be accomplished without damage to the portion of the sidewalk to remain.

Unless otherwise noted or directed, the saw cut shall be vertical, a minimum of 3/8 inch wide, and extend to a depth sufficient to create a clean cut line but no less than 2 inches, or as approved by the Resident.

Follow environmental and worker safety requirements during saw cutting operations. Dust, residue or debris from the sawing operations shall be removed immediately and legally disposed of by the Contractor.

## 419.03 Method of Measurement

Saw Cutting Concrete Sidewalk will be measured by the linear foot of concrete sidewalk actually cut and accepted. No additional payment will be made for variations in the concrete thickness.

## 419.04 Basis of Payment

Saw Cutting Concrete Sidewalk will be paid for at the Contract unit price per linear foot which shall be full compensation for all materials, tools, equipment, labor, and all incidentals necessary for the completion of the work to the satisfaction of the Resident. The disposal of saw cut residue shall be incidental to the pay item.

Payment will be made under:

| Pay Item | | Pay Unit |
|---|---|---|
| 419.40 | Saw Cutting Concrete Sidewalk Pavement | Linear Foot |

# SPECIAL PROVISION
# SECTION 502
# STRUCTURAL CONCRETE
(Condenser Pad)
(Security Building Slab)

All work and materials shall conform to the Contract Drawings and the provisions of the State of Maine Department of Transportation Standard Specifications, Revision November 2014, SECTION 502 – STRUCTURAL CONCRETE, with the following modifications:

## Section 502.01 Description

This subsection is amended by the addition of the following:

This work shall consist of furnishing and placing Structural Concrete for condenser pads and security building slab in accordance with these Specifications and in conformity with the lines, grades, and dimensions shown on the Plans. The structural concrete shall be Class "A" with a basic design stress of f'c = 4,000 psi.

## Section 502.18 Method of Measurement

This subsection is amended by the addition of the following:

Measurement of concrete for the condenser pads shall be by the lump sum satisfactorily placed and accepted in accordance with dimensions shown on the plans.

Measurement of concrete for the security building (guard house) slab satisfactorily placed and accepted will be measured by the cubic yard, in accordance with the dimensions shown on the Plans.

## Section 502.19 Basis of Payment

This subsection is amended by the addition of the following:

Reinforcing steel for the condenser pads and security building slab will not be paid separately but will be incidental to the related Structural Concrete Pay Item.

Excavation and backfilling shall be paid under Pay Item 203.20, Common Excavation.

Add the following Pay Items:

| Pay Item | | Pay Unit |
|---|---|---|
| 502.603 | Structural Concrete, Condenser Pad | Lump Sum |
| 502.606 | Structural Concrete, Security Building Slab | Lump Sum |

END OF SECTION

# SPECIAL PROVISION
# SECTION 502
# STRUCTURAL CONCRETE
(QC/QA Acceptance Methods)

| CLASS OF CONCRETE | ITEM NUMBER | DESCRIPTION | P | METHOD |
|---|---|---|---|---|
| A | 502.603 | Struct. Concrete, Condenser Pad | - | C |
| A | 502.606 | Struct. Concrete, Security Building Slab | - | C |
| A | 608.08 | Reinforced Concrete Sidewalk | - | C |
| A | 608.26 | Curb Ramp Detectable Warning Field | - | C |
| | | | | |
| | | | | |
| | | | | |
| | | | | |
| | | | | |

# SPECIAL PROVISION
# SECTION 607
# FENCES

## 607.01 Description

This Subsection is amended by the addition of the following:

The following items shall be removed by the Contractor and remain property of the Department:
Chain Link Fence
Primary Terminal Gate, Motors, and Key Pad

The Contractor shall use great care and remove, transport and deliver without damage all chain link fence, gate, motors and components to another location on the International Marine Terminal Site as directed by the Resident and Terminal Manager.

The Contractor shall contact the Resident and Terminal Manager a minimum of 72 hours in advance of delivery of the fence, gate, motors and components. The Contractor shall supply the labor and equipment to load, unload and transport the items.

The work shall also include the installation of new fence posts with concrete foundations for the resetting of the existing 8-ft tall security chain link fence as shown on the Plans.

The work shall also include temporary fencing to maintain a secure boundary at the International Marine Terminal throughout the duration of the project. Temporary fencing will consist of 4-ft tall chain link fence with three-strand barbed wire mounted on a concrete jersey barrier. The Contractor is advised that portions of the temporary fencing will need be moved and reset to accommodate construction phasing and terminal operations.

## 607.02 Materials

Replace the fifth paragraph with the following:

Concrete for anchoring metal posts shall meet the requirements of Section 03 30 00, Cast In Place Concrete.

## 607.05 Chain Link Fence

This Subsection is amended by the addition of the following:

e. Barbed Wire All permanent and temporary fencing and gates shall be equipped with 3 strands of barbed wire. In the event that barbed wire cannot be salvaged from fence called out to be removed and reset, the contractor will provide new barbed wire at no additional cost.

## 607.06 Method of Measurement

This Subsection is amended by the addition of the following:

Metal fence posts with concrete foundations installed for resetting the 8-ft tall security chain link fence shall not be measured separately but rather shall be incidental to the Remove and Reset Chain Link Fence pay item.

Measurement for the removal of the gate shall be measured by each unit and shall include all labor, materials, incidentals, and equipment necessary to completely remove, pack, load, transport and unload the items as directed by the Resident. The motors, key pad and other components associated with the gate shall not be measured separately but rather shall be incidental to the pay item.

Temporary Security Fence Mounted on Jersey Barrier – Movable will be measured for payment by the linear foot and shall include all movements of the fence to accommodate the construction phasing and terminal operations.

Remove and Reset Temporary Security Fence Mounted on Jersey Barrier will be measured for payment by the linear foot and shall include all movements of the fence to accommodate the construction phasing and terminal operations.

607.07 Basis of Payment

This Subsection is amended by the addition of the following:

The accepted quantities of fence will be paid for at the contract unit price per line foot of the type specified complete in place. Such payment will be full compensation for all materials, equipment, labor, excavation, backfill, tools and any other incidentals necessary to complete the work. All movements of the temporary security fence mounted on Jersey Barrier will be considered incidental to the pay item.

Payment for Remove Gate and Motors will be full compensation for materials, labor and equipment for removing, transporting and delivering without damage the gate and its components to another location on the International Marine Terminal Site as directed by the Resident and Terminal Manager. The motors, key pad and other components associated with the gate will not be paid for separately but rather will be incidental to the pay item.

Payment will be made under the following Pay Items:

| Pay Item | | Pay Unit |
|---|---|---|
| 607.1602 | Temp. Security Fence Mounted on Jersey Barrier – Movable | Linear Foot |
| 607.1603 | Remove and Reset Temp Security Fence on Jersey Barrier | Linear Foot |
| 607.243 | Remove Chain Link Fence (Retained by the Dept.) | Linear Foot |
| 607.25 | Remove and Reset Chain Link Fence | Linear Foot |
| 607.4921 | Remove Gate and Motors (Retained by the Dept.) | Each |

# SPECIAL PROVISION
# SECTION 609
# CURB
# (Special Granite Curb)

## 609.01 Description

This Subsection is amended by the addition of the following:

Special Granite Curb – 24" shall be similar to Vertical Curb Type 1 except the granite height is 24" and width is 6" as detailed on the Plans.

## 419.03 Method of Measurement

This Subsection is amended by the addition of the following:

Special Granite Curb – 24" will be measured by the linear foot along the front face of the curb at the elevation of the finished pavement, complete in place and accepted.

## 419.04 Basis of Payment

This Subsection is amended by the addition of the following:

Special Granite Curb – 24" will be paid for at the Contract unit price per linear foot which shall be full compensation for all materials, tools, equipment, labor, and all incidentals necessary for the completion of the work to the satisfaction of the Resident.

Payment will be made under:

| Pay Item | | Pay Unit |
|---|---|---|
| 609.111 | Special Granite Curb – 24" | Linear Foot |

# SPECIAL PROVISIONS
## SECTION 621
## LANDSCAPE

(Plant Species Specification and Quantities List)

The following list of items provides the estimated quantities for use on this project. The scientific name of the plant material is provided along with the common name in parenthesis.

The contractor shall follow ***Standard Specifications*** Rev. November, 2014 for landscape materials and installation procedures (sec. 621).

The Resident Engineer or ***MaineDOT*** Landscape Architect or designee will be available to inspect plant materials and inspect planting at that time.

No Landscape Warranty Bond will be required; two-year warrantee will be included incidental to planting.

## PLANT MATERIALS

| ITEM | Description | Unit | Quantity | Total |
|---|---|---|---|---|
| 621.126 | Small Deciduous Trees (6 Foot-8 Foot) Group. A | Ea. | | |
| | *(Fraxinus Americana)* White Ash | | 3 | 3 |
| 621.5352 | Deciduous Shrubs 18" – 24" Group A | Ea. | | |
| | *(Buxus sempervirens)* Boxwood Vardar Valley | | 20 | 20 |

# SPECIAL PROVISION
# SECTION 627
# PAVEMENT MARKINGS
# (Pavement Markings in Parking Lot and Driveways)

## 627.01 Description

This Subsection is amended by the addition of the following:

This work includes pavement marking for building parking lot, the crosswalks, and the stop bar at the International Marine Terminal exit.

## 627.09 Method of Measurement

This Subsection is amended by the addition of the following:

The Pavement Markings in the Building Parking Lot and Driveways shall be measured by the lump sum and shall include the white parking stall striping, the blue striping with handicap symbols, the white crosswalks, and the white stop line at the International Marine Terminal exit.

## 627.10 Basis of Payment

This Subsection is amended by the addition of the following:

The accepted quantity of pavement markings will be paid for at the contract lump sum price.

Payment will be made under:

| Pay Item | | Pay Unit |
|---|---|---|
| 627.901 | Pavement Markings in the Parking Lot and Driveways | Lump Sum |

# SPECIAL PROVISION
# SECTION 634
# HIGHWAY LIGHTING
## (Remove and Retain High Mast Light Standard and Reefer Outlet Pedestal)

The provisions of Section 634 of the Standard Specifications shall apply with the following additions:

### 634.01 Description

This Subsection is amended by the addition of the following:

The following items shall be removed by the Contractor and remain property of the Department:
High Mast Light Standard and Foundation
Reefer Outlet Pedestal and Foundation

The Contractor shall use great care and remove, transport and deliver without damage high mast light standard, reefer outlet pedestal and associated foundations, lights and wiring to another location on the International Marine Terminal Site as directed by the Resident and Terminal Manager.

The Contractor shall contact the Resident and Terminal Manager a minimum of 72 hours in advance of delivery. The Contractor shall supply the labor and equipment to load, unload and transport the items.

The work shall also include all labor, materials and equipment to disconnect, remove and relocate the High Mast Lights, associated wiring, light standard and foundation as noted on the plans and specifications. The existing foundation includes a concrete footing and pier. The approximately size of the footing is 10'-0" wide by 10'-0" long by 2'-0" thick with the bottom of footing located a minimum of 6'-0" below finish grade. The approximate size of the pier is 3'-0" in diameter and a minimum of 7' tall.

The work shall also include all labor, materials and equipment to disconnect, remove and relocate the Reefer Outlet Pedestal, associated wiring, and foundation as noted on the plans and specifications. The existing foundation includes a concrete pier. The approximately size of the pier is 2'-4" in diameter and a minimum of 6' tall with the bottom of pier located a minimum of 5'-0" below finish grade.

### 634.06 Method of Measurement

This Subsection is amended by the addition of the following:

Measurement for the work associated with the removal of the Existing High Mast Light Standard as shown on the plans and described herein will be per each unit.

Measurement for the work associated with the removal of the Existing High Mast Light Standard Foundation as shown on the plans and described herein will be per each unit.

Measurement for the work associated with the removal of the Existing Reefer Outlet Pedestal and Foundation as shown on the plans and described herein will be per each combined pedestal and foundation unit.

634.07 Basis of Payment

This Subsection is amended by the addition of the following:

Payment for the accepted quantity of removed and relocated High Mast Light Standard will be at the contract unit price. This payment will include all materials, labor, equipment and incidentals necessary to complete the work.

Payment for the accepted quantity of removed and relocated High Mast Light Standard Foundation will be at the contract unit price.. This payment will include all materials, labor, equipment and incidentals necessary to complete the work.

Payment for the accepted quantity of removed and relocated Reefer Outlet Pedestal and Foundation will be at the contract unit price. This payment will include all materials, labor, equipment and incidentals necessary to complete the work.

Payment will be made under the following Pay Items:

| Pay Item | | Pay Unit |
|---|---|---|
| 634.2081 | Remove Existing High Mast Light Standard | Each |
| 634.2082 | Remove Existing High Mast Light Standard Foundation | Each |
| 634.2083 | Remove Existing Reefer Outlet Pedestal and Foundation | Each |

# Highway Lighting Quality Control Checklist

## Subsection 634.09 Field Testing

**Project Pin #** _____

**Location** (if multiple services, please be specific)- _____

**Grounding Electrode Resistance at service** _____

**Number of Circuits** _____

**Hand-Off-Auto Switch?** _____

### Circuit #1

**Open Circuit Resistance**- (Ohm out both hot legs at the cabinet while they are shorted together at the last pole and the fuse holders are disconnected at each pole) _____

**Megger Test**- (Meg out both hot legs to ground at the cabinet while they are shorted together at the last pole and the fuse holders are disconnected at each pole) _____

**Current draw**- (during normal operation) Leg #1 _____ Leg #2 _____

**Operating Voltage at last pole** _____

### Circuit #2

**Open Circuit Resistance**- (Ohm out both hot legs at the cabinet while they are shorted together at the last pole and the fuse holders are disconnected at each pole) _____

**Megger Test**- (Meg out both hot legs to ground at the cabinet while they are shorted together at the last pole and the fuse holders are disconnected at each pole) _____

**Current draw**- (during normal operation) Leg #1 _____ Leg #2 _____

**Operating Voltage at last pole** _____

**I, _____, certify that this work was done in accordance with subsection 643.14 and current NEC _____ guidelines, and when tested, was functioning as intended.**

**(YEAR)**

**Electrician's Signature** _____

**Electrician's License #** _____

# Highway Lighting Quality Control Checklist

## Subsection 634.09 Field Testing

**Project Pin #** _____

**Location** (if multiple services, please be specific)- _____

**Grounding Electrode Resistance at service** _____

**Number of Circuits** _____

**Hand-Off-Auto Switch?** _____

### Circuit #3

**Open Circuit Resistance**- (Ohm out both hot legs at the cabinet while they are shorted together at the last pole and the fuse holders are disconnected at each pole) _____

**Megger Test**- (Meg out both hot legs to ground at the cabinet while they are shorted together at the last pole and the fuse holders are disconnected at each pole) _____

**Current draw**- (during normal operation) Leg #1 _____ Leg #2 _____

**Operating Voltage at last pole** _____

### Circuit #4

**Open Circuit Resistance**- (Ohm out both hot legs at the cabinet while they are shorted together at the last pole and the fuse holders are disconnected at each pole) _____

**Megger Test**- (Meg out both hot legs to ground at the cabinet while they are shorted together at the last pole and the fuse holders are disconnected at each pole) _____

**Current draw**- (during normal operation) Leg #1 _____ Leg #2 _____

**Operating Voltage at last pole** _____

**I, _____, certify that this work was done in accordance with subsection 643.14 and current NEC _____ guidelines, and when tested, was functioning as intended.**

**(YEAR)**

**Electrician's Signature** _____

**Electrician's License #** _____

# Traffic Signal Quality Control Checklist

## Subsection 643.14 Field Testing

**Project Pin #** _____

**Grounding Electrode Resistance at service** _____

**ID tags on loop amps / detector cards?** _____

**Location** _____

**Street Approach** _____

| | | | |
|---|---|---|---|
| **Loop #** | _____ | **Resistance** | _____ |
| **Phase #** | _____ | **Meg to ground** | _____ |
| **L,C, or R Lane** | _____ | **Amount of bondo covering loop** | _____ |
| **Pulse or Presence** | _____ | | |

**Street Approach** _____

| | | | |
|---|---|---|---|
| **Loop #** | _____ | **Resistance** | _____ |
| **Phase #** | _____ | **Meg to ground** | _____ |
| **L,C, or R Lane** | _____ | **Amount of bondo covering loop** | _____ |
| **Pulse or Presence** | _____ | | |

**Street Approach** _____

| | | | |
|---|---|---|---|
| **Loop #** | _____ | **Resistance** | _____ |
| **Phase #** | _____ | **Meg to ground** | _____ |
| **L,C, or R Lane** | _____ | **Amount of bondo covering loop** | _____ |
| **Pulse or Presence** | _____ | | |

**I, _____, certify that this work was done in accordance with subsection 643.14 and current NEC _____ guidelines, and when tested, was functioning as intended.**

(YEAR)

**Electrician's Signature** _____

**Electricain's License #** _____

August 25, 2011

SPECIAL PROVISION
SECTION 803
TEST PITS

Description. This work shall consist of excavating test pits for buried site features. At least 10 CY of material must be excavated to qualify as a test pit. Only one test pit payment per specific site will be made.

Method of Measurement. Test Pits will be measured by the unit each, complete.

Basis of Payment. Payment for test pits shall include clearing, excavation, dewatering, backfill and compaction in locations as shown on the plans or as directed.

| Pay Item | | Pay Unit |
|---|---|---|
| 801.03 | Test Pits | Each |

# SPECIAL PROVISION
# SECTION 801
# SANITARY SEWER

Description This work shall consist of constructing cellar drain inspection standpipes, in accordance with these specifications and in reasonably close conformity with the lines and grades shown on the plans and as directed by the resident in the field.

Materials Meet Sections:

| | |
|---|---|
| Sewer Line Bedding and Initial Backfilling Stone | 703.02 for class AA |
| PVC Pipes & Fittings (4 in ) | ASTM D3034 (SDR 35) |

Construction Requirements

Excavation Trenches shall be excavated in accordance with the requirements of Section 206 - Structural Excavation and wide enough to allow joining the pipe and compacting the bedding and backfill material under and around the pipe. Unless otherwise designated, trench walls shall be as nearly vertical as possible and the trench width no greater than necessary for installation of the pipe.

Bedding The inspection standpipe and pipe line shall be bedded in original material.

Laying The Contractor shall not install nor backfill cellar drain inspection standpipes between December 15$^{th}$ and April 1$^{st}$ without written permission. Installing shall begin at the downhill end of the cellar drain line. Bell or groove ends shall be placed facing uphill.

Joining The pipe ends shall be thoroughly cleaned before the joint is made. Joints shall be made in accordance with the manufacturer's recommended procedures.

Backfilling After the inspection standpipe and pipe are installed, it will be inspected before any backfill material is placed. All pipe found to be out of alignment, unduly settled or damaged to the extent that full performance is impaired, shall be taken up and re-laid or replaced. One bag of concrete mix shall be installed around the foot of the standpipe, placement as per manufacturer’s recommendations.

Trenches shall be backfilled in accordance with Section 206.03 and as follows. The backfill shall be original excavation in 12 in maximum lifts and shall be thoroughly compacted with power tampers or vibratory compactors or other approved equipment or combination of equipment.

Method of Measurement PVC pipe will be measured by the length in meter [foot] along the invert, horizontally and vertically, including fittings and caps, laid as directed, complete

in place, and accepted. Pipe laid in excess of the authorized length will not be included. Pipe installed inside a manhole will not be measured for payment.

Basis of Payment The accepted quantities of pipe will be paid for at the contract unit price per meter [linear foot], for the types and sizes specified, complete in place and shall be full compensation for all labor, materials, equipment, excavation, dewatering, bedding, furnishing and installing pipe, removal and disposal of existing pipes, connecting to manholes, connecting to existing cellar drain, concrete footing, backfill, compacting, cleaning, testing, maintaining existing flows, and all other incidental required.

No payment will be made for pipe ordered without written approval of the Resident when such pipe is not required to be installed for completion of the work.

Payment will be made under:

| Pay Item | | Pay Unit |
|---|---|---|
| 801.141 | 4” PVC Sanitary Sewer (SDR-35) | Linear Foot |
| 801.16 | 6” PVC Sanitary Sewer (SDR-35) | Linear Foot |

# SPECIAL PROVISION
# SECTION 803
# SANITARY SEWER MANHOLES

## Description
This work shall consist of the construction and placement of sanitary sewer manholes. The provisions of Section 604 shall apply with the following additions and modifications.

## Materials
Manhole frames and covers shall be circular. Diameter of the covers shall be 24" and frame outside diameter shall be 26". Sewer covers shall have "Sewer" cast in to the cover. Refer to details in the plan set.

## Submittals
Submit shop drawings and product information for the following:

- Precast concrete manhole
- Precast manhole inverts
- Manhole steps
- Cast iron manhole frame and cover

## Construction Requirements
All manhole bases, barrel sections and top sections shall be marked by the manufacturer with the appropriate manhole station and offset and project name.

Sanitary sewer shelves, channels and inverts shall be constructed of brick set in mortar or pre-cast concrete. Pre-cast inverts shall be cured at least 7 days in a controlled environment with use of plasticizers to reduce moisture content before applying epoxy. Epoxy shall be Sikagard 62 or approved equivalent and shall be cured in accordance with manufacturer's recommendations before delivery to the project site.

Outside surface of any masonry work shall be plastered with mortar from ¼ to 3/8 inch thick. The masonry shall be properly wetted before the plaster is applied. The plaster shall be carefully spread and troweled so that all cracks are thoroughly worked out. After hardening, the plaster shall be carefully checked by being tapped for bond and soundness.

All brick masonry surfaces with mortar shall be waterproofed with one coat of Dehydratine 6 Trowel Mastc, Dehydratine 10 Semi-mastic or approved equivalent.

All poured concrete or precast concrete surfaces shall be waterproofed with two heavy coats of bituminous waterproofing materials. The material shall be Minwax Fibrous Brush Coat made by the Minwax Company, New York, New York; Tremco 121 Foundation Coating, made by the Tremco Manufacturing Company, Cleveland, Ohio; Inertol No-7 made by Inertol Company, Newark, New Jersey or approved equal.

## Manhole Structures Removed
Existing castings to be removed shall be carefully removed and delivered to the City, if requested. Otherwise they shall be disposed. Removal of existing manholes shall be incidental to pay item 803.173.

Testing

Vacuum Test: Prior to backfilling, all manholes shall be vacuum tested in the following manner:

a. A vacuum of 10 inches of Hg shall be drawn on the manhole and the loss of 1 inch of Hg vacuum timed. The manhole shall be considered to have passed the test if the time for loss of 1 inch of Hg is 2 minutes or longer.
b. If the manhole fails the initial test, the Contractor shall locate the leaks and make repairs. The manhole shall be retested until a satisfactory result is obtained.

Manhole Repairs

Correct leakage by reconstruction, replacement of gaskets and/or other engineer-approved methods.

Method of Measurement

Under this subsection the following sections shall be amended as follows:

a. Subsection (a) of the Standard Specifications shall be deleted and the following paragraph shall be included:

   Complete structures. Each manhole will be measured per each complete.
b. Subsections (c) and (d) of the Standard Specifications shall be deleted and the following paragraph shall be included:

   All steps, castings or other appurtenances installed as shown on the plans or as required shall incidental to pay item 803.173.
c. Separate payment for manhole removal shall be made whenever the center of the structure to be removed is 8 feet or more from the center of a new manhole. If the center of a manhole to be removed is less than 8 feet from the center of a new structure, no separate payment will be made for manhole removal, in which case the cost of manhole removal shall be considered incidental to the cost of the new structure.
d. Method of measurement for structural excavation and subsequent gravel backfill or granular borrow if ordered, shall be bounded by a vertical plane measured 18-inches around the outside diameter of each structure.

Basis of Payment

The first paragraph shall be amended by adding the following sentence:

The cost of furnishing and installing steps, installing reinforced steel concrete stubs and other appurtenances shall be considered as incidental to the structure and no separate payment will be made.

The cost of excavation and backfill of all manholes, either new, or removed and/or replaced shall be included in the cost of the specific work for each type of structure.

The cost of maintaining flows in existing sewer lines and manholes and any maintenance and cleaning of said sewers that may be required as a result of new manhole installations shall be incidental to the related pay item and no separate payment for this work will be made.

Connection of existing pipes to proposed structures, including all necessary excavation, fittings and backfill shall be considered incidental to the respective structure and no separate payment shall be made.

Payment will be made under:

| Pay Item | | Pay Unit |
|---|---|---|
| 803.173 | Sewer Manhole – 4’ Diameter | Each |

# SPECIAL PROVISION
# SECTION 827
# NATURAL GAS DISTRIBUTION

All work and materials shall conform to the Contract Drawings and the provisions of the State of Maine Department of Transportation Standard Specifications, Revision November 2014, with the following additions:

## Natural Gas Distribution

All natural gas piping, installation, materials, and work shall conform to the requirements of Unitil Corporation. Contractor shall coordinate all work through Unitil at 866-933-3821, including installation of new piping and service meter to the building.

## Method of Measurement

Natural Gas Distribution shall be measured by the lump sum, and shall include all labor, materials, incidentals, and equipment necessary to satisfactorily complete the work in accordance with the Plans and Specifications. Work will include all install coordination with Unitil to ensure the installation of gas service is properly conducted throughout the project, and that final gas service installation is provided at the building. Excavation, backfilling, and compacting shall also be included in this work.

## Basis of Payment

Natural Gas Distribution will be paid for at the Contract lump sum price and will be full compensation for all labor, materials, incidentals, and equipment necessary to satisfactorily complete the work in accordance with the Plans and Specifications. Excavation, backfilling, and compacting shall also be included in the corresponding Pay Item.

Payment will be made under:

| Pay Item | | Pay Unit |
|---|---|---|
| 827.37 | Natural Gas Distribution | Lump Sum |

# SPECIAL PROVISION
# SECTION 832
# (Contractor Allowances)

## Description

The Contractor shall include allowances for the following fees and services:

| Allowance | Service |
|---|---|
| $40,000.00 | City of Portland fees for permits including but not limited to Building Permit, Street Opening Permit and Excavator License to Work in the City Right of Way. |
| $30,000.00 | CMP charges associated with the new electrical service. |
| $5,000.00 | Unitil charges associated with the new natural gas service. |
| $5,000.00 | Fairport charges associated with the new telephone service. |
| $5,000.00 | Oxford Networks charges associated with the new fiber optic cable service. |
| $5,000.00 | Portland Water District charges associated with the new water service. |

## Method of Measurement

The Contractor Allowances will each be measured by the Lump Sum, installed and accepted.

## Basis of Payment

Payment for Contractor Allowances will be determined by the invoice received from the City of Portland and the respective utility company.

Payment will be made under:

| Pay Item | | Pay Unit |
|---|---|---|
| 832.071 | Contractor Allowance for City Permits | Lump Sum |
| 832.071 | Contractor Allowance for CMP | Lump Sum |
| 832.071 | Contractor Allowance for Unitil | Lump Sum |
| 832.071 | Contractor Allowance for Fairpoint | Lump Sum |
| 832.071 | Contractor Allowance for Oxford Networks | Lump Sum |
| 832.071 | Contractor Allowance for Portland Water District | Lump Sum |

# SPECIAL PROVISIONS
# SECTION 841
# BOLLARDS

Description. This work shall consist of furnishing and installing metal bollards, concrete foundation, and associated hardware necessary to complete the work as detailed on the plans.

Method of Measurement. Bollards and all necessary incidentals to complete the work shall be paid for by each complete and accepted in place.

Basis of Payment. The accepted quantity of Bollards will be paid for at the contract unit price for each installation. Such payment will be full compensation for all materials, equipment, labor, excavation, backfill, concrete foundation tools, associated hardware, and any other incidentals necessary to complete the work.

Payment will be made under:

| Pay Item | | Pay Unit |
|---|---|---|
| 841.48 | Bollards | Each |

# SPECIAL PROVISIONS
# SECTION 890
# BIKE RACK

Description. This work shall consist of furnishing and installation of the bike rack, concrete foundation, sonotube, and associated hardware necessary to complete the work. The Bike Rack shall be model "Bike Hitch" from Dero (www.dero.com), in-ground mount, color black. In-ground mount shall consist of 10 inch diameter by 2.5 feet deep concrete filled sonotube below the concrete sidewalk.

Method of Measurement. The Bike Rack and all necessary incidentals to complete the work shall be paid for by each complete and accepted in place.

Basis of Payment. The accepted quantity of Bike Rack will be paid for at the contract unit price for each installation. Such payment will be full compensation for all materials, equipment, labor, excavation, backfill, concrete foundation, tools, associated hardware, and any other incidentals necessary to complete the work.

Payment will be made under:

| Pay Item | | Pay Unit |
|---|---|---|
| 890.07 | Bike Rack | Each |

STATE OF MAINE
DEPARTMENT OF TRANSPORTATION
AUGUSTA, MAINE
TECHNICAL SPECIFICATIONS
FOR:

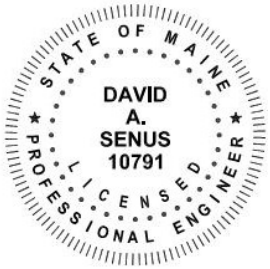
# PORTLAND INTERNATIONAL MARINE TERMINAL IMPROVEMENTS

Portland, Maine

PROJECT PIN: 021942.02

February 16, 2018

CIVIL ENGINEER
Woodard & Curran, Portland, Maine




2/16//18

*Dave Senus, P.E.* *Date*
*Project Manager*

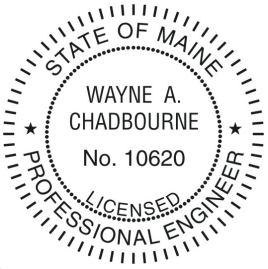
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# SECTION 01 41 00 – SPECIAL INSPECTIONS

All work and materials shall conform to the Contract Documents and the provisions of the State of Maine Department of Transportation Standard Specifications, Revision November 2014, with the following additions:

Add the following:

PART 1 GENERAL

1.01 RELATED DOCUMENTS

A. The drawings and general conditions of the Contract, including General and Supplementary Conditions and MaineDOT Division 100, General Conditions, apply to 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 GENERAL REQUIREMENTS:

A. Special Inspections and Structural Testing shall be in accordance with Chapter 17 of the International Building Code (2009) as referenced by the Maine Uniform Building and Energy Code (MUBEC).

B. The program of Special Inspection and Structural Testing is a Quality Assurance program intended to ensure that the work is performed in accordance with the Contract Documents.

C. This specification section is intended to inform the Contractor of the Owner's quality assurance program and the extent of the Contractor's responsibilities. This specification section is also intended to notify the Special Inspector, Testing Laboratory, and other Agents of the Special Inspector of their requirements and responsibilities.

1.03 DEFINITIONS:

A. Registered Design Professional: Licensed Professional Engineer or Registered Architect whose seal appears in the Construction Drawings. Unless noted otherwise, references to the Registered Design Professional in this section refer to the Structural Engineer of Record (SER).

B. Code Enforcement Official: Officer or other designated authority charged with administration and enforcement of the MUBEC.

C. Special Inspector: A Professional Engineer retained by the Owner to perform structural inspections and coordinate and oversee the work of the other Agents. The Special Inspector shall be licensed in the state where the project is located and shall have building design experience.

D. Testing/Inspecting Agency: Agent retained by Special Inspector or Owner and coordinated by Special Inspector to perform some inspection services on behalf of Special Inspector. A Geotechnical Engineer is an example of an Inspecting Agent.

E. Statement of Special Inspections: Documents prepared by the Registered Design Professional and filed with and approved by the Code Enforcement Official, listing materials and work requiring Special Inspections. The Statement of Special Inspections is located in Attachment A.

F. Schedule of Special Inspections: An itemized list of inspections, verifications, and tests (including frequency) required for the project and individuals, agencies, or firms who will be retained to perform these services. The Schedule of Special Inspections is located in Attachment A.

G. Continuous Special Inspection: Full-time observation of work by the Special Inspector or Testing Agency while the work is being performed.

H. Periodic Special Inspections: Part-time or intermittent observation of work by the Special Inspector or Testing Agency for work that has been or is being performed and at completion of the work.

1.04 QUALIFICATIONS:

A. The Special Inspector shall be a licensed Professional Engineer or Structural Engineer who is approved by the Registered Design Professional for Structural Engineer of Record and Code Enforcement Official.

B. The Testing Laboratory and individual technicians shall be approved by the Structural Engineer of Record (SER).

C. The Testing Laboratory shall maintain a full time licensed Professional Engineer on staff who shall certify all test reports. The Engineer shall be responsible for the training of the testing technicians and shall be in responsible charge of the field and laboratory testing operations.

D. Special Inspections shall be performed by inspectors who are either licensed Professional Engineers (P.E.), Engineer-Intern (E.I.) with an education and background in structural engineering except as indicated below.

E. Comply with the following specific requirements:

1. Special Inspections of soils and foundations may be performed by inspectors with an education and background in geotechnical engineering in lieu of a background in structural engineering.

2. Technicians performing sampling and testing of concrete shall be ACI certified Concrete Field Testing Technicians — Grade 1.

3. Inspectors performing inspections of concrete work such as inspections of concrete placement, batching, reinforcing placement, curing and protection, may be ACI certified Concrete Construction Inspectors or ICC certified Reinforced Concrete Special Inspector in lieu of being a licensed P.E, S.E. or EIT.

4. Technicians performing visual inspection of welding shall be AWS Certified Welding Inspectors or ICC certified Structural Steel and Welding Special Inspectors, technicians performing non-destructive testing such as ultrasonic testing, radiographic testing, magnetic particle testing, or dye-penetrant testing shall be certified as an ASNT-TC Level II or Level III technician.

5. Technicians performing standard tests described by specific ASTM Standards shall have training in the performance of such tests and must be able to demonstrate either by oral or written examination competence for the test to be conducted. They shall be under the supervision of a licensed Professional Engineer and shall not be permitted to independently evaluate test results.

1.05 SUBMITTALS:

A. The Special Inspector and Testing Laboratory shall submit to the Registered Design Professional for Structural Engineer of Record (SER) and Code Enforcement Official for review a copy of their qualifications which shall include the names and qualifications of each of the individual inspectors and technicians who will be performing inspections or tests.

B. The Special Inspector and Testing Laboratory shall disclose any past or present business relationship or potential conflict of interest with the Contractor or any of the Subcontractors whose work will be inspected or tested.

1.06 CONTRACTOR RESPONSIBILITIES:

The Contractor shall cooperate with the Special Inspector and his agents so that the Special Inspections and testing may be performed without hindrance.

A. The Contractor shall review the Statement of Special Inspections and shall be responsible for coordinating and scheduling inspections and tests. The Contractor shall notify the Special Inspector or Testing Laboratory at least 24 hours in advance of a required inspection or test. Uninspected work that required inspection may be rejected solely on that basis.

B. The Contractor shall provide incidental labor and facilities to provide access to the work to be inspected or tested, to obtain and handle samples at the site or at source of products to be tested, to facilitate tests and inspections, storage and curing of test samples.

C. The Contractor shall keep at the project site the latest set of construction drawings, field sketches, approved shop drawings, and specifications for use by the inspectors and testing technicians.

D. The Special Inspection program shall in no way relieve the Contractor of his obligation to perform work in accordance with the requirements of the Contract Documents or from implementing an effective Quality Control program. All work that is to be subjected to Special Inspections shall first be reviewed by the Contractor's quality control personnel.

E. The Contractor shall be solely responsible for construction site safety.

1.07 LIMITS ON AUTHORITY:

A. The Special Inspector or Testing/Inspecting Agencies may not release, revoke, alter, or enlarge on the requirements of the Contract Documents.

B. The Special Inspector or Testing/Inspecting Agencies will not have control over the Contractor's means and methods of construction.

C. The Special Inspector or Testing/Inspecting Agencies shall not be responsible for construction site safety.

D. The Special Inspector or Testing/Inspecting Agencies have no authority to stop the work.

1.08 STATEMENT OF SPECIAL INSPECTIONS:

A. The attached Statement of Special Inspections (Attachment A), prepared by the Registered Design Professional for Structural Engineer of Record (SER), shall be submitted with the application for Building Permit.

1.09 RECORDS AND REPORTS:

A. Detailed daily reports shall be prepared of each inspection or test and submitted to the Special Inspector. Reports shall include:

1. Date of test or inspection.
2. Name of inspector or technician.
3. Location of specific areas tested or inspected.
4. Description of test or inspection and results.
5. Applicable ASTM standard.
6. Weather conditions.
7. Engineer's signature and license number.

B. The Special Inspector shall submit interim reports to the Code Enforcement Official at the end of each week that

include all inspections and test reports received that week. Copies shall be sent to the SER, Architect, and Contractor.

C. Any discrepancies from the Contract Documents found during a Special Inspection shall be immediately reported to the Contractor. If the discrepancies are not corrected, the Special Inspector shall notify the SER and Code Enforcement Official. Reports shall document all discrepancies identified and the corrective action taken.

D. The Testing Laboratory shall immediately notify the Special Inspector and the SER by telephone and email of any test results that fail to comply with the requirements of the Contract Documents. Notification shall be made within 3 days of test showing deficiency.

E. Reports shall be submitted to the Special Inspector within 7 days of the inspection or test. Handwritten reports may be submitted if final typed copies are not available.

F. At the completion of the work requiring Special Inspections, each inspection agency and testing laboratory shall provide a statement to the Special Inspector that all work was completed in substantial conformance with the Contract Documents and that all appropriate inspections and tests were performed.

1.10 COMMUNICATION:

A. Testing/Inspecting Agency shall immediately notify the Contractor, Special Inspector, and Registered Design Professional by telephone, fax, or e-mail of test results failing to comply with requirements of Contract Documents.

B. Special Inspector shall immediately notify the Contractor of work found to be in nonconformance with Contract Documents during inspections. If nonconforming work is not corrected while Special Inspector is on-site, Special Inspector shall notify Registered Design Professional within 24 hours (one business day) and issue a nonconformance report. Special Inspector may use Special Inspection Non-Conformance Report form at end of this section or other similar form.

C. If nonconforming work is not corrected at time of substantial completion of structure or other appropriate time, Special Inspector shall notify Code Enforcement Official.

1.11 DISTRIBUTION OF REPORTS:

A. Testing/Inspecting Agency shall submit reports to Special Inspector and Registered Design Professional within 7 days of inspection or test. Legible handwritten reports may be submitted if final typed copies are not available.

B. Special Inspector shall submit reports to Registered Design Professional within 7 days of inspections. Legible handwritten reports may be submitted if final typed copies are not available.

C. If requested by the Code Enforcement Official, Special Inspector shall submit interim reports that include inspections and tests performed since beginning of construction or since previous interim report. Interim reports shall be addressed to the Code Enforcement Official with copies sent to the Registered Design Professionals (Structural Engineer and Architect) and Contractor. Interim reports shall be signed by Agent performing inspections.

1.12 FINAL REPORT OF SPECIAL INSPECTIONS:

A. At completion of work, each Testing/Inspecting Agency shall submit Agent's Final Report of Special Inspections to Special Inspector stating work was completed in substantial conformance with Contract Documents and appropriate inspections and tests were performed. Testing/Inspecting Agency may use Agent's Final Report of Special Inspections form provided at end of this section or other similar form.

B. At completion of work, Special Inspector shall compile inspection and test reports generated by each Agent into a Final Report of Special Inspections. Final Report of Special Inspections shall state required inspections have been performed and itemize nonconforming work not corrected or resolved.

C. Special Inspector may use Final Report of Special Inspections form provided (Attachment A) or other similar form.

D. Special Inspector shall submit Final Report of Special Inspections to Registered Design Professional and Code Enforcement Official prior to issuance of a Certificate of Use and Occupancy.

PART 2 BASIS OF PAYMENT:

2.01 BASIS OF PAYMENT:

A. The owner will engage and pay for the Special Inspector and Testing/Inspecting Agency defined within this specification

B. The Contractor shall be responsible for cost of retesting or reinspection of work failing to comply with requirements of Contract Documents.

C. Payment for the Contractor responsibilities as defined in Section 1.06 of this specification will be not be made directly but will be considered incidental to Division 1.

**END OF SECTION**

**ATTACHMENT A**

**STATEMENT OF SPECIAL INSPECTIONS**

# Structural Statement of Special Inspections

Project: PORTLAND IMT MAINTENANCE & OPERATIONS CENTER WIN # 021942.02

Location: PORTLAND, MAINE

Owner: MDOT

This *Statement of Special Inspections* encompass the following discipline: **Structural**

This *Statement of Special Inspections* is submitted as a condition for permit issuance in accordance with the Special Inspection and Structural Testing requirements of the Building Code. It includes a schedule of Special Inspection services applicable to this project as well as the name of the Structural Special Inspection Coordinator (SSIC) and the identity of other approved agencies to be retained for conducting these inspections and tests.

The Structural Special Inspection Coordinator shall keep records of all Structural inspections and shall furnish inspection reports to the Building Code Official (BCO) and the Structural Registered Design Professional in Responsible Charge (SRDP). Discovered discrepancies shall be brought to the immediate attention of the Contractor for correction. If such discrepancies are not corrected, the discrepancies shall be brought to the attention of the Building Official and the Structural Registered Design Professional in Responsible Charge. The Special Inspection program does not relieve the Contractor of his or her responsibilities.

Interim reports shall be submitted to the Building Official and the Structural Registered Design Professional in Responsible Charge at an interval determined by the SSIC and the BCO.

A *Final Report of Special Inspections* documenting completion of all required Special Inspections, testing and correction of any discrepancies noted in the inspections shall be submitted to the BCO prior to issuance of a Certificate of Use and Occupancy.

Job site safety and means and methods of construction are solely the responsibility of the Contractor.

Interim Report Frequency: ☒ *Upon request of Building Official* or ☐ per attached schedule.

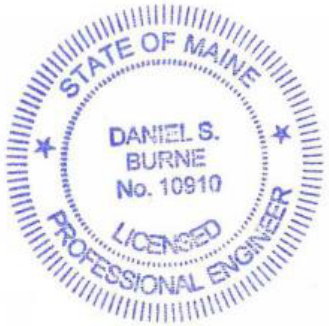
Prepared by:

*Daniel S. Burne, P.E. – Becker Structural Engineers*

(type or print name of the Structural Registered Design Professional in Responsible Charge)

Signature

*1/12/18*
Date



Design Professional Seal

Owner's Authorization:

Signature Date

Building Code Official's Acceptance:

Signature Date

# Structural Statement of Special Inspections (Continued)

Project: PORTLAND IMT MAINTENANCE & OPERATIONS CENTER WIN # 021942.02

Location: PORTLAND, MAINE

Owner: MDOT

This *Statement of Special Inspections* encompass the following discipline: **Structural**

This Statement of Special Inspections / Quality Assurance Plan includes the following building systems:

- ☒ Soils and Foundations
- ☒ Cast-in-Place Concrete
- ☐ Precast Concrete System
- ☐ Structural Masonry Systems
- ☒ Structural Steel
- ☐ Wood Construction
- ☐ Special Cases

| **Special Inspection Agencies** | **Firm** | **Address, Telephone, e-mail** |
|---|---|---|
| 1. STRUCTURAL Special Inspections Coordinator (SSIC) | *TBD* | |
| 2. Special Inspector (SI 1) - STRUCTURAL | *TBD* | |
| 3. Special Inspector (SI 2) – GEOTECHNICAL | *TBD* | |
| 4. Testing Agency (TA 1) | *TBD* | |

Note: The inspectors and testing agencies shall be engaged by the Owner or the Owner's Agent, and not by the Contractor or Subcontractor whose work is to be inspected or tested. Any conflict of interest must be disclosed to the Building Official, prior to commencing work.

# Structural Statement of Special Inspections (Continued)

## Final Report of Special Inspections (SSIC)

[To be completed by the Structural Special Inspections Coordinator (SSIC). Note that all Agent's Final Reports must be received prior to issuance.]

Project: PORTLAND IMT MAINTENANCE & OPERATIONS CENTER WIN # 021942.02
Location: PORTLAND, MAINE
Owner: MDOT
Owner's Address: 24 CHILD ST
AUGUSTA, ME 04330

| | | |
|---|---|---|
| Architect of Record: | STEVE WEATHERHEAD | WINTON SCOTT ARCHITECTS |
| | *(name)* | *(firm)* |
| Structural Registered Design Professional in Responsible Charge: | DANIEL S. BURNE | BECKER STRUCTURAL ENGINEERS |
| | *(name)* | *(firm)* |

To the best of my information, knowledge and belief, the Special Inspections required for this project, and itemized in the *Statement of Special Inspections* submitted for permit, have been performed and all discovered discrepancies have been reported and resolved.

Interim reports submitted prior to this final report form a basis for and are to be considered an integral part of this final report.

Respectfully submitted,
Structural Special Inspection Coordinator

(Type or print name)

(Firm Name)

Signature Date

Licensed Professional Seal

# Structural Statement of Special Inspections (Continued)
## Special Inspector's/Agent's Final Report

Project: PORTLAND IMT MAINTENANCE & OPERATIONS CENTER WIN # 021942.02

Special Inspector or Agent: _____

*(name)* *(firm)*

Designation:

To the best of my information, knowledge and belief, the Special Inspections or testing required for this project, and designated for this Inspector/Agent in the *Statement of Special Inspections* submitted for permit, have been performed and all discovered discrepancies have been reported and resolved.

Interim reports submitted prior to this final report form a basis for and are to be considered an integral part of this final report.

Respectfully submitted,
Special Inspector or Agent:

_____
(Type or print name)

_____
Signature Date

*Licensed Professional Seal or*
Certification Number

# Structural Schedule of Special Inspections

## Qualifications of Inspectors and Testing Technicians

The qualifications of all personnel performing Special Inspection and testing activities are subject to the approval of the Building Official. The credentials of all Inspectors and testing technicians shall be provided to the Special Inspector for their records. *NOTE VERIFICATION THAT QUALIFIED INDIVIDUALS ARE AVAILABLE TO PERFORM STIPULATED TESTING AND/OR INSPECTION SHOULD BE PROVIDED PRIOR TO SUBMITTING STATEMENT. AGENT QUALIFICATIONS IN SCHEDULE ARE SUGGESTIONS ONLY; FINAL QUALIFICATIONS ARE SUBJECT TO THE DISCRETION OF THE REGISTERED DESIGN PROFESSIONAL PREPARING THE SCHEDULE.*

### Key for Minimum Qualifications of Inspection Agents:

When the Registered Design Professional in Responsible Charge or Special Inspector of Record deems it appropriate that the individual performing a stipulated test or inspection have a specific certification, license or experience as indicated below, such requirement shall be listed below and shall be clearly identified within the schedule under the Agent Qualification Designation.

| | |
|---|---|
| PE/SE | Structural Engineer – a licensed SE or PE specializing in the design of building structures |
| PE/GE | Geotechnical Engineer – a licensed PE specializing in soil mechanics and foundations |
| EIT | Engineer-In-Training – a graduate engineer who has passed the Fundamentals of Engineering examination |

### Experienced Testing Technician

| | |
|---|---|
| ETT | Experienced Testing Technician – An Experienced Testing Technician with a minimum 5 years experience with the stipulated test or inspection |

### American Concrete Institute (ACI) Certification

| | |
|---|---|
| ACI-CFTT | Concrete Field Testing Technician – Grade 1 |
| ACI-CCI | Concrete Construction Inspector |
| ACI-LTT | Laboratory Testing Technician – Grade 1&2 |
| ACI-STT | Strength Testing Technician |

### American Welding Society (AWS) Certification

| | |
|---|---|
| AWS-CWI | Certified Welding Inspector |
| AWS/AISC-SSI | Certified Structural Steel Inspector |

### American Society of Non-Destructive Testing (ASNT) Certification

| | |
|---|---|
| ASNT | Non-Destructive Testing Technician – Level II or III. |

### International Code Council (ICC) Certification

| | |
|---|---|
| ICC-SMSI | Structural Masonry Special Inspector |
| ICC-SWSI | Structural Steel and Welding Special Inspector |
| ICC-SFSI | Spray-Applied Fireproofing Special Inspector |
| ICC-PCSI | Prestressed Concrete Special Inspector |
| ICC-RCSI | Reinforced Concrete Special Inspector |

### National Institute for Certification in Engineering Technologies (NICET)

| | |
|---|---|
| NICET-CT | Concrete Technician – Levels I, II, III & IV |
| NICET-ST | Soils Technician - Levels I, II, III & IV |
| NICET-GET | Geotechnical Engineering Technician - Levels I, II, III & IV |

# Structural Schedule of Special Inspections
## SOILS & FOUNDATION CONSTRUCTION

| VERIFICATION AND INSPECTION<br><br>IBC Section 1704.7, 1704.8, 1704.9 | REQD Y/N | EXTENT: CONTINUOUS, PERIODIC, SUBMITTAL, OR NONE | COMMENTS | AGENT | AGENT QUALIFICATION | TASK COMPLETED |
|---|---|---|---|---|---|---|
| 1. Required Verification and Inspection of Soils: | | | | | | |
| a. Verify materials below shallow foundations are adequate to achieve the design bearing capacity. | Y | P | IBC 1704.7 | SI2 | PE/GE, EIT or ETT | |
| b. Verify excavations are extended to proper depth and have reached proper material. | Y | P | IBC 1704.7 | SI2 | PE/GE, EIT or ETT | |
| c. Perform classification and testing of compacted fill materials. | Y | P | IBC 1704.7 | TA1 | PE/GE, EIT or ETT | |
| d. Verify use of proper materials, densities and lift thicknesses during placement and compaction of compacted fill. | Y | C | IBC 1704.7 | TA1 | PE/GE, EIT or ETT | |
| e. Prior to placement of compacted fill, observe subgrade and verify that site has been prepared properly. | Y | P | IBC 1704.7 | SI2 | PE/GE, EIT or ETT | |
| 2. Required Verification and Inspection of Driven Deep Foundation Elements: | | | | | | |
| a. Verify element materials, sizes and lengths comply with the requirements. | N | C | IBC 1704.8 | TA1 | PE/GE, EIT or ETT | |
| b. Determine capacities of test elements and conduct additional load tests, as required. | N | C | IBC 1704.8 | SI2 | PE/GE, EIT or ETT | |
| c. Observe driving operations and maintain complete and accurate records for each element. | N | C | IBC 1704.8 | TA1 | PE/GE, EIT or ETT | |
| d. Verify placement locations and plumbness, confirm type and size of hammer, record number of blows per foot of penetration, determine required penetrations to achieve design capacity, record tip and butt elevations and document any damage to foundation element. | N | C | IBC 1704.8 | TA1 | PE/GE, EIT or ETT | |
| 3. Required Verification and Inspection of Cast-in-Place Deep Foundation Elements: | | | | | | |
| a. Observe drilling operations and maintain complete and accurate records for each element. | N | C | IBC 1704.9 | TA1 | PE/GE, EIT or ETT | |
| b. Verify placement locations and plumbness, confirm elelment diameters, bell diameters (if applicable), lengths, embedment into bedrock (if applicable) and adequate end bearing strata capacity. Record concrete or grout volumes. | N | C | IBC 1704.9 | TA1 | PE/GE, EIT or ETT | |

# Structural Schedule of Special Inspections
## CONCRETE CONSTRUCTION

| VERIFICATION AND INSPECTION<br><br>IBC Section 1704.4 | REQD Y/N | EXTENT: CONTINUOUS, PERIODIC, SUBMITTAL, OR NONE | COMMENTS | AGENT | AGENT QUALIFICATION | TASK COMPLETED |
|---|---|---|---|---|---|---|
| 1. Inspection of reinforcing steel, including prestressing tendons, and placement | Y | P | ACI 318: 3.5, 7.1-7.7 | SI1 | PE/SE or EIT | |
| 2. Inspection of reinforcing steel welding in accordance with Table 1704.3, Item 5B | N | - | Not applicable. Welding of Reinf Not Allowed | - | - | |
| 3. Inspect bolts to be installed in concrete prior to and during placement of concrete where allowable loads have been increased or where strength design is used. | N | C | IBC 1911.5 | SI1 | PE/SE or EIT | |
| 4. Inspection of anchors installed in hardened concrete. | Y | P | IBC 1212.1 | SI1 | PE/SE or EIT | |
| 5. Verifying use of required design mix | Y | P | ACI 318: Ch 4, 5.2-5.4 | TA1 | ACI-CFTT or ACI-STT | |
| 6. At time fresh concrete is sampled to fabricate specimens for strength tests, perform slump and air content tests and determine the temperature of the concrete. | Y | C | ASTM C 172<br>ASTM C 31<br>ACI 318: 5.6, 5.8 | TA1 | ACI-CFTT or ACI-STT | |
| 7. Inspection of concrete and shotcrete placement for proper application techniques | Y | C | ACI 318: 5.9, 5.10 | TA1 | ACI-CFTT or ACI-STT | |
| 8. Inspection for maintenance of specified curing temperature and techniques | Y | P | ACI 318: 5.11-5.13 | SI1 | PE/SE or EIT | |
| 9. Inspection of Prestressed Concrete | | | | | | |
| a. Application of prestressing force. | N | C | ACI 318: 18.20 | TA2 | PE/SE or EIT | |
| b. Grouting of bonded prestressing tendons in seismic force resisting system | N | C | ACI 318: 18.18.4 | TA1 | ACI-CFTT or ACI-STT | |
| 10. Erection of precast concrete members. | N | P | ACI 318: Ch 16 | SI1 | PE/SE or EIT | |
| 11. Verification of in-situ concrete strength, prior to stressing of tendons in post-tensioned concrete and prior to removal of shores and forms from beans and structural slabs. | N | P | ACI 318: 6.2 | TA1 | ACI-CFTT or ACI-STT | |
| 12. Inspect formwork for shape, location and dimensions of the concrete member being formed. | Y | P | Limitations apply. See below | SI1 | PE/SE or EIT | |

Limitations of item 12: Special inspection includes periodic review of formwork shape, general location, and formwork dimensions that can be readily measured with conventional tape measure. Verification of building layout, building location, foundation extents, column grids, and foundation elevations is excluded.

# Structural Schedule of Special Inspections
## STEEL CONSTRUCTION

| VERIFICATION AND INSPECTION<br><br>IBC Section 1704.3 | REQD Y/N | EXTENT: CONTINUOUS, PERIODIC, SUBMITTAL, OR NONE | COMMENTS | AGENT | AGENT QUALIFICATION | TASK COMPLETED |
|---|---|---|---|---|---|---|
| 1. Material verification of high-strength bolts, nuts and washers: | | | | | | |
| a. Identification markings to conform to ASTM standards specified in the approved construction documents. | Y | P | Applicable ASTM material standards, AISC 360, A3.3 | TA1 | AWS/AISC-SSI | |
| b. Manufacturer's certificate of compliance required. | Y | S | | SI1 | PE/SE or EIT | |
| 2. Inspection of high-strength bolting | | | | | | |
| a. Snug-tight joints. | Y | P | | TA1 | AWS/AISC-SSI | |
| b. Pretensioned and slip-critical joints using turn-of-nut with matchmaking, twist-off bolt or direct tension indicator methods of installation. | Y | P | AISC LRFD Section M2.5 IBC Sect 1704.3.3 | TA1 | AWS/AISC-SSI | |
| c. Pretensioned and slip-critical joints using turn-of-nut without matchmaking or calibrated wrench methods of installation. | Y | C | | TA1 | AWS/AISC-SSI | |
| 3. Material verification of structural steel and cold-formed steel deck: | | | | | | |
| a. For structural steel, identification markings to conform to AISC 360. | Y | P | AISC 360, M5.5 | SI1 | PE/SE or EIT | |
| b. For other steel, identification markings to conform to ASTM standards specified in the approved construction documents. | Y | P | Applicable ASTM material standards | SI1 | PE/SE or EIT | |
| c. Manufacturer's certified test reports. | Y | S | | SI1 | PE/SE or EIT | |
| 4. Material verification of weld filler materials: | | | | | | |
| a. Identification markings to conform to AWS specification in the approved construction documents. | Y | P | AISC 360, M5.5 | TA1 | AWS/AISC-SSI | |
| b. Manufacturer's certificate of compliance required. | Y | S | | SI1 | PE/SE or EIT | |
| 5. Submit current AWS D1.1 welder certificate for all field welders who will be welding on this project. | Y | S | AWS D1.1 | SI1 | PE/SE or EIT | |
| 6. Inspection of welding (IBC 1704.3.1): | | | | | | |
| a. Structural steel and cold-formed deck: | | | | | | |
| 1) Complete and partial joint penetration groove welds. | Y | C | AWS D1.1 | TA1 | AWS-CWI | |
| 2) Multipass fillet welds. | Y | C | | TA1 | AWS-CWI | |
| 3) Single-pass fillet welds> 5/16" | Y | C | | TA1 | AWS-CWI | |
| 4) Plug and slot welds | Y | C | | TA1 | AWS-CWI | |
| 5) Single-pass fillet welds≤ 5/16" | Y | P | | TA1 | AWS-CWI | |
| 6) Floor and deck welds. | Y | P | AWS D1.3 | TA1 | AWS-CWI | |
| b. Reinforcing steel: | | | | | | |
| 1) Verification of weldability of reinforcing steel other than ASTM A706. | N | - | Not applicable. | - | - | |

| | | | | | | |
|---|---|---|---|---|---|---|
| 2) Reinforcing steel-resisting flexural and axial forces in intermediate and special moment frames, and boundary elements of special structural walls of concrete and shear reinforcement. | N | C | AWS D1.4 ACI 318: 3.5.2 | TA1 | AWS-CWI | |
| 3) Shear reinforcement. | N | C | | TA1 | AWS-CWI | |
| 4) Other reinforcing steel. | N | P | | TA1 | AWS-CWI | |
| 7. Inspection of steel frame joint details for compliance (IBC Sect 1704.3.2) with approved construction documents: | | | | | | |
| a. Details such as bracing and stiffening. | Y | P | IBC 1704.3.2 | SI1 | PE/SE or EIT | |
| b. Member locations. | Y | P | | SI1 | PE/SE or EIT | |
| c. Application of joint details at each connection. | Y | P | | SI1 | PE/SE or EIT | |

## FABRICATION AND IMPLEMENTATION PROCEDURES – STRUCTURAL STEEL

| VERIFICATION AND INSPECTION<br><br>IBC Section 1704.2 | REQD Y/N | EXTENT: CONTINUOUS, PERIODIC, SUBMITTAL, OR NONE | COMMENTS | AGENT | AGENT QUALIFICATION | TASK COMPLETED |
|---|---|---|---|---|---|---|
| 1. Fabrications Procedures: Review of fabricator's written procedural and quality control manuals and periodic auditing of fabrication practices by an approved special inspection agency. At the completion of fabrication, the approved fabricator shall submit a certificate of compliance to the building code official stating that the work was performed in accordance with the approved construction documents.<br>-OR-<br>2. AISC Certification | N<br><br>Y | S | Fabricator shall submit one of the two qualifications | SI1 | PE/SE or EIT | |
| 3. At completion of fabrication, the approved fabricator shall submit a certificate of compliance to the building code official stating that the work was performed in accordance with the approved construction documents. | Y | S | IBC 1704.2.2 | SI1 | PE/SE or EIT | |

# Structural Schedule of Special Inspections
## SEISMIC RESISTANCE - STRUCTURAL

| VERIFICATION AND INSPECTION<br><br>IBC Section 1707 | REQD Y/N | EXTENT: CONTINUOUS, PERIODIC, SUBMITTAL, OR NONE | COMMENTS | AGENT | AGENT QUALIFICATION | TASK COMPLETED |
|---|---|---|---|---|---|---|
| 1. Special inspections for seismic resistance. Special inspection as specified in this section is required for the following: | | | | | | |
| a. The seismic-force-resisting systems in structures assigned to Seismic Design Category C, D, E or F | N | P | IBC 1707.1 | SI1 | PE/SE or EIT | |
| b. Designated seismic systems in structures assigned to Seismic Design Category D, E, or F. | N | P | IBC 1707.1 | SI1 | PE/SE or EIT | |
| 2. Structural steel: Continuous special inspection for structural welding in accordance with AISC 341. | N | C | IBC 1707.2 | TA1 | AWS-CWI | |
| 3. Structural wood: | | | | | | |
| a. Continuous special inspection during field gluing operations of elements of the seismic-force-resisting system. | N | C | IBC 1707.3 | SI1 | PE/SE or EIT | |
| b. Periodic special inspections for nailing, bolting, anchoring and other fastening of components within the seismic-force-resisting system (where spacing is 4”o.c., or less) including drag struts, braces and hold-downs | N | P | IBC 1707.3 | SI1 | PE/SE or EIT | |
| 4. Cold-formed steel framing: Periodic special inspections during welding operations of elements of the seismic-force-resisting system. Periodic special inspections for screw attachment, bolting, anchoring and other fastening of components within the seismic-force-resisting system (where spacing is 4” o.c., or less), including struts, braces, and hold-downs | N | - | CFSF for this project not part of the primary seismic-force resisting system. | - | - | |
| 5. Seismic isolation system. Provide periodic special inspection during the fabrication and installation of isolator units and energy dissipation devices if used as part of the seismic isolation system | N | - | Seismic isolators not used. | - | - | |

## SEISMIC RESISTANCE CHECK LIST [IBC 1705.3]

**Seismic Design Category B**

☐ **FOR SEISMIC DESIGN CATEGORY C OR HIGHER:**

**Structural:**

☐ The seismic-force-resisting systems

- ☐ Steel Braced Frames and associated connections/anchorage (Not required for SDC C, R=3)
- ☐ Steel Moment Frames and associated connections (Not required for SDC C, R=3)
- ☐ Shear walls: ☐ CMU ☐ Wood ☐ Concrete ☐ Diaphragms: ☐ Floor ☐ Roof
- ☐ Other:

## WIND RESISTANCE CHECK LIST [IBC 1705.4]

**Wind Exposure Category C**

| REQUIRED | NOT REQUIRED | NOT APPLICABLE | WIND RESISTANCE REQUIREMENTS |
|---|---|---|---|
| ☐ | ☐ | ☒ | In wind exposure Category B, where the 3-second-gust basic wind speed is 120 miles per hour (mph) (52.8 *m/sec)* or greater. |
| ☐ | ☒ | ☐ | In wind exposure Categories C and D, where the 3-second-gust basic wind speed is 110 mph (49 *m/sec)* or greater. |

# Fabricator's Certificate of Compliance

Each approved fabricator that is exempt from Special Inspection of shop fabrication and implementation procedures per section 1704.2 of the International Building Code must submit a *Fabricator's Certificate of Compliance* at the completion of fabrication.

Project: PORTLAND IMT MAINTENANCE & OPERATIONS CENTER WIN # 021942.02

Fabricator's Name:

Address:

Certification or Approval Agency:

Certification Number:

Date of Last Audit or Approval:

Description of structural members and assemblies that have been fabricated:

I hereby certify that items described above were fabricated in strict accordance with the approved construction documents.

_____ _____
Signature Date

_____
Title

Attach copies of fabricator's certification or building code evaluation service report and fabricator's quality control manual

**End of Structural Statement of Special Inspections**

# SECTION 02 41 14 - SELECTIVE DEMOLITION FOR EARTHWORK

All work and materials shall conform to the Contract Documents and the provisions of the State of Maine Department of Transportation Standard Specifications, Revision November 2014, with the following additions:

Add the following:

PART 1 – GENERAL

1.1 RELATED DOCUMENTS

A. The drawings and general conditions of the Contract, including General and Supplementary Conditions and MaineDOT Division 100, General Conditions, apply to this section.

1.2 SUMMARY

A. Section includes

1. Perform selective demolition for earthwork in accordance with this section.

B. Demolition includes modification, removal, relocation, and disposal of items as shown on Drawings or as specified.

1.3 REFERENCES

A. Reference Standards

1.4 SUBMITTALS

A. Submit in accordance with Division 01 General Requirements.

1. Submit proposed methods and disposal Plans for demolition to Owner and Engineer for review prior to start of Work as specified.

2. Submit schedule indicating proposed sequence of demolition to Owner and Engineer for review prior to start of Work. Include coordination for shutoff, capping, and continuation of utility services as required, together with details for dust and noise control protection.

3. Submit proper documentation that all lead based paint and Asbestos containing materials have been properly disposed of. Submit documentation to Owner and Engineer promptly after demolition of each structure.

B. Closeout and Maintenance Material Submittals: per Division 01 General Requirements.

PART 2 – PRODUCTS (NOT USED)

PART 3 – EXECUTION

3.1 PREPARATION

A. Provide interior and exterior shoring, bracing, or support to prevent movement, settlement, or collapse of structure or element to the demolished and adjacent facilities or Work to remain.

B. Stop demolition operations and notify Engineer immediately if safety of structure appears to be endangered. Take precautions to support structure until determination is made for continuing operations.

C. Locate, identify, stub-off, and disconnect utility services that are not indicated to remain in accordance with Plans.

3.2 JOB CONDITIONS

A. Owner will be continuously occupying areas adjacent to areas of selective demolition. Conduct selective demolition Work in manner that will minimize need for disruption of Owner's normal operations.

B. Contractor shall obtain all required permits for demolition.

C. The Owner assumes no responsibility for actual condition of structures to be demolished.

1. Conditions existing at time of inspection will be maintained by Owner in so far as practicable. However, variations within structure may occur by Owner's removal and salvage operations prior to start of demolition Work.

D. Items must be removed from structure as Work progresses. Salvaged items must be transported from the Site as they are removed.

1. Coordinate with Owner before removing any items. Owner reserves the right to retain demolished items at a designated location on Site. Allow Owner to remove components from demolished items. Items Owner does not retain become property of Contractor and must be removed and disposed of properly.

E. Use of explosives will not be permitted.

F. Conduct demolition operations and removal of debris to ensure no interference with roads, streets, walks, and other adjacent occupied or used facilities. Do not close or obstruct streets, walks or other occupied or used facilities without permission from authorities having jurisdiction. Provide alternate routes around closed or obstructed traffic ways.

G. Provide temporary barricades and other forms of protection to ensure safe passage of personnel around area of demolition. Conduct operations to prevent injury to adjacent buildings, structures, other facilities, and persons.

1. Provide protective measures as required to provide free and safe passage of people.

2. Provide interior and exterior shoring, bracing, or support to prevent movement, settlement, or collapse of structure or element to the demolished and adjacent facilities or Work to remain.

3. Remove protections at completion of Work.

H. Promptly repair damages caused to adjacent structures and utilities by demolition operations at no cost to Owner.

I. Use water sprinkling, temporary enclosures, and other suitable methods to limit dust and dirt rising, and scattering in air to lowest practical level. Comply with governing Regulations, permits, Laws, ordinances, etc. pertaining to environmental protection.

J. Upon completion of demolition of below-grade portions of buildings, notify the Owner and Engineer. Filling and backfilling operations shall not commence until a complete record of the plan and vertical limits of demolition has been documented by the Owner and Engineer.

## 3.3 DEMOLITION

A. Perform selective demolition Work in a systematic manner. Use such methods as required to complete Work indicated on Drawings or as specified in accordance with demolition schedule and applicable Regulations.

B. Provide services for effective air and water pollution controls; water sprinkling, temporary enclosures, and other suitable methods to limit dust and dirt rising and scattering in air to lowest practical level. Comply with governing Regulations, permits, Laws, and ordinances pertaining to environmental protection.

C. Completely fill below grade areas and voids resulting from demolition Work. Provide fill materials as shown on the Drawing or as specified in Section 31 00 00, Earthwork.

D. Saw-cut asphalt and concrete paved surfaces before removal. Joint cut should be neat and straight.

## 3.4 SALAVAGED MATERIALS

A. Where shown on the Drawings or specified as Salvage, Property of Owner, or Deliver to Owner, carefully remove indicated items, clean, store, and turn over to Owner in area designated by Engineer or Owner.

B. Any unanticipated items of significant historic or commercial value discovered in the demolition Work shall remain the property of Owner. Contractor will have the option to take possession of all other demolition materials or to dispose of them suitably. No materials assigned to Contractor may remain on Site without written authorization from Engineer or Owner.

3.5 PIPE CORING

A. Core holes for all pipe protrusions through existing concrete structures to allow watertight installation of pipe and link seal or pipe sleeve as required. Double link seals shall be installed at all pipe protrusions through concrete walls containing liquid or saturated conditions on either side.

3.6 DISPOSAL OF DEMOLISHED MATERIALS

A. Remove from Project Site, debris, rubbish, and other materials resulting from demolition operations. Do not remove from Project Site without prior permission by Owner or Engineer. Store all demolished materials that Owner wishes to retain at location designated by Owner or Engineer.

B. Burning of removed materials from demolished structures will not be permitted on Site.

C. Dispose of demolition debris in a lawful manner.

D. Management of hazardous materials not specifically identified in this Specification shall be extra Work. This provision does not relieve Contractor of his responsibility to respond promptly and appropriately to indications of hazardous material.

E. In the event that unanticipated hazardous materials are discovered or suspected, Contractor shall carry out suitable measures to minimize hazards and immediately report conditions to Engineer.

3.7 CLEAN-UP

A. Contractor shall remove from the Site, all debris resulting from the demolition operations as it accumulates. Upon completion of the Work, all materials, equipment, waste, and debris of every sort shall be removed and premises shall be left, clean, neat, and orderly.

3.8 WATER DISTRICT

A. Contractor shall complete all Work in coordination with the Portland Water District.

3.9 SANITARY AND STORM SEWER

A. Contractor shall complete all Work in accordance with the City of Portland Standards

3.10 GAS/ELECTRICAL/OTHER

A. Contractor shall complete all Work in accordance with the requirements of the appropriate entities, including, but not limited to, the following:

1. Central Maine Power
2. Oxford Networks
3. Fairpoint
4. Unitil Corporation

PART 4 – BASIS OF PAYMENT

4.1 METHOD OF MEASUREMENT:

A. Measurement will be per MaineDOT Standard Specification Section 202.07 with the following paragraphs added:

1. Removing ADA Accessible Curb Ramp shall be measured by the lump sum and shall include all labor, materials, incidentals, equipment and disposal necessary to satisfactory complete the work in accordance with the plans and specifications.
2. Removing Concrete Sidewalk shall be measured by on a unit (square yard) basis and shall include all labor, materials, incidentals, equipment and disposal necessary to satisfactory complete the work in accordance with the plans and specifications.
3. Removing Bituminous Pavement shall be measured by the lump sum and shall include all labor, materials, incidentals, equipment and disposal necessary to satisfactory complete the work in accordance with the plans and specifications.

4. Removing Existing Catch Basin shall be measured by the unit (each) and shall include all labor, materials, incidentals, equipment and disposal necessary to satisfactory complete the work in accordance with the plans and specifications. Backfilling will be incidental to the item.

5. Removing Concrete Barrier shall be measured on a unit (linear foot) basis and shall include all labor, materials, incidentals, equipment and disposal necessary to satisfactory complete the work in accordance with the plans and specifications.

4.2 BASIS OF PAYMENT:

B. Payment will be per MaineDOT Standard Specification Section 202.08 with the following paragraphs added:

1. Removing ADA Accessible Curb Ramp will be paid for at the Contract lump sum price for full removal and disposal of the structure and associated materials.

2. Removing Concrete Sidewalk will be paid for at the Contract lump unit price for full removal and disposal of the concrete sidewalk.

3. Removing Existing Bituminous Pavement will be paid for at the Contract lump unit price for full removal and disposal of the bituminous pavement.

4. Removing Existing Catch Basin will be paid for at the Contract unit price for full removal of the structure and subsequent backfill.

5. Removing Concrete Barrier will be paid for at the Contract unit price for full removal of the concrete barrier.

C. Payment will be made under:

| Pay Item | | Pay Unit |
|---|---|---|
| 202.02 | Removing ADA Accessible Curb Ramp | Lump Sum |
| 202.111 | Removing Concrete Sidewalk | Square Yard |
| 202.127 | Removing Existing Bituminous Pavement | Lump Sum |
| 202.15 | Removing Manhole or Catch Basin | Each |
| 526.75 | Removing Concrete Barrier | Linear Foot |

**END OF SECTION**

# SECTION 03 30 00 – CAST -IN-PLACE CONCRETE

All work and materials shall conform to the Contract Documents and the provisions of the State of Maine Department of Transportation Standard Specifications, Revision November 2014, with the following additions:

Add the following:

PART 1 GENERAL

1.01 RELATED DOCUMENTS

A. The drawings and general conditions of the Contract, including General and Supplementary Conditions and MaineDOT Division 100, General Conditions, apply to 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 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 include the following:

1. The extent of cast-in-place concrete work is shown on drawings and includes (but not by way of limitation) formwork, reinforcing, cast-in-place concrete, accessories, finishing, and casting in of items specified under other Sections of the Specifications or furnished by Owner that are required to be built-in with the concrete.

2. Equipment support pads indicated on mechanical drawings to be installed by the Building Contractor.

3. Cast-in-place retaining walls, exterior slabs on grade and other concrete shown on site drawings.

1.03 RELATED WORK:

A. Polished Concrete Finishing: Section 03 35 43

B. Metal Fabrications: Section 05 50 00

1. Expansion Anchors - Section 05 12 00

2. Embedded Items - Section 05 50 00

C. Anchor Bolts: Section 05 12 00

D. Joint Sealants: Division 7

E. Underslab Vapor Retarders/Wall Waterproofing: Division 7

1.04 QUALITY ASSURANCE:

A. Codes and Standards: Comply with provisions of the latest edition of the following except where more stringent requirements are shown or specified:

1. ACI “Manual of Concrete Practice”.

2. ACI 117 “Standard Specifications for Tolerances for Concrete Construction and Materials”.

3. ACI 211.1 "Standard Practice for Selecting Proportions for Normal, Heavyweight and Mass Concrete."

4. ACI 212.3R "Chemical Admixtures for Concrete."

5. ACI 301 "Specifications for Structural Concrete for Buildings."

6. ACI 302.1R "Guide for Concrete Floor and Slab Construction."

7. ACI 304R "Guide for Measuring, Mixing, Transporting and Placing Concrete."

8. ACI 304.2R "Placing Concrete by Pumping Methods."
9. ACI 306 R "Cold Weather Concreting."
10. ACI 308 “Standard Practice for Curing Concrete."
11. ACI 309R "Guide for Consolidation of Concrete."
12. ACI 315 "ACI Detailing Manual."
13. ACI 318 "Building Code Requirements for Reinforced Concrete."
14. ACI 347R "Guide to Formwork for Concrete."
15. Concrete Reinforcing Steel Institute, "Placing Reinforcing Bars."
16. AISC “Code of Standard Practice for Steel Buildings and Bridges.”
17. “Code of Federal Regulations, Part 1926” per the Occupational Safety and Health Administration (OSHA), Department of Labor (Latest Revision).

B. Materials and installed work may require testing and retesting, as directed by the Architect, at any time during progress of work. Allow free access to material stockpiles and facilities. Tests not specifically indicated to be done at Owner's expense, including retesting of rejected materials and installed work, shall be done at Contractor's expense.

1.05 SUBMITTALS:

A. Unless otherwise specified, submittals required in this section shall be submitted for review. Submittals shall be prepared and submitted in accordance with Division 100.

B. General Contractor shall submit a Submittal Schedule to the engineer within 30 days after they have received the Owner’s Notice to Proceed.

C. All submittals shall be reviewed and returned to the Architect within 10 working days.

D. Incomplete submittals will not be reviewed.

E. Submittals not reviewed by the General Contractor prior to submission to the Engineer will not be reviewed. Include on the submittal statement or stamp of approval by Contractor, representing that the Contractor has seen and examined the submittal and that all requirements listed in this Section and Division 1 have been complied with.

F. Engineer will review submittals a maximum of two review cycles as part of their normal services. If submittals are incomplete or otherwise unacceptable and re-submitted, General Contractor shall compensate Engineer for additional review cycles.

G. Hardcopy Submittals: Submit three prints. Prints will be reviewed by the Engineer, and then the Architect. One marked print will be returned to Contractor for printing and distribution. Multiple copies will not be marked by the Engineer.

H. Electronic Submittals:

1. Contractor shall include in the submittal schedule an indication of submittals that are intended to be submitted electronically. Upon receipt of the submittal schedule, the Engineer reserves the right to indicate submittals that will not be accepted electronically. Paper copies of such submittals shall be furnished as referenced in this specification.
2. The Engineer reserves the right to require paper copies of submittals that are received electronically. Provide Engineer one (1) paper copies in addition to the electronic submittal. Paper copy will be retained and electronic copy will be returned. Review cycle for such submittals shall not commence until such time that the paper copies are received.
3. Electronic Submittals shall be submitted in Protected Document Format (PDF) compatible with Bluebeam version 12 or later. Electronic files shall not be broken into smaller individual files. File sizes too large to process email or within a file transfer protocol (FTP) site shall be provided on a CD.

4. The submission of submittals electronically does not relieve the contractor of their responsibility to review the submittal prior to transmission to the Engineer. Electronic Submittals shall include contractor comments, and a statement and/or stamp of approval by Contractor, representing that the Contractor has seen and examined the submittal and that all requirements listed in this Section and Division 1 have been complied with. Electronic submittals without the Contractor's approval will be rejected and returned.
5. The Engineer assumes no responsibility for the printed reproduction of submittals reviewed electronically, transmission errors or returned electronic submittals that become corrupted or are otherwise not accessible by the Contractor's or Subcontractor's computer hardware and/or software.

I. Product Data: Submit producer's or manufacturer's specifications and installation instructions for the following products. Include laboratory test reports and other data to show compliance with specifications (including specified standards).
1. Reinforcement certified mill reports covering chemical and physical properties and yield strength.
2. Patching products.
3. Non-shrink grout.
4. Curing compounds, where applicable.
5. Admixtures.
6. Expansion/Adhesive Anchors.

J. Shop Drawings:
1. Shop Drawing Preparation: Electronic files of structural drawings will not be provided to the contractor for preparation of shop drawings. Reproduction of any portion of the Construction Documents for use as Shop drawings is prohibited. Shop drawings created from reproduced Construction Documents will be returned without review. Submit shop drawings for fabrication, bending and placement of concrete reinforcement. Comply with ACI 315, showing bar schedules, stirrup and tie spacing, diagrams of bent bars, and arrangement of concrete reinforcement. Include special reinforcement required at openings through concrete elements. Include supplemental reinforcing and bar supports necessary to support reinforcing steel at proper location within forms or slabs.
a. Review of the shop drawings will be made for the size and arrangement of reinforcement. Conformance of the Shop Drawings to the Contract Drawings remains the responsibility of the General Contractor. Engineer's review in no way relieves the General Contractor of this responsibility.
b. Shop drawings will not be reviewed as partial submittals. A complete submittal shall be provided all items listed prior. **Incomplete submittals will not be reviewed.**

K. Mix designs: Submit all laboratory test reports and materials for each mix design listed within. Prepare mixes by the field experience method and/or trial mixtures per the requirements of chapter 5 of ACI 318. Include the calculation of average strength and standard deviation. Proportioning by water cement ratio method will not be permitted.

L. Samples: Submit samples of materials as specified and as otherwise requested by Architect, including names, sources and descriptions.

M. Curing Methods: Submit documentation of curing methods to be used for review. Account for anticipated project temperature ranges and conditions in curing methods.

N. Contraction/Construction Joints: Submit plan indicating proposed location of contraction and construction joints in walls and slabs.

O. Test Reports: Test reports shall be submitted to the Owner, Architect and Engineer within 48 hour after completion of each test.

PART 2 PRODUCTS

2.01 FORM MATERIALS:

A. Forms for Exposed Finish Concrete: Unless otherwise indicated, construct formwork for exposed concrete surfaces with plywood, metal, metal-framed plywood faced or other acceptable panel-type materials, to provide continuous, straight, smooth, exposed surfaces. Furnish in largest practicable sizes to minimize number of joints and to conform to joint system shown on drawings. Provide form material with sufficient thickness to withstand pressure of newly-placed concrete without bow or deflection.

1. Use plywood complying with U.S. Product Standard PS-1 "B-B (Concrete Form) Plywood", Class I, Exterior Grade or better, mill-oiled and edge-sealed, with piece bearing legible inspection trademark.

B. Forms for Unexposed Finish Concrete: Form concrete surfaces which will be unexposed in finished structure with plywood, lumber, metal or other acceptable material. Provide lumber dressed on at least 2 edges and one side for tight fit.

C. Form Coatings: Provide commercial formulation form-coating compounds that will not bond with, stain nor adversely affect concrete surfaces, and will not impair subsequent treatments of concrete surfaces.

2.02 REINFORCING MATERIALS:

A. Reinforcing Bars: ASTM A 615, Grade 60, deformed.

B. Welded Wire Fabric: ASTM A 185, welded steel wire fabric. Provide welded wire fabric in flat sheets.

C. Plate Dowels/Load Plates with Support Baskets: PNA Construction Technologies, Inc.

D. Supports for Reinforcement: Provide supports for reinforcement including bolsters, chairs, spacers, and other devices for spacing, supporting and fastening reinforcing bars and welded wire fabric in place. Use plastic, wire bar type supports or concrete block supports complying with CRSI recommendations, unless otherwise specified. Wood, clay brick and other unspecified devices are not acceptable.

1. For slabs-on-grade, use supports with sand plates or horizontal runners where base material will not support chair legs.

2. For exposed-to-view concrete surfaces, where legs of supports are in contact with forms, provide supports with legs which are plastic protected (CRSI, Class I) or stainless steel protected (CRSI, Class 2).

2.03 CONCRETE MATERIALS:

A. Single-Source Supplier: Ready-mix concrete shall be from one supplier unless specific written approval is received from the Structural Engineer.

B. Portland Cement: ASTM C 150, Type I or Type II, unless otherwise approved Use one brand of cement throughout project, unless otherwise acceptable to Architect.

C. Normal Weight Aggregates: ASTM C 33. Provide from a single source for exposed concrete. Do not use aggregates containing soluble salts or other substances such as iron sulfides, pyrite, marcasite, or ochre which can cause stains on exposed concrete surfaces.

D. Water: Potable.

E. Air-Entraining Admixture: ASTM C 260.

F. High-Range Water-Reducing Admixture (Super Plasticizer): ASTM C 494, Type F or Type G containing not more than 1% chloride ions.

G. Normal range water reducing admixture: ASTM C 494 Type A containing no calcium chloride.

H. Accelerating Admixture: ASTM C 494, Type C or E.

I. Air Detraining Admixture: ASTM C494, Type S, Specific Performance Admixture

J. Blast Furnace Slag: ASTM C989

K. Fly Ash: ASTM C618, Class C or F

L. Calcium Chloride is not permitted.

2.04 RELATED MATERIALS:

A. Underslab Vapor Retarder: Provide vapor retarder over prepared sub base. Refer to architectural drawings, geotechnical report and/or division 7 specifications for additional requirements and vapor retarder location.

B. Non-Shrink Cement-based Grout: Provide grout consisting of pre-measured, prepackaged materials supplied by the manufacturer requiring only the addition of water. Manufacturer's instructions must be printed on the outside of each bag.

1. Non-shrink: No shrinkage (0.0%) and a maximum 4.0% expansion when tested in accordance with ASTM C-827. No shrinkage (0.0%) and a maximum of 0.3% expansion in the hardened state when tested in accordance with CRD-C-621.

2. Compressive strength: A minimum 28 day compressive strength of 5000 psi when tested in accordance with ASTM C-109.

3. Setting time: A minimum initial set time of 60 minutes when tested in accordance with ASTM C-191.

4. Composition: Shall not contain metallic particles or expansive cement.

C. Absorptive Cover: Burlap cloth made from jute or kenaf, weighing approximately 9 oz. per sq. yd., complying with AASHTO M182, Class 2.

D. Moisture-Retaining Cover: One of the following, complying with ANSI/ASTM C 171.

1. Waterproof paper.

2. Polyethylene film.

3. Polyethylene-coated burlap.

E. Liquid Membrane-Forming Curing Compound: Liquid type membrane forming curing compound complying with ASTM C 309, Type I, Class A unless other type acceptable to Architect. Curing compound shall not impair bonding of any material, including floor finishes, to be applied directly to the concrete. Demonstrate the non-impairment prior to use.

F. Preformed Expansion Joint Formers:

1. Bituminous Fiber Type, ASTM D 1751.

2. Felt Void, Poly-Styrene Cap with removable top as manufactured by SUPERIOR.

G. Slab Joint Filler: Multi-component polyurethane sealant (self-leveling type).

2.05 PROPORTIONING AND DESIGN OF MIXES:

A. Prepare design mixes for each type and strength of concrete by either laboratory trial batch or field experience methods as specified in ACI 318. Use material, including all admixtures, proposed for use on the project. If trial batch method used, use an independent testing facility acceptable to Architect for preparing and reporting proposed mix designs. The testing facility shall not be the same as used for field quality control testing unless otherwise acceptable to Architect.

B. Submit written reports to Architect of each proposed mix for each class of concrete. Do not begin concrete production until mixes have been reviewed by Architect.

C. Proportion design mixes to provide concrete with the following properties:

1. Footings and foundation walls

a. Strength: 3,500 psi at 28 days.

b. Aggregate: 3/4"

c. Design Air Dry Density: 145 pcf Normal Weight

d. W/C Ratio: 0.55 maximum

e. Entrained Air: 6% +/- 1.5%

f. Slump: 4" maximum

2. Interior Slab on grade at Garage:

a. Strength: 3,500 psi at 28 days

b. Aggregate: 3/4" minimum, 1 1/2" maximum

c. Design Air Dry Density: 145 pcf Normal Weight

d. W/C Ratio: 0.54 maximum

e. Entrapped Air only (no entrainment), not to exceed 3% at point of discharge

f. Slump: 4” maximum

3. Interior Slabs on grade not at Garage:

a. Strength: 3,000 psi at 28 days

b. Aggregate: 3/4" minimum, 1 1/2" maximum

c. Design Air Dry Density: 145 pcf Normal Weight

d. W/C Ratio: 0.54 maximum

e. Entrapped Air only (no entrainment), not to exceed 3% at point of discharge

f. Slump: 4” maximum

4. Exterior Slabs and all other exposed Site Concrete not specified elsewhere:

a. Strength: 5,000 psi at 28 days

b. Aggregate: 3/4"

c. Design Air Dry Density: 145 pcf Normal Weight

d. W/C Ratio: 0.40 maximum

e. Entrained Air: 6% +/- 1.5%

f. Slump: 4" maximum

5. Add air entraining admixture at manufacturers prescribed rate to result in concrete at point of placement having the above noted air contents.

6. Additional slump may be achieved by the addition of a mid-range or high-range water reducing admixture. Maximum slump after the addition of admixture shall be 6 or 8 inches for mid-range or high range water reducing admixtures, respectively.

D. Adjustment to Concrete Mixes: Mix design adjustments may be requested by Contractor, when characteristics of materials, job conditions, weather, test results, or other circumstances warrant, at no additional cost to Owner and as accepted by Architect. Laboratory test data for revised mix design and strength results must be submitted to and accepted by Structural Engineer before using in work.

1. Water may be added at the project only if the maximum specified slump and design mix maximum water/cement ratio is not exceeded.

2. Additional dosages of superplastisizer should be used when delays occur and required slump has not been maintained. A maximum of two additional dosages will be permitted per ACI 212.3R recommendations.

2.06 CONCRETE MIXING:

A. Job-Site Mixing will not be permitted.

B. Ready-Mix Concrete: Must comply with the requirements of ASTM C 94, and as herein specified. Provide batch ticket for each batch discharged and used in work, indicating project name, mix type, mix time and quantity.

1. During hot weather, or under conditions contributing to rapid setting of concrete, a shorter mixing time than specified in ASTM C94 may be required by Structural Engineer.

2. When the air temperature is between 85 degrees F. and 90 degrees F., reduce the mixing and delivery time from 1 1/2 hours to 75 minutes, and when the air temperature is above 90 degrees F., reduce the mixing and delivery time to 60 minutes.

PART 3 EXECUTION

3.01 FORMS:

A. Design, erect, support, brace and maintain formwork to support vertical and lateral loads that might be applied until such loads can be supported by concrete structure. Construct formwork so concrete members and structures are of correct size, shape, alignment, elevation and position.

B. Design, construct, erect, maintain, and remove forms for cast-in-place concrete work in compliance with ACI 347.

C. Design formwork to be readily removable without impact, shock or damage to cast-in-place concrete surfaces and adjacent materials.

D. Construct forms to sizes, shapes, lines and dimensions shown, and to obtain accurate alignment, location, grades, level and plumb work in finished structures. Provide for openings, offsets, keyways, recesses, moldings, rustications, reglets, chamfers, blocking, screeds, bulkheads, anchorages and inserts, and other features required in work. Use selected materials to obtain required finishes. Solidly butt joints and provide backup at joints to prevent leakage of cement paste.

E. Vertical dovetail slots may be required for masonry tie installation. Coordinate dovetail slot spacing and location with division 4 specifications and Architectural drawings.

F. Fabricate forms for easy removal without hammering or prying against concrete surfaces. Provide crush plates or wrecking plates where stripping may damage cast concrete surfaces. Provide top forms for inclined surfaces where slope is too steep to place concrete with bottom forms only. Kerf wood inserts for forming keyways, dovetail slots, reglets, recesses, and the like to prevent swelling and for easy removal.

G. Provide temporary openings where interior area of formwork is inaccessible for clean out, for inspection before concrete placement and for placement of concrete. Securely brace temporary openings and set tightly to forms to prevent loss of concrete mortar. Locate temporary openings on forms at inconspicuous locations.

H. Chamfer exposed corners and edges as indicated, using wood, metal, PVC or rubber chamfer strips fabricated to produce uniform smooth lines and tight edge joints.

I. Form Ties: Factory-fabricated, adjustable-length, removable or snap-off metal form ties, designed to prevent form deflection, and to prevent spalling concrete surfaces upon removal.

1. Unless otherwise indicated, provide ties for concrete surfaces to be exposed to view in the final condition so portion remaining within concrete after removal is 1" (minimum) inside concrete.

2. Form ties shall not leave holes larger than 1" diameter in concrete surface. Repair holes left by form ties after removal of formwork.

J. Provision for Other Trades: Provide openings in concrete formwork to accommodate work of other trades. Determine size and location of openings, recesses, and chases from trades providing such items. Accurately place and securely support items built into forms.

K. Cleaning and Tightening: Thoroughly clean forms and adjacent surfaces to receive concrete. Remove chips, wood, sawdust, dirt or other debris just before concrete is placed. Retighten forms and bracing after concrete placement as required to eliminate mortar leaks and maintain proper alignment.

3.02 PLACING REINFORCEMENT:

A. Comply with Concrete Reinforcing Steel Institute's recommended practice for "Placing Reinforcing Bars", for details and methods of reinforcement placement and supports, and as herein specified.

1. Subgrade tolerance shall conform to a tolerance of +0/-1 1/2". Base tolerance (fine grading) for slabs shall conform to a tolerance of +0"/-3/4" in. Confirm compliance of above tolerances with surveyed measurements taken at 20 ft. intervals in each direction.

2. Concrete reinforcing and/or welded wire fabric shown on structural drawings is provided for structural purposes only; additional reinforcement may be necessary for reinforcing support, the anchorage of structural embedded items, and the anchorage of non-structural embedded items including but not by limitation radiant tubing. This reinforcing is not shown on the structural drawings as it is part of the contractor's means and methods and shall be included at no cost to the Owner.

3. Clean reinforcement of loose rust and mill scale, earth, ice, and other materials which reduce or destroy bond with concrete.

4. Accurately position, support and secure reinforcement against displacement by formwork, construction, or concrete placement operations. Locate and support reinforcing by metal chairs, runners, bolsters, spacers and hangers, as required.

5. Place reinforcement to obtain specified coverage for concrete protection within tolerances of ACI-318. Arrange, space and securely tie bars and bar supports to hold reinforcement in position during concrete placement operations. Set wire ties so ends are directed into concrete, not toward exposed concrete surfaces.

6. Install diamond dowels at construction joints and load plates at contraction joints in slab-on-grade per manufacturer's recommendations and as indicated on Drawings.

7. Install welded wire fabric in flat sheets in as long lengths as practicable. Lap adjoining pieces at least one full mesh and lace splices with wire. Offset end laps in adjacent widths to prevent continuous laps in either direction.

3.03 JOINTS:

A. Construction Joints: Locate and install construction joints, which are not shown on drawings, so as not to impair strength and appearance of the structure, as acceptable to Architect. Submit plan indicating proposed location of construction joints for review prior to beginning work.

1. Provide keyways at least 1-1/2" deep in construction joints in walls, and slabs; bulkheads reviewed by the Engineer, designed for this purpose may be used for slabs.

2. Roughened surfaces shall be used between walls and footings unless shown otherwise on the drawings. The footing surface shall be roughened to at least an amplitude of 1/4" for the width of the wall before placing the wall concrete.

3. Place construction joints perpendicular to the main reinforcement. Continue reinforcement across construction joints.

4. Joints in slabs on grade shall be located and detailed as indicated on the drawings. If saw-cut joints are required, the early-entry dry-cut process shall be used. Refer to ACI 302, section 8.3.12.

3.04 INSTALLATION OF EMBEDDED ITEMS:

A. General: Set, securely anchor and build into work prior to concrete placement all anchorage devices and all other embedded items, including but not by limitation reinforcement, reinforcing dowels, embedded plates, anchor rods, anchor inserts, sleeves, load transfer plates, diamond dowels and shelf bulk heads required for other work that is attached to, bear upon, or supported by, cast-in-place concrete. Use setting drawings, diagrams, instructions and directions provided by suppliers of items to be attached thereto. Notify other trades to permit installation of their work. Templates to be utilized for setting of anchorage devices shall be constructed in a manner to allow mechanical consolidation of concrete without disturbance. Embedments shall be placed in a timely fashion to permit the inspection of embedments prior to concrete placement. **"Wet Setting" of embedded items into plastic concrete is strictly prohibited.**

B. Edge Forms and Screed Strips for Slabs: Set edge forms or bulkheads and intermediate screed strips for slabs to obtain required elevations and contours in finished slab surface.

C. Provide PVC sleeves where pipes and/or conduit pass through exterior concrete or slabs. Sleeves or penetrations shall not be placed through footings, piers, pedestals, drop caps, columns or pilasters unless specifically noted.

D. Tolerances: Tolerances for Anchor Bolts/Rods, other embedded items and bearing surfaces shall meet the requirement set forth in the latest edition of the American Institute of Steel Construction "Code of Standard Practice for Steel Buildings and Bridges," and ACI 117. The more stringent criteria from these documents shall apply.

3.05 INSTALLATION OF GROUT

A. Place grout for base plates in accordance with manufacturer's recommendations.

B. Grout below setting plates as soon as practicable to facilitate erection of steel and prior to removal of temporary bracing and guys. If leveling bolts or shims are used for erection grout shall be installed prior to addition of any column load.

C. Pack grout solidly between bearing surfaces and bases or plates to ensure that no voids remain. Finish exposed surfaces, protect installed materials and allow to cure. For proprietary grout materials, comply with manufacturer's instructions.

3.06 PREPARATION OF FORM SURFACES:

A. Coat contact surfaces of forms with a form-coating compound before reinforcement is placed.

B. Thin form-coating compounds only with thinning agent of type, and in amount, and under conditions of form-coating material manufacturer's directions. Do not allow excess form coating to accumulate in forms or to come into contact with concrete surfaces against which fresh concrete will be placed. Apply in compliance with manufacturer's instructions.

3.07 CONCRETE PLACEMENT:

A. Preplacement Review: Footing bottoms are subject to review by the Geotechnical Engineer. Reinforcement and all concrete preparation work shall be subject to review by the Structural Engineer. Verify that reinforcing, ducts, anchors, seats, plates and other items cast into concrete are placed and securely held. Notify Engineer/Project Special Inspector 48 hours prior to scheduled placement and obtain approval or waiver of review prior to placement. Be sure that all debris and foreign matter is removed from forms.

B. Concrete shall be placed in the presence of an approved testing agency.

C. General: Comply with ACI 304, and as herein specified.

1. Deposit concrete continuously or in layers of such thickness that no concrete will be placed on concrete which has hardened sufficiently to cause the formation of seams or planes of weakness. If a section cannot be placed continuously, provide construction joints as herein specified. Deposit concrete as nearly as practicable to its final location to avoid segregation due to rehandling or flowing.

2. Concrete shall be handled from the mixer to the place of final deposit as rapidly as practicable by methods which will prevent segregation or loss of ingredients and in a manner which will assure that the required quality of the concrete is maintained.

3. Conveying equipment shall be approved and shall be of a size and design such that detectable setting of concrete shall not occur before adjacent concrete is placed. Conveying equipment shall be cleaned at the end of each operation or work day. Conveying equipment and operations shall conform to the following additional requirements:

a. Belt conveyors shall be horizontal or at a slope which will not cause excessive segregation or loss of ingredients. Concrete shall be protected against undue drying or rise in temperature. An arrangement shall be used at the discharge end to prevent apparent segregation. Mortar shall not be allowed to adhere to the return length of the belt. Long runs shall be discharged into a hopper or through a baffle.

b. Chutes shall be metal or metal-lined and shall have a slope not exceeding 1 vertical to 2 horizontal and not less than 1 vertical to 3 horizontal. Chutes more than 20 feet long, and chutes not meeting the slope requirements may be used provided they discharge into a hopper before distribution.

c. Pumping or pneumatic conveying equipment shall be of suitable kind with adequate pumping capacity. Pneumatic placement shall be controlled so that segregation is not apparent in the discharged concrete.

d. Concrete shall not be conveyed through pipe made of aluminum alloy. Standby equipment shall be provided on the site.

e. Tined rakes are prohibited as a means of conveying fiber reinforced concrete.

4. Do not use reinforcement as bases for runways for concrete conveying equipment or other construction loads.

D. Placing Concrete in Forms: Deposit concrete in forms in horizontal layers not deeper than 18 inches and in a manner to avoid inclined construction joints. Where placement consists of several layers, place each layer while preceding layer is still plastic to avoid cold joints.

1. Consolidate placed concrete by mechanical vibrating equipment. Hand-spading, rodding or tamping as the sole means for the consolidation of concrete will only be permitted with special permission from the Engineer. Use equipment and procedures for consolidation of concrete in accordance with ACI recommended practices.

2. Use vibrators designed to operate with vibratory equipment submerged in concrete, maintaining a speed of not less than 8000 impulses per minute and of sufficient amplitude to consolidate the concrete effectively. Do not use vibrators to transport concrete inside forms. Insert and withdraw vibrators vertically at uniformly spaced locations not farther than visible effectiveness of machine, generally at points 18 inches maximum apart. Place vibrators to rapidly penetrate placed layer and at least 6 inches into the preceding layer. Do not insert vibrators into lower layers of concrete that have begun to set. At each insertion maintain the duration of vibration for the time necessary to consolidate concrete and complete embedment of reinforcement and other embedded items without causing segregation of mix, generally from 5 to 15 seconds. A spare vibrator shall be kept on the job site during all concrete placing operation.

E. Placing Concrete Slabs: Deposit and consolidate concrete slabs in a continuous operation, within limits of construction joints, until the placing of a panel or section is completed.

1. Consolidate concrete using internal vibrators during placing operations so that concrete is thoroughly worked around reinforcement and other embedded items and into corners.

2. Bring slab surfaces to correct level with straightedge and strike off. Use bull floats or darbies to smooth surface, free of humps or hollows. Do not disturb slab surfaces prior to beginning finishing operations. Do not sprinkle water on plastic surface.

3. Maintain reinforcing in proper position during concrete placement operations.

4. Slab thicknesses indicated on the drawings are minimums. Provide sufficient concrete to account for structure deflection, subgrade fluctuations, and to obtain the specified slab elevation at the flatness and levelness indicated here within.

5. Finish: See “Monolithic Slab Finishes” in this specification for slab finish requirements.

F. Cold Weather Placing: Protect concrete work from physical damage or reduced strength which could be caused by frost, freezing actions, or low temperatures, in compliance with ACI 306 and as herein specified.

1. When air temperature has fallen to or is expected to fall below 40 degrees F (4 degrees C), uniformly heat water and aggregates before mixing to obtain a concrete mixture temperature of not less than 50 degrees F (10 degrees C), and not more than 80 degrees F (27degrees 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 and other materials containing antifreeze agents or chemical accelerators.

4. All temporary heat, form insulation, insulated blankets, coverings, hay or other equipment and materials necessary to protect the concrete work from physical damage caused by frost , freezing action, or low temperature shall be provided prior to start of placing operations.

5. When the air temperature has fallen to or is expected to fall below 40 degrees F, provide adequate means to maintain the temperature in the area where concrete is being placed between 50 and 70 degrees F.

G. Hot Weather Placing: When hot weather conditions exist that would seriously impair quality and strength of concrete, place concrete in compliance with ACI 305 and as herein specified.

1. Cool ingredients before mixing to maintain concrete temperature at time of placement below 90 degrees F. Mixing water may be chilled, or chopped ice may be used to control the concrete temperature provided the water equivalent of the ice is calculated to the total amount of mixing water.

2. Cover reinforcing steel with water-soaked burlap if it becomes too hot, so that the steel temperature will not exceed the ambient air temperature immediately before embedment in concrete.

3. Wet forms thoroughly before placing concrete.

4. Do not use retarding admixtures without the written acceptance by the Architect.

3.08 FINISH OF FORMED SURFACES:

A. Rough Form Finish: For formed concrete surfaces not exposed-to-view in the finish work or by other construction, unless otherwise indicated. This concrete surface shall have texture imparted by form facing material, with tie holes and defective areas repaired and patched and fins and other projections exceeding 1/4 in. in height rubbed down or chipped off.

B. Smooth Form Finish: For formed concrete surfaces exposed-to-view, or that are to be covered with a coating material applied directly to concrete, or a covering material applied directly to concrete, such as waterproofing, damp-proofing, painting or other similar system. This as-cast concrete surface shall be obtained with selected form facing material, arranged orderly and symmetrically with a minimum of seams. Repair and patch defective areas with fins or other projections completely removed and smoothed.

C. Grout Cleaned Finish: Provide grout cleaned finish to scheduled concrete surfaces which have received smooth form finish treatment. Combine one part Portland cement to 1-1/2 parts fine sand by volume and mix with water to consistency of thick paint. Proprietary additives may be used at Contractor's option. Blend standard Portland cement and white Portland cement, amounts determined by trial patches, so that final color of dry grout will closely match adjacent surfaces.

1. Thoroughly wet concrete surfaces and apply grout to coat surfaces and fill small holes. Remove excess grout by scraping and rubbing with clean burlap. Keep damp by fog spray for at least 36 hours after rubbing.

D. Related Unformed Surfaces: At tops of walls and grade beams, horizontal offset surfaces occurring adjacent to formed surfaces, strike-off, smooth and finish with a texture matching adjacent unformed surfaces. Continue final surface treatment of formed surfaces uniformly across adjacent unformed surfaces, unless otherwise indicated.

3.09 FLOOR FLATNESS AND LEVELNESS

A. Floor flatness/levelness tolerances: Tolerances for various floor uses shall conform to the requirements set forth in ACI 117 and ACI 302 for “flat” floor profile.

1. Minimum Test Area Flatness/Levelness: $F_F35/F_L25$

2. Minimum Local F Number: $F_F25/F_L15$

B. Levelness criteria shall be applied to slabs-on-grade only.

C. Contractor shall measure floor finish within 72 hours after slab finishing and provide corrective measures for finishes not within tolerance. Corrective procedures shall be reviewed by the Architect prior to implementation.

3.10 MONOLITHIC SLAB FINISHES:

A. Polished Concrete Finishing: See section 03 35 43.

B. Scratch Finish: Apply scratch finish to monolithic slab surfaces that are to receive concrete floor topping or mortar setting beds, and as otherwise indicated.

1. After placing slabs, plane surface to a tolerance not exceeding 1/2 in. in 10 ft. when tested with a 10-ft. straightedge. Slope surfaces uniformly to drains where required. After leveling, roughen surface before final set with stiff brushes, brooms or rakes.

C. Float Finish: Apply float finish to monolithic slab surfaces to receive trowel finish and other finishes as hereinafter specified, and slab surfaces which are to be covered with membrane or elastic waterproofing, and as otherwise indicated.

D. Trowel Finish: Apply trowel finish to monolithic slab surfaces indicated, including slab surfaces to be covered with carpet, resilient flooring, paint or other thin-film finish coating system.

E. Non-Slip Broom Finish: Apply non-slip broom finish to exterior concrete platforms, steps and ramps, and elsewhere as indicated.

F. Slab finishes for floor coverings not indicated or exposed to view in the final condition shall be coordinated with the Architect prior to slab placement.

G. Slab Joints: Where indicated, sawn slab contraction joints shall be “soft cut”, immediately after concrete surface is firm enough not to be torn or damaged by the blade.

3.11 CONCRETE CURING AND PROTECTION:

A. General: Protect freshly placed concrete from premature drying and excessive cold or hot temperatures. Protect concrete work from physical damage or reduced strength which could be caused by frost, freezing actions, or low temperatures, in compliance with the requirements of ACI 308 as herein specified.

B. Curing Methods: Perform curing of concrete by moist curing, by moisture-retaining cover curing, by curing compound, and by combinations thereof, as herein specified unless noted otherwise. Curing shall commence as soon as concrete surfaces are sufficiently hard as to withstand surface damage.

C. Curing of Slabs-on Grade:

1. Slabs-on-grade shall be cured by wet curing methods unless otherwise noted.

2. Slabs-on-grade to receive floor coverings with moisture sensitive adhesives shall be cured by means of a moisture retaining covering. Coordinate curing with flooring adhesive manufacturer and flooring installer. Submit curing methods to Architect for review and approval.

3. Slab-on Grade with Barrier 1 Admixture shall be cured by means of a moisture retaining covering in accordance with recommendations of Barrier 1 Admixture Manufacturer.

D. Curing Formed Surfaces: Cure formed concrete surfaces, including undersides of beams, supported slabs and other similar surfaces by moist curing with forms in place for full curing period or until forms are removed. If forms are removed, continue curing by methods specified above, as applicable.

E. Protection From Mechanical Injury: During the curing period and duration of construction, the concrete shall be protected from damaging mechanical disturbances, such as load stresses, heavy shock, and excessive vibration. All finished concrete surfaces shall be protected from damage by construction equipment, materials, or methods, by application of curing procedures, and by rain or running water. Self-supporting structures shall not be loaded in such a way as to overstress the concrete.

3.12 REMOVAL OF FORMS:

A. Formwork not supporting weight of concrete, such as sides of beams, walls, columns, and similar parts of the work, may be removed after cumulatively curing at not less than 50 degrees F for 24 hours after placing concrete, provided concrete is sufficiently hard to not be damaged by form removal operations, and provided curing and protection operations are maintained.

B. Formwork supporting weight of concrete, such as joints, slabs and other structural elements, may not be removed in fewer than 14 days or until concrete has attained design minimum compressive strength at 28 days. Determine potential compressive strength of in-place concrete by testing field-cured specimens representative of concrete location or members.

C. Form facing material may be removed 4 days after placement only if shores and other vertical supports have been arranged to permit removal of form facing material without loosening or disturbing shores and support.

3.13 REUSE OF FORMS:

A. Clean and repair surfaces of forms to be reused in work. Split, frayed, delaminated or otherwise damaged form facing material will not be acceptable for exposed surfaces. Apply new form coating compound as specified for new formwork.

B. When forms are extended for successive concrete placement, thoroughly clean surfaces, remove fins and latency, and tighten forms to close joints. Align and secure joint to avoid offsets. Do not use "patched" forms for exposed concrete surfaces, except as acceptable to Architect.

3.14 MISCELLANEOUS CONCRETE ITEMS:

A. Fill in holes and openings left in concrete structures for passage of work by other trades, unless otherwise shown or directed, after work of other trades is in place. Mix, place, and cure concrete as herein specified, to blend with in-place construction. Provide other miscellaneous concrete filling shown or required to complete work.

3.15 CONCRETE SURFACE REPAIRS:

A. Patching Defective Areas: Repair and patch defective areas with cement mortar immediately after removal of forms, when acceptable to the Architect.

1. Cut out honeycomb, rock pockets, voids over 1/4 inch in any dimension, and holes left by tie rods and bolts, down to solid concrete but in no case to a depth of less than 1 inch. Make edges of cuts perpendicular to the concrete surface. Thoroughly clean, dampen with water, and brush coat the area to be patched with approved bonding agent. Place patching mortar after bonding compound has dried.

2. For exposed-to-view surfaces, blend white Portland cement and standard Portland cement so that, when dry, patching mortar will match color surrounding. Provide test areas at inconspicuous location to verify mixture and color match before proceeding with patching. Compact mortar in place and strike-off slightly higher than surrounding surface.

B. Repair of Formed Surfaces: Remove and replace concrete having defective surfaces if defects cannot be repaired to satisfaction of Architect. Surface defects, as such, include color and texture irregularities, form tie holes, cracks, spalls, air bubbles, honeycomb, rock pockets, fins, and other projections on surface and stains and other discolorations that cannot be removed by cleaning.

3.16 QUALITY CONTROL TESTING DURING CONSTRUCTION:

A. Testing Agency/Project Special Inspector shall verify reinforcement, including foundation reinforcement and slab reinforcement (WWF or reinforcing bar). Agent shall verify WWF or reinforcement has been chair/placed with proper clearances.

B. The Owner shall employ a Testing Laboratory to inspect, sample and test the materials and the production of concrete and to submit test reports. Concrete testing shall be performed by technicians certified by the Maine Concrete Technician Certification Board and/or ACI Concrete Field Testing Technician Grade I.

C. Concrete shall be sampled and tested for quality control during placement. Quality control testing shall include the following, unless otherwise directed by the Architect.

D. See Submittals section for report requirements.

E. Sampling Fresh Concrete: ASTM C 172.

1. Slump: ASTM C143; One test for each set of compressive strength test specimens. Sample shall be taken from middle third of the load per ASTM C172. A slump test must be run prior to the incorporation of the CFP fibers per recommendations of ACI 544. A slump test must be run prior to and following the addition of a water reducer (superplasticizer) per recommendations of ACI 301.
2. Air Content: ASTM C231 "Pressure method for normal weight concrete." One test for each set of compressive strength specimens measured at point of discharge.
3. Concrete Temperature: Per ASTM C-1064; One test each time a set of compression test specimens are made.
4. Compression Test Specimen: ASTM C31; one set of 5 standard cylinders for each compressive strength test, unless otherwise directed. Mold and store cylinders for laboratory cured test specimens except when field-cure test specimens are required.
    a. An insulated Cure Box for specimen curing shall be supplied by Testing Agency for initial curing as defined in ACI C31.
    b. Means of heating or cooling the Cure Box shall be provided by the Inspection Agency if required in order to maintain a temperature between 60 and 80 degrees F. Contractor shall provide an electrical source to the Testing Agency when required for temperature control.
    c. A maximum-minimum thermometer shall be provided in the Cure Box by the Testing Agency to record the temperature range of the Cure Box during specimen curing. The Testing Agency shall record the maximum/minimum temperature of the Cure Box when transferring the specimens to the laboratory.
    d. Test Specimens shall be moist cured.
    e. Refer to ASTM C31 for additional requirements for Test Specimens.
5. Compressive Strength Tests: ASTM C39; one set for each 50 cu. yds. or fraction thereof, of each concrete class placed in any one day or for each 4,000 sq. ft. of surface area placed; 1 specimen tested at 7 days, 3 specimens tested at 28 days, 1 specimen retained in reserve for later testing if required.
6. Pumped concrete shall be tested at point of discharge per ACI 301.

F. Additional Tests: The testing service will make additional tests of in-place concrete when test results indicate specified concrete strengths and other characteristics have not been attained in the structure, as directed by the Architect. Testing service may conduct tests to determine adequacy of concrete by cored cylinders complying with ASTM C42, or by other methods, as directed. Contractor shall pay for such tests conducted, and any other additional testing as may be required, when unacceptable concrete is verified.

PART 4 BASIS OF PAYMENT:

4.01 METHOD OF MEASUREMENT:

A. Cast-in-place concrete will be measured by the lump sum, complete and accepted. The cast-in-place concrete limits shall be as shown or described in the Contract Documents.

4.02 BASIS OF PAYMENT:

A. Cast-in-place concrete will be paid for at the contract lump sum price. Payment for cast-in-place concrete will be under:

| Pay Item | | Pay Unit |
|---|---|---|
| DIV. 3 | Concrete | Lump Sum |

**END OF SECTION**

# SECTION 03 35 43 – POLISHED CONCRETE FINISHING

All work and materials shall conform to the Contract Documents and the provisions of the State of Maine Department of Transportation Standard Specifications, Revision November 2014, with the following additions:

Add the following:

PART 1 - GENERAL

1.01 RELATED DOCUMENTS:

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

1.02 SUMMARY:

A. Section Includes:
1. Polished Concrete: Includes diamond grinding, honing and polishing with use of silicate sealer, hardener, and densifier floor finish, scavenger for unreacted silicate removal and non-film forming stain protection.

B. Related Sections: Division 03 Section "Cast In Place Concrete"

1.03 REFERENCE STANDARDS:

A. ASTM C642-06 Standard Test Method for Density, Absorption, and Voids in Hardened Concrete.

B. ASTM D5178-98/08 Standard Test Method for Mar Resistance of Organic Coatings

C. ASTM D2486-06 Standard Test Methods for Scrub Resistance of Wall Paints

D. ASTM D4060-07 Standard Test Method for Abrasion Resistance of Organic Coatings by the Taber Abrasion: Modified.

E. ASTM G154-06 Standard Practice for Operating Fluorescent Light Apparatus for UV Exposure of Nonmetallic Materials.

F. ASTM D4541-09 Standard Test Method for Pull-Off Strength of Coatings Using Portable Adhesion Testers.

G. ASTM D236- 07 Standard Test Method for Volatile Content of Coatings

H. ASTM D2047-04 Standard Test Method for Static Coefficient of Friction of Polish-Coated Flooring Surfaces as Measured by the James Machine.

I. Reflectivity according to use of Horiba IG-320 Gloss Checker.

J. ASTM C1378-04 (2009) Standard Test Method for Determination of Resistance to Staining

1.04 ADMINISTRATIVE REQUIREMENTS:

A. Schedule and hold a pre-installation meeting prior to project start.
1. To attend: Architect, Owners Representative, General Contractor, Concrete Contractor Vexcon Representative, and Certi-Shine Installer.

B. Complete and submit manufacturer's project form work.
   1. Vexcon "Project Conference and Job Survey".

C. Schedule installation and review date for mock-up.

1.05 SUBMITTALS:

A. Comply with section 01 33 00 Submittal Procedures

B. Comply with section 01 31 00 Project Management and Coordination

C. Product Data: Provide data on all products, including information on compatibility of different products and limitations

D. Indicate installation procedures and interface required with adjacent construction

E. Provide Manufacturers Maintenance Instructions

F. Provide Installer certification and job experience

G. Test Data: Provide test reports and warranty

1.06 INFORMATIONAL SUBMITTALS:

A. Quality Assurance
   1. Certificates
      a. Product certificates signed by the manufacturer certifying materials comply with specified performance characteristics and criteria and physical requirements.
      b. Current contractor's certificate signed by the manufacturer declaring contractor as a certified and approved installer of the polishing system.

B. Qualifications:
   1. Installer certified by Vexcon Chemicals and experienced in performing work of this section that has specialized in installation of work similar to that required for this project.

   2. Installer trained and holding current certification for Certi-Shine Clear, Certi-Shine Clear FSR or Certi-Shine Micro-Stain FSR installation.

C. Pre-installation Meetings: Conduct a pre-installation meeting to verify project requirements, manufacturer's installation instructions and manufacturer's warranty requirements.
   1. Environmental requirements.
   2. Curing of the concrete- method and period of time.
   3. Scheduling and phasing of work.
      a. Large enough areas with no other trades
   4. Coordinating with other work and personnel.
   5. Protection of adjacent surfaces.
   6. Surface preparation.
   7. Repair of defects and defective work prior to installation.
   8. Cleaning.
   9. Application of liquid hardener, densifier.
   10. Importance of un-reacted silicate rinse.
   11. Installation of polished non-film forming floor finishes
   12. Protection of finished surfaces after installation.

1.07 MOCK UP: Approved site mock-ups for all architectural concrete shall set the standard for the various architectural concrete features: flatness, levelness, formed finishes, and colors of the concrete. The materials and

practices used to produce the mock-up panel, including placement, curing and surface treatment applications shall be the same as the project installation.

A. Installation: Provide an 10' x 10' test area of polished floor as specified in Section 3.03

B. Mock-up Size: [100 ft2 (9.3 m2)] sample panel at jobsite at location as directed under conditions similar to those which will exist during actual placement.

C. Mock-up will be used to evaluate concrete substrate preparation, material application, color selection, and shine.

D. When approved by the Architect, Mock-up will demonstrate minimum standard of quality required for proceeding with this work.

E. Approved Mock-up shall remain for comparison and quality control as part of the finished work.

1.08 DELIVERY, STORAGE, AND HANDLING:

A. Store material in dry, enclosed area protected from exposure to moisture & temperatures below 50° F.

B. Keep containers closed and upright to prevent leakage.

C. Dispense special concrete finish material from factory numbered and sealed containers.

D. Maintain record of lot numbers.

1.09 PROJECT CONDITIONS:

A. Protect concrete slabs from staining prior to application of concrete finish system.

B. Diaper hydraulic powered equipment.

C. Inspect lift tires daily for screws and nails- remove.

D. Place drop cloths under parked vehicles and all mechanical equipment.

E. Do not store structural steel or metal fabrications on slab.

F. Do not allow pipe-cutting machine on slab.

G. Sweep and Clean up spills daily

1.10 WARRANTY:

A. Certi-Shine Clear: Provide 20 year manufacturer's material warranty commencing at date of building substantial completion. Manufacturer shall warrant to the owner that polished surface will remain water repellent, dustproof, hardened and abrasion resistant.

PART 2 - PRODUCTS

2.01 MANUFACTURERS:

A. Basis of Design: Subject to compliance with requirements provide Vexcon Chemicals system: Certi-Shine Clear FSR
   1. Vexcon Chemicals, Inc.
      a. Contact: Jennifer Faller , Certi-Shine Brand Manager
         1-888-VEXCON-1; jfaller@vexcon.com;
         Fax 215-332-9997;
         7240 State Rd Phila., PA 19135; www.vexcon.com
      b. Local certified Certi-Shine installer

B. Available Products: Subject to compliance with performance requirements, products that may be incorporated into the work must have 5 years of recognized polishing use on jobs of similar magnitude and be single source manufactured.

2.02 SYSTEM DESCRIPTION:

A. Polished Concrete: Includes Diamond Grinding, Honing and Polishing with use of silicate sealer, hardener, and densifier floor finish, scavenger for unreacted silicate removal and non-film forming stain protection.

B. Performance Data
1. ASTM C642 Absorbability: Reduction of 75% of Control
2. ASTM D5178 Balance Beam Mar Tester: Greater than 50% harder
3. ASTM D2486 Abrasive Scrub: 1200 Cycles
4. ASTM D4060 Modified Taber Abrasion 600 Rev: 0.37% treated vs. 0.68% untreated
5. ASTM G154: 5000 HR QUV: No fade, change or erosion
6. ASTM D4541 Bonding: Greater than 50 psi
7. ASTM D2369 Solids: 18% Min.
8. ASTM D2047 Coefficient of Friction Determinations by Case Consulting Laboratories:
a. Certi-Shine Clear - average - 0.54
b. Certi-Shine Finish Coat Ultra - average - 0.63
9. Reflectivity: Change in gloss to 30, 60 or 80 depending on Certi-Shine system, as measured using a gloss meter in accordance with Horiba IG-320 Gloss Checker.
10. ASTM C1378 Stain resistance: Food, Chemical, Oil and common stain resistance. See manufacturer's literature for list.

2.03 PRODUCTS/SYSTEMS:

A. Hardener, Penetrating Sealer, Densifier: Proprietary, water based, odorless liquid, VOC compliant, environmentally safe chemical hardening solution leaving no surface film.
1. Acceptable Material: Vexcon Chemicals, Inc., Certi-Shine Clear.

B. Unreacted Silicate Rinse: Liquid rinse solution, increases stain resistance.
1. Acceptable Material: Vexcon Chemicals, Inc., Certi-Shine Fixative.

C. Stain Repellent (non-film forming): Ready to use, food (oil and acid), hydraulic fluid and motor oil stain and water repellent, Silane and Silane polymer blend available in 3 formulations
1. Acceptable Material: Vexcon Chemicals, Inc., Certi-Shine Finish Coat Ultra
a. Note: Product choice will depend on VOC regulations or preference
1) Certi-Shine Finish Ultra Coat Water Base
2) Certi-Shine Finish Coat Ultra AIM
3) Certi-Shine Finish Coat Ultra

D. Silicate floor repair material: Liquid silicate material Silicate floor repair material: Liquid silicate material which fills and repairs concrete surface imperfections (optional).
1. Acceptable Material: Vexcon Chemicals Inc., Certi-Shine Fusion.

E. Cleaning Solution: Eco-friendly degreaser and cleaner, concentrate pH must be slightly alkaline.
1. Acceptable Material: Vexcon Chemicals, Inc., StarSeal EF Degreaser and Cleaner.

F. Finish Gloss Level Standard: Satin shine (Silver), equivalent to 60° film gloss of 30 when viewed at an angle

PART 3 - EXECUTION

3.01 EXAMINATION:

A. Curing Methods: (refer back to section 03 30 00).
1. Disposable Blankets/Impervious Sheet Cure (preferred method) Wet exposed surfaces of concrete after completing finishing and then apply pre-wetted sheets with edges lapped 6 inches minimum and sealed & secured in such a manner as to prevent moisture from escaping from concrete laps or edges.
a. UltraCure by McTech Group www.mctechgroup.com 1.866.913.8363
b. Conkure Blankets by Raven Industries website: ravenefd.com 800.635-345

2. Water base resin cure: Apply liquid curing compounds by spraying or rolling uniformly in a single coat on surfaces immediately following final finishing.

a. Vexcon Chemicals Inc., Enviocure 100 Contact: Jennifer Faller 1.888.839.2661

B. Protection of the Architectural Concrete: Immediately after placement, protect concrete from premature drying, excessively hot or cold temperatures and possible damage.
1. Protect wet cured or impervious sheet cured surfaces as follows
a. Barricade concrete surfaces immediately after finishing
b. Do not allow light traffic, except for curing purposes, on concrete surfaces until concrete has obtained 1800 psi (approx 3 days).
c. Do not allow heavy traffic on concrete surface until concrete has obtained, by test, its design strength as noted on drawings but no sooner than 9 days after placement.
d. Permit concrete to dry minimum of 2 additional days after curing is completed before removing barricades.

C. Site Verification of Concrete Conditions
1. Installer and manufacturer's representative will examine surfaces receiving concrete finish and polishing system.
a. Verify that surfaces conform to product manufacturer's requirements for substrate conditions.
b. Verify floor is free of curing membrane, bond-breaker, concrete laitance, and will absorb water per water absorbency test.

D. Concrete slab performance requirements
1. Verify that all the concrete complies with finishing requirements as specified in Cast In Place Section 03 30 00.

3.02 ARCHITECTURAL CONCRETE PREPARATION FOR POLISHING:

A. Complete surface preparation per manufacturers written instructions.

B. Sweep floor area, blow out corners and column footings.

C. Remove all other construction materials.

D. Initial grind should clean the concrete surface, removing all coatings, dirt, oil and laitance.

E. If grinding does not remove oil spots, treat oil spots with emulsifier and oil absorber materials. Detail scrub with high pH detergent.
1. Vexcon product: StarSeal EF Stripper

F. Double scrub floor with automatic scrubber capable minimum of 80 to 120 pounds of head pressure, equipped with black stripping pads. Use proper dilution of high pH detergent. Scrub floor once without squeegee or vacuum. On second pass, remove water solution.

G. Using automatic scrubber rinse surface removing all traces of soap residue.

H. Inspect the concrete surface.

I. Complete surface preparation per manufacturers written instructions.

J. Perform water absorbency test.
1. Repeat any steps as necessary to prepare for polishing.
a. If water repels contact Vexcon directly

3.03 CONCRETE FINISH APPLICATION AND POLISHING:

A. Immediately following cleaning operation, grind, hone and install concrete polishing material(s) per manufacturer's installation instructions (OP 200AVexcon) polish until desired gloss is achieved.

B. Perform grinding, honing and polishing operations to the specified polish level.
1. Polishing Levels for Certi-Shine products
a. Silver - Satin shine - Equivalent to 60° film gloss of 30 when viewed on an angle.

C. Grind concrete and reveal the specified appearance.

1. Appearance in accordance with the approved Mock-up.
   a. Sand finish- the concrete will show sand on 80%+ of the surface, less than 20% small aggregate.

3.04 PROTECTION:

A. Protect finished surfaces from damage and soiling and other construction activities.

B. Without damaging completed work, provide protective cover.
   1. EZCover by McTech Group www.mctechgroup.com 1.866.913.8363
   2. Ram Board by Ram Board www.ramboard.com 818.848-0400

3.05 MAINTENANCE:

A. Spills: When they occur, clean with neutral or preferably an alkaline cleaner, like StarSeal EF Degreaser & Cleaner making sure to scrub and rinse with clean water.

B. General Cleaning: Use a walk behind scrubber equipped with medium to soft nylon brushes. Clean on a daily basis with neutral or preferably an alkaline cleaner, like StarSeal EF Degreaser & Cleaner making sure to scrub and rinse with clean water.

C. Maintenance Cleaning: Perform when a more thorough cleaning is desired. This should be based on based on individual traffic areas or departments and the overall cleanliness of the facility.

PART 4 - MEASUREMENT AND PAYMENT:

4.01 METHOD OF MEASUREMENT:

Polished Concrete Finishing will be measured by the lump sum, complete and accepted. The Polished Concrete Finishing limits shall be as shown or described in the Contract Documents.

4.02 BASIS OF PAYMENT:

Polished Concrete Finishing will be paid for at the contract lump sum price. Payment for Polished Concrete Finishing will be under:

| Pay Item | | Pay Unit |
|---|---|---|
| DIV. 3 | Concrete | Lump Sum |

**END OF SECTION**

# SECTION 04 20 00 - UNIT MASONRY

All work and materials shall conform to the Contract Documents and the provisions of the State of Maine Department of Transportation Standard Specifications, Revision November 2014, with the following additions:

Add the following:

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 unit masonry assemblies consisting of the following:
   1. Concrete masonry units (CMUs).
   2. Mortar and grout.
   3. Reinforcing steel.
   4. Masonry joint reinforcement.
   5. Ties and anchors.
   6. Miscellaneous masonry accessories.

B. Related Sections include the following:
   1. Division 07 Section "Bituminous Dampproofing" for dampproofing applied to cavity face of backup wythes of cavity walls.
   2. Division 07 Section "Penetration Firestopping" for firestopping at openings in masonry walls.
   3. Division 07 Section "Joint Sealants" for sealing control and expansion joints in unit masonry.

C. Products installed, but not furnished, under this Section include the following:
   1. Architectural precast concrete units, furnished under Division 03 Section "Precast Architectural Concrete."
   2. Hollow-metal frames in unit masonry openings, furnished under Division 08 Section "Hollow Metal Doors and Frames."
   3. Hollow-metal frames in unit masonry openings, furnished under Division 14 Section "Hydraulic Elevators."

1.3 DEFINITIONS

A. CMU(s): Concrete masonry unit(s).

B. Reinforced Masonry: Masonry containing reinforcing steel in grouted cells.

1.4 SUBMITTALS

A. Product Data: For each type of product indicated.

B. Shop Drawings: For the following:
   1. Reinforcing Steel: Detail bending and placement of unit masonry reinforcing bars. Comply with ACI 315, "Details and Detailing of Concrete Reinforcement." Show elevations of reinforced walls.

C. Samples for Selection: For the following:
   1. Face brick, in the form of straps of five or more bricks.
   2. Pigmented mortar. Make Samples using same sand and mortar ingredients to be used on Project**.** Label Samples to indicate types and amounts of pigments used.

D. List of Materials Used in Constructing Mockups: List generic product names together with manufacturers, manufacturers' product names, model numbers, lot numbers, batch numbers, source of supply, and other information as required to identify materials used. Include mix proportions for mortar and grout and source of aggregates.

1. Submittal is for information only. Neither receipt of list nor approval of mockup constitutes approval of deviations from the Contract Documents unless such deviations are specifically brought to the attention of Architect and approved in writing.

E. Material Certificates: Include statements of material properties indicating compliance with requirements including compliance with standards and type designations within standards. Provide for each type and size of the following:
1. Masonry units.
   a. Include material test reports substantiating compliance with requirements.
   b. For bricks, include size-variation data verifying that actual range of sizes falls within specified tolerances.
   c. For exposed brick, include material test report for efflorescence according to ASTM C 67.
   d. For masonry units used in structural masonry, include data and calculations establishing average net-area compressive strength of units.
2. Cementitious materials. Include brand, type, and name of manufacturer.
3. Preblended, dry mortar mixes. Include description of type and proportions of ingredients.
4. Grout mixes. Include description of type and proportions of ingredients.
5. Reinforcing bars.
6. Joint reinforcement.
7. Anchors, ties, and metal accessories.

F. Cold-Weather and Hot-Weather Procedures: Detailed description of methods, materials, and equipment to be used to comply with requirements.

## 1.5 QUALITY ASSURANCE

A. Installer Qualifications: Company specializing in performing the work of this Section with minimum 5 years experience.

B. Testing Agency Qualifications: An independent agency qualified according to ASTM C 1093 for testing indicated, as documented according to ASTM E 548.

C. Source Limitations for Masonry Units: Obtain exposed masonry units of a uniform texture and color, or a uniform blend within the ranges accepted for these characteristics, through one source from a single manufacturer for each product required.

D. Source Limitations for Mortar Materials: Obtain mortar ingredients of a uniform quality, including color for exposed masonry, from a single manufacturer for each cementitious component and from one source or producer for each aggregate.

E. Fire-Resistance Ratings: Where indicated, provide materials and construction identical to those of assemblies with fire-resistance ratings determined per ASTM E 119 by a testing and inspecting agency, by equivalent concrete masonry thickness, or by other means, as acceptable to authorities having jurisdiction.

F. Preinstallation Conferences: Conduct conference at Project site to comply with requirements in Division 01 Section "Project Management and Coordination."
1. At least 7 days prior to starting CMU masonry, conduct a meeting to review detailed requirements for mortar and grout mixes and to determine procedures for satisfactory construction and curing operations. Review requirements of submittals, status of coordinating work, and availability of materials. Review requirements tenting and heating. Establish preliminary work progress schedule and procedures for materials inspection, testing, and certifications. Require representatives of each entity directly concerned with masonry construction to attend, including the following:
   a. Contractor's superintendent.
   b. Masonry foreman.
   c. Architect.

2. At least 7 days prior to starting veneer masonry, conduct a meeting to review detailed requirements for mortar mixes and to determine procedures for satisfactory construction operations. Review requirements of submittals, status of coordinating work, and availability of materials. Review requirements tenting and heating. Establish preliminary work progress schedule and procedures for materials inspection, testing, and certifications. Require representatives of each entity directly concerned with masonry construction to attend, including the following:
   a. Contractor's superintendent.
   b. Masonry foreman.
   c. Architect.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Store masonry units on elevated platforms in a dry location. If units are not stored in an enclosed location, cover tops and sides of stacks with waterproof sheeting, securely tied. If units become wet, do not install until they are dry.

B. Store cementitious materials on elevated platforms, under cover, and in a dry location. Do not use cementitious materials that have become damp.

C. Store aggregates where grading and other required characteristics can be maintained and contamination avoided.

D. Deliver preblended, dry mortar mix in moisture-resistant containers designed for lifting and emptying into dispensing silo. Store preblended, dry mortar mix in delivery containers on elevated platforms, under cover, and in a dry location or in a metal dispensing silo with weatherproof cover.

E. Store masonry accessories, including metal items, to prevent corrosion and accumulation of dirt and oil.

1.7 PROJECT CONDITIONS

A. Protection of Masonry: During construction, cover tops of walls, projections, and sills with waterproof sheeting at end of each day's work. Cover partially completed masonry when construction is not in progress.
   1. Extend cover a minimum of 24 inches down both sides and hold cover securely in place.
   2. Where 1 wythe of multiwythe masonry walls is completed in advance of other wythes, secure cover a minimum of 24 inches down face next to unconstructed wythe and hold cover in place.

B. Do not apply uniform floor or roof loads for at least 12 hours and concentrated loads for at least 3 days after building masonry walls or columns.

C. Stain Prevention: Prevent grout, mortar, and soil from staining the face of masonry to be left exposed or painted. Immediately remove grout, mortar, and soil that come in contact with such masonry.
   1. Protect base of walls from rain-splashed mud and from mortar splatter by spreading coverings on ground and over wall surface.
   2. Protect sills, ledges, and projections from mortar droppings.
   3. Protect surfaces of window and door frames, as well as similar products with painted and integral finishes, from mortar droppings.
   4. Turn scaffold boards near the wall on edge at the end of each day to prevent rain from splashing mortar and dirt onto completed masonry.

D. Cold-Weather Requirements: Do not use frozen materials or materials mixed or coated with ice or frost. Do not build on frozen substrates or setting beds. Remove and replace unit masonry damaged by frost or by freezing conditions. Comply with the following requirements:

   1. Cold-Weather Construction: When the anticipated daytime low temperature is within the limits indicated, use the following procedures:
      a. 40 to 32 deg F (4 to 0 deg C): Heat mixing water or sand to produce mortar temperatures between 40 and 120 deg F (4 and 49 deg C).
      b. 32 to 25 deg F (0 to -4 deg C): Heat mixing water and sand to produce mortar temperatures between 40 and 120 deg F (4 and 49 deg C). Heat grout materials to produce grout temperatures between 40 and 120 deg F (4 and 49 deg C). Heat masonry units to 40 deg F (4 deg C). Maintain mortar and grout above freezing until used in masonry. Use heat on both sides of walls under construction.

c. 25 to 20 deg F (-4 to -7 deg C): Heat mixing water and sand to produce mortar temperatures between 40 and 120 deg F (4 and 49 deg C). Heat grout materials to produce grout temperatures between 40 and 120 deg F (4 and 49 deg C). Maintain mortar and grout above freezing until used in masonry. Heat masonry units to 40 deg F (4 deg C).

d. 20 deg F (-7 deg C) and Below: Heat mixing water and sand to produce mortar temperatures between 40 and 120 deg F (4 and 49 deg C). Heat grout materials to produce grout temperatures between 40 and 120 deg F (4 and 49 deg C). Maintain mortar and grout above freezing until used in masonry. Heat masonry units to 40 deg F (4 deg C).

2. Cold-Weather Protection: When the anticipated daytime low temperature is within the limits indicated, coordinate with the General Contractor to provide the following protection. This is in addition to construction procedures specified above:
   a. 40 to 32 deg F (4 to 0 deg C): Cover masonry with insulating blankets for 48 hours after construction.
   b. 32 deg F (0 deg C) and Below: Provide enclosure and heat to maintain temperatures above 32 deg F (0 deg C) within the enclosure for 72 hours after construction.

3. Cold-Weather Cleaning: Use liquid cleaning methods only when air temperature is 40 deg F (4 deg C) and above and will remain so until masonry has dried out, but not less than 7 days after completion of cleaning.

E. Hot-Weather Requirements: Coordinate with the General Contractor to protect unit masonry work when temperature and humidity conditions produce excessive evaporation of water from mortar and grout. Provide artificial shade and wind breaks and use cooled materials as required.
   1. When ambient temperature exceeds 100 deg F, or 90 deg F with a wind velocity greater than 8 mph, do not spread mortar beds more than 48 inches ahead of masonry. Set masonry units within one minute of spreading mortar.

## PART 2 - PRODUCTS

### 2.1 MANUFACTURERS

A. In other Part 2 articles where titles below introduce lists, the following requirements apply to product selection:

1. Available Products: Subject to compliance with requirements, products that may be incorporated into the Work include, but are not limited to, products specified.
2. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, manufacturers specified.

### 2.2 MASONRY UNITS, GENERAL

A. Defective Units: Referenced masonry unit standards may allow a certain percentage of units to exceed tolerances and to contain chips, cracks, or other defects exceeding limits stated in the standard. Do not uses units where such defects, including dimensions that vary from specified dimensions by more than stated tolerances, will be exposed in the completed Work or will impair the quality of completed masonry.

B. Fire-Resistance Ratings: Where indicated, provide units that comply with requirements for fire-resistance ratings indicated as determined by testing according to ASTM E 119, by equivalent masonry thickness, or by other means, as acceptable to authorities having jurisdiction.

C. Provide products that are manufactured within 500 miles of project site.

### 2.3 CONCRETE MASONRY UNITS (CMUs)

A. Shapes: Provide shapes indicated and as follows:
   1. Provide special shapes for lintels, corners, jambs, sashes, movement joints, headers, bonding, and other special conditions.
   2. Provide square-edged units for outside corners, unless otherwise indicated.

B. Concrete Masonry Units: ASTM C 90.
1. Unit Compressive Strength: Provide units with minimum average net-area compressive strength of 1900 psi.
2. Weight Classification: Normal weight.
3. Curing: Allow masonry units to cure 28 days to permit drying shrinkage before laying.
4. Size (Width): Manufactured to dimensions 3/8 inch less than nominal dimensions.
5. Exposed Faces: Manufacturer's standard color and texture, unless otherwise indicated.

## 2.4 MASONRY LINTELS

A. Masonry Lintels: Built-in-place masonry lintels made from bond beam concrete masonry units with reinforcing bars placed as indicated and filled with coarse grout. Temporarily support built-in-place lintels until cured.

## 2.5 MORTAR AND GROUT MATERIALS

A. General: Mortar and grout may be provided in one of two options; field mix of Portland cement, lime and sand or with specified Portland Cement-Lime Mix.

B. Portland Cement: ASTM C 150, Type I or II.

C. Hydrated Lime: ASTM C 207, Type S.

D. Portland Cement-Lime Mix: Packaged blend of portland cement complying with ASTM C 150, Type I or Type III, and hydrated lime complying with ASTM C 207, Type S.
1. Blue Circle Cement, Inc.: Eaglebond High Strength Type "S".
2. Ciment Quebec, Inc.: Portland and Lime / Type S.
3. Dragon Cement and Concrete: Type S Masonry Cement.

E. Aggregate for Mortar: ASTM C 144.

F. Aggregate for Grout: ASTM C 404.

G. Water: Potable.

## 2.6 REINFORCEMENT

A. Uncoated Steel Reinforcing Bars: ASTM A 615/A 615M or ASTM A 996/A 996M, Grade 60.

B. Masonry Joint Reinforcement, General: ASTM A 951.
1. Interior Walls: Mill- galvanized, carbon steel.
2. Exterior Walls: Hot-dip galvanized, carbon steel.
3. Wire Size for Side Rods: W1.7 or 0.148-inch diameter for interior walls and W2.8 or 0.188-inch diameter for exterior walls.
4. Wire Size for Cross Rods: W1.7 or 0.148-inch diameter.
5. Wire Size for Veneer Ties: W1.7 or 0.148-inch diameter.
6. Spacing of Cross Rods, Tabs, and Cross Ties: Not more than 16 inches o.c.
7. Provide in lengths of not less than 10 feet.

C. Masonry Joint Reinforcement for Single-Wythe Masonry: Truss type with single pair of side rods.
1. Available Products:
a. Dayton Superior Corporation, Dur-O-Wal Division; Dur-O-Truss.
b. Hohmann & Barnard; Truss-Mesh, #120.
c. Wire-Bond; Series 300, Single Wythe.

D. Masonry Joint Reinforcement for Multiwythe Masonry:
1. Adjustable (two-piece) type, truss design, with one side rod at each face shell of backing wythe and with separate ties that extend into facing wythe. Ties have two hooks that engage eyes or slots in reinforcement

and resist movement perpendicular to wall. Ties extend at least halfway through facing wythe but with at least 5/8-inch cover on outside face.

2. Available Products:
   a. Duro-wall; D/A 370 Ladur-eye.
   b. Hohmann & Barnard; Lox-All Adjustable Eye-Wire, #170.
   c. Wire-Bond; Series 900, Composite Hook and Eye.

## 2.7 TIES AND ANCHORS

A. Materials: Provide ties and anchors specified in subsequent paragraphs that are made from materials that comply with subparagraphs below, unless otherwise indicated.
   1. Hot-Dip Galvanized, Carbon-Steel Wire: ASTM A 82; with ASTM A 153/A 153M, Class B-2 coating.
   2. Steel Sheet, Galvanized after Fabrication: ASTM A 1008/A 1008M, Commercial Steel, hot-dip galvanized after fabrication to comply with ASTM A 153/A 153M.

B. Wire Ties, General: Unless otherwise indicated, size wire ties to extend at least halfway through veneer but with at least 5/8-inch cover on outside face. Outer ends of wires are bent 90 degrees and extend 2 inches parallel to face of veneer.

C. Individual Wire Ties: Rectangular units with closed ends and not less than 4 inches wide.
   1. Where wythes are of different materials, use adjustable ties with pintle-and-eye connections having a maximum adjustment of 1-1/4 inches.
   2. Wire: Fabricate from 3/16-inch- diameter, hot-dip galvanized steel wire.

A. Partition Top anchors: 0.097-inch- thick metal plate with 3/8-inch- diameter metal rod 6 inches long welded to plate and with closed-end plastic tube fitted over rod that allows rod to move in and out of tube. Fabricate from steel, hot-dip galvanized after fabrication.
   1. Available Products:
      a. Hohmann and Barnard #PTA 420.
      b. Heckman: No. 419, Pin type.
      c. Wire Bond: Partition Top Anchor.

B. Rigid Strap Anchors: Fabricate from steel bars 1-1/2 inches wide by 1/4 inch thick by 24 inches long, with ends turned up 2 inches or with cross pins, unless otherwise indicated.
   1. Corrosion Protection: Hot-dip galvanized to comply with ASTM A 153/A 153M.

## 2.8 MISCELLANEOUS ANCHORS

A. Anchor Bolts: Headed or L-shaped steel bolts complying with ASTM A 307, Grade A; with ASTM A 563 hex nuts and, where indicated, flat washers; hot-dip galvanized to comply with ASTM A 153/A 153M, Class C; of dimensions indicated.

## 2.9 MISCELLANEOUS MASONRY ACCESSORIES

A. Compressible Filler: Premolded filler strips complying with ASTM D 1056, Grade 2A1; compressible up to 35 percent; of width and thickness indicated; formulated from neoprene, urethane or PVC.
   1. Holmann & Barnard: #NS – Closed Cell Neoprene.
   2. Wire Bond: 3000 Horizontal.

B. Bond-Breaker Strips: Asphalt-saturated, organic roofing felt complying with ASTM D 226, Type I (No. 15 asphalt felt).

C. Reinforcing Bar Positioners: Wire units designed to fit into mortar bed joints spanning masonry unit cells with loops for holding reinforcing bars in center of cells. Units are formed from 0.142-inch steel wire, hot-dip galvanized after fabrication. Provide units with either two loops or four loops as needed for number of bars indicated.

1. Available Products:
   a. Dayton Superior Corporation, Dur-O-Wal Division; D/A 810, D/A 812 or D/A 817.
   b. Heckmann Building Products Inc.; No. 376 Rebar Positioner.
   c. Hohmann & Barnard, Inc.; #RB or #RB-Twin Rebar Positioner.
   d. Wire-Bond; O-Ring or Double O-Ring Rebar Positioner.

D. Grout Screen: Monofilament screen fabricated from high-strength, non-corrosive, polypropylene polymers.
1. Available Products: Subject to compliance with requirements, grout screen materials that may be incorporated into the Work include, but are not limited to, the following:
   a. AA3260; AA Wire Products.
   b. Dur-O-Stop; Dur-O-Wal, Inc.
   c. MGS; Hohmann and Barnard.

## 2.10 MASONRY CLEANERS

A. Job-Mixed Detergent Solution: Solution of 1/2-cup dry measure tetrasodium polyphosphate (Spic and Span) and 1/2-cup dry measure laundry detergent dissolved in 1 gal. of water.

B. Proprietary Acidic Cleaner: Manufacturer's standard-strength cleaner designed for removing mortar/grout stains, efflorescence, and other new construction stains from new masonry without discoloring or damaging masonry surfaces. Use product expressly approved for intended use by cleaner manufacturer and manufacturer of masonry units being cleaned.
1. Available Manufacturers:
   a. 202V Vana-Stop; Diedrich Technologies, Inc.
   b. Sure Klean Vana Trol; ProSoCo, Inc.

## 2.11 MORTAR AND GROUT MIXES

A. General: Do not use admixtures, including pigments, air-entraining agents, accelerators, retarders, water-repellent agents, antifreeze compounds, or other admixtures, unless otherwise indicated.
1. Do not use calcium chloride in mortar or grout.
2. Limit cementitious materials in mortar to portland cement and lime.

B. Preblended, Dry Mortar Mix: Furnish dry mortar ingredients in form of a preblended mix. Measure quantities by weight to ensure accurate proportions, and thoroughly blend ingredients before delivering to Project site.

C. Mortar for Unit Masonry: Comply with ASTM C 270, Property Specification. Provide type S mortar for all applications stated unless another type is indicated.

D. Grout for Unit Masonry: Comply with ASTM C 476.
1. Use grout of type indicated or, if not otherwise indicated, of type (fine or coarse) that will comply with Table 1.15.1 in ACI 530.1/ASCE 6/TMS 602 for dimensions of grout spaces and pour height.
2. Provide grout with a slump of 8 to 11 inches as measured according to ASTM C 143/C 143M.

# PART 3 - EXECUTION

## 3.1 EXAMINATION

A. Examine conditions, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of work.
1. Verify that foundations are within tolerances specified.
2. Verify that reinforcing dowels are properly placed.
3. Verify that built-in items are in proper location and ready for roughing into masonry work.
4. Examine wall framing and sheathing to verify that stud locations are suitable for spacing of veneer anchors and that installation will result in a weatherproof covering.

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

3.2 INSTALLATION, GENERAL

A. Thickness: Build cavity and composite walls and other masonry construction to full thickness shown. Build single-wythe walls to actual widths of masonry units, using units of widths indicated.

B. Build chases and recesses to accommodate items specified in this and other Sections.

C. Leave openings for equipment to be installed before completing masonry. After installing equipment, complete masonry to match the construction immediately adjacent to opening.

D. Use full-size units without cutting if possible. If cutting is required to provide a continuous pattern or to fit adjoining construction, cut units with motor-driven saws; provide clean, sharp, unchipped edges. Allow units to dry before laying unless wetting of units is specified. Install cut units with cut surfaces and, where possible, cut edges concealed.

E. Select and arrange units for exposed unit masonry to produce a uniform blend of colors and textures.
1. Mix units from several pallets or cubes as they are placed.

F. Comply with construction tolerances in ACI 530.1/ASCE 6/TMS 602 and with the following:
1. For conspicuous vertical lines, such as external corners, door jambs, reveals, and expansion and control joints, do not vary from plumb by more than 1/8 inch in 10 feet, 1/4 inch in 20 feet, or 1/2 inch maximum.
2. For vertical alignment of exposed head joints, do not vary from plumb by more than 1/4 inch in 10 feet, or 1/2 inch maximum.
3. For conspicuous horizontal lines, such as lintels, sills, parapets, and reveals, do not vary from level by more than 1/8 inch in 10 feet, 1/4 inch in 20 feet, or 1/2 inch maximum.
4. For exposed bed joints, do not vary from thickness indicated by more than plus or minus 1/8 inch, with a maximum thickness limited to 1/2 inch. Do not vary from bed-joint thickness of adjacent courses by more than 1/8 inch.
5. For exposed head joints, do not vary from thickness indicated by more than plus or minus 1/8 inch. Do not vary from adjacent bed-joint and head-joint thicknesses by more than 1/8 inch.
6. For faces of adjacent exposed masonry units, do not vary from flush alignment by more than 1/16 inch except due to warpage of masonry units within tolerances specified for warpage of units.
7. For exposed bed joints and head joints of stacked bond, do not vary from a straight line by more than 1/16 inch from one masonry unit to the next.

G. Bracing Walls During Construction: It is the sole responsibility of the masonry contractor to design and provide temporary bracing of masonry walls during construction. Refer to NCMA Tek Bulletin 3-4B and applicable OSHA standards. Provide 3’ vinyl construction fencing around Restricted Zones.

3.3 LAYING MASONRY WALLS

A. Lay out walls in advance for accurate spacing of surface bond patterns with uniform joint thicknesses and for accurate location of openings, movement-type joints, returns, and offsets. Avoid using less-than-half-size units, particularly at corners, jambs, and, where possible, at other locations.

B. Bond Pattern for Exposed Masonry: Unless otherwise indicated, lay exposed masonry in running bond; do not use units with less than nominal 4-inch horizontal face dimensions at corners or jambs.

C. Lay concealed masonry with all units in a wythe in running bond or bonded by lapping not less than 4-inches. Bond and interlock each course of each wythe at corners. Do not use units with less than nominal 4-inch horizontal face dimensions at corners or jambs.

D. Stopping and Resuming Work: Stop work by racking back units in each course from those in course below; do not tooth. When resuming work, clean masonry surfaces that are to receive mortar, remove loose masonry units and mortar, and wet brick if required before laying fresh masonry.

E. Built-in Work: As construction progresses, build in items specified in this and other Sections. Fill in solidly with masonry around built-in items.

F. Fill space between steel frames and masonry solidly with mortar, unless otherwise indicated.

G. Where built-in items are to be embedded in cores of hollow masonry units, place a layer of metal lath, wire mesh, or plastic mesh in the joint below and rod mortar or grout into core.

H. Fill cores in hollow concrete masonry units with grout 24 inches under bearing plates, beams, lintels, posts, and similar items, unless otherwise indicated.

I. Build non-load-bearing interior partitions full height of story to underside of solid floor or roof structure above, unless otherwise indicated.

1. At non-fire rated partitions, install compressible filler in joint between top of partition and underside of structure above.
2. Fasten partition top anchors to structure above and build into top of partition. Grout cells of CMUs solidly around plastic tubes of anchors and push tubes down into grout to provide 1/2-inch clearance between end of anchor rod and end of tube. Space anchors 48 inches o.c., unless otherwise indicated.
3. At fire-rated partitions, treat joint between top of partition and underside of structure above to comply with Division 07 Section "Fire-Resistive Joint Systems."

## 3.4 MORTAR BEDDING AND JOINTING

A. Lay hollow concrete masonry units as follows:

1. With face shells fully bedded in mortar and with head joints of depth equal to bed joints.
2. With webs fully bedded in mortar in all courses of piers, columns, and pilasters.
3. With webs fully bedded in mortar in grouted masonry, including starting course on footings.
4. With entire units, including areas under cells, fully bedded in mortar at starting course on footings where cells are not grouted.

B. Lay solid masonry units or brick with completely filled bed and head joints; butter ends with sufficient mortar to fill head joints and shove into place. Do not deeply furrow bed joints or slush head joints.

C. Set firebox brick in full bed of refractory mortar with full head joints. Form joints by buttering both surfaces of adjoining brick and sliding it into place. Make joints just wide enough to accommodate variations in size of brick, approximately 1/8 inch. Tool joints smooth on surfaces exposed to fire or smoke.

D. Tool exposed joints slightly concave when thumbprint hard, using a jointer larger than joint thickness, unless otherwise indicated.

E. Cut joints flush for masonry walls to receive plaster or other direct-applied finishes (other than paint), unless otherwise indicated.

F. Do not shift or tap masonry units after mortar has achieved initial set. Where adjustment is necessary, remove mortar and replace.

## 3.5 CAVITY WALLS

A. Bond wythes of cavity walls together using the following method:
1. Masonry Joint Reinforcement: Installed in horizontal mortar joints.
a. Where one wythe is of clay masonry and the other of concrete masonry, use adjustable (two-piece) type reinforcement to allow for differential movement regardless of whether bed joints align.

B. Keep cavities clean of mortar droppings and other materials during construction. Strike joints facing cavities flush.

1. Install the specified cavity drainage material in thickness to fill the cavity above flashings as work progresses.

C. Coat cavity face of backup wythe to comply with Division 07 Section "Bituminous Dampproofing."

3.6 MASONRY JOINT REINFORCEMENT

A. General: Install entire length of longitudinal side rods in mortar with a minimum cover of 5/8 inch on exterior side of walls, 1/2 inch elsewhere. Lap reinforcement a minimum of 6 inches.
1. Space reinforcement not more than 16 inches o.c., unless noted otherwise.
2. Space reinforcement not more than 8 inches o.c. in foundation walls and parapet walls.
3. Provide reinforcement not more than 8 inches above and below wall openings and extending 12 inches beyond openings.
a. Reinforcement above is in addition to continuous reinforcement.

B. Interrupt joint reinforcement at control and expansion joints, unless otherwise indicated.

C. Provide continuity at wall intersections by using prefabricated T-shaped units.
1. At “T” intersection of walls, Strap Anchors may be used in lieu of masonry joint reinforcement. Install 16 inches on center.

D. Cut and bend reinforcing units as directed by manufacturer for continuity at corners, returns, offsets, column fireproofing, pipe enclosures, and other special conditions.

E. Provide continuous horizontal-joint reinforcement in block veneer. Space reinforcement not more than 16-inches o.c., starting reinforcement on top of first block course.

3.7 CONTROL AND EXPANSION JOINTS

A. Install control joints in veneer masonry as indicated on the drawings or, if not indicated, at a maximum spacing of 24 feet on center. Locate joints at door and window jambs inasmuch as possible.
1. Provide joints at both sides of windows and doors 6 foot wide or wider.

B. Form expansion joints in brick made from clay or shale as follows:
1. Build in compressible joint fillers and set back from face of veneer to form open joint 3/4 inch deep and not less than 3/8 inch for installation of sealant and backer rod specified in Division 07 Section "Joint Sealants."

3.8 LINTELS

A. Install steel lintels where indicated.

B. Provide masonry lintels where shown and where openings of more than 12 inches for brick-size units and 24 inches for block-size units are shown without structural steel or other supporting lintels.

C. Provide minimum bearing of 8 inches at each jamb, unless otherwise indicated.

3.9 REINFORCED UNIT MASONRY INSTALLATION

A. Temporary Formwork and Shores: Construct formwork and shores as needed to support reinforced masonry elements during construction.
1. Construct formwork to provide shape, line, and dimensions of completed masonry as indicated. Make forms sufficiently tight to prevent leakage of mortar and grout. Brace, tie, and support forms to maintain position and shape during construction and curing of reinforced masonry.
2. Do not remove forms and shores until reinforced masonry members have hardened sufficiently to carry their own weight and other temporary loads that may be placed on them during construction.

B. Placing Reinforcement: Comply with requirements in ACI 530.1/ASCE 6/TMS 602.

C. Grouting: Do not place grout until entire height of masonry to be grouted has attained enough strength to resist grout pressure.
   1. 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.
   2. Limit height of vertical grout pours to not more than 60 inches.

3.10 FIRESTOPPING

A. Firestopping: Refer to Division 07 Section “Penetration Firestopping” for installation requirements. Provide firestopping, as part of the work of this section, at the top of fire-rated masonry walls between top of partition and underside of structure above, both for new and existing conditions. Where gypsum wallboard is installed at the top of rated existing masonry walls, the firestopping will be provided by others.
   1. Bearing walls, not subject to vertical movement, may be grouted solid between top of wall and underside of structure, in lieu of firestopping.

3.11 INSTALLATION OF PRECAST CONCRETE UNITS

A. Erect architectural precast concrete level, plumb, and square within specified allowable tolerances. 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.
   2. Unless otherwise indicated, maintain uniform joint widths of 3/8 inch.

3.12 FIELD QUALITY CONTROL

A. Testing and Inspecting: Owner will engage special inspectors to perform tests and inspections and prepare reports. Allow inspectors access to scaffolding and work areas, as needed to perform tests and inspections. Retesting of materials that fail to comply with specified requirements shall be done at Contractor's expense.

B. Inspections: [**Level 1**] [**Level 2**] special inspections according to the "International Building Code."
   1. Begin masonry construction only after inspectors have verified proportions of site-prepared mortar.
   2. Place grout only after inspectors have verified compliance of grout spaces and of grades, sizes, and locations of reinforcement.
   3. Place grout only after inspectors have verified proportions of site-prepared grout.

C. Testing Prior to Construction: One set of tests.

D. Testing Agency: Owner will engage a qualified independent testing and inspecting agency to perform field tests and inspections indicated below and prepare test reports:
   1. Payment for these services will be made by Owner.
   2. Retesting of materials failing to comply with specified requirements shall be done at Contractor's expense.

E. Testing Frequency: One set of tests for each 5000 sq. ft. of wall area or portion thereof.

F. Mortar Test (Property Specification): For each mix provided, per ASTM C 780. Test mortar for compressive strength.

G. Grout Test (Compressive Strength): For each mix provided, per ASTM C 1019.

3.13 REPAIRING, POINTING, AND CLEANING

A. Remove and replace masonry units that are loose, chipped, broken, stained, or otherwise damaged or that do not match adjoining units. Install new units to match adjoining units; install in fresh mortar, pointed to eliminate evidence of replacement.

B. Pointing: During the tooling of joints, enlarge voids and holes, except weep holes, and completely fill with mortar. Point up joints, including corners, openings, and adjacent construction, to provide a neat, uniform appearance. Prepare joints for sealant application, where indicated.

C. In-Progress Cleaning: Clean unit masonry as work progresses by dry brushing to remove mortar fins and smears before tooling joints.

D. Final Cleaning: After mortar is thoroughly set and cured, clean exposed masonry as follows:
1. Remove large mortar particles by hand with wooden paddles and nonmetallic scrape hoes or chisels.
2. Test cleaning methods on sample wall panel; leave one-half of panel uncleaned for comparison purposes. Obtain Architect's approval of sample cleaning before proceeding with cleaning of masonry.
3. Protect adjacent stone and nonmasonry surfaces from contact with cleaner by covering them with liquid strippable masking agent or polyethylene film and waterproof masking tape.
4. Wet wall surfaces with water before applying cleaners; remove cleaners promptly by rinsing surfaces thoroughly with clear water.
5. Clean brick by bucket-and-brush hand-cleaning method described in BIA Technical Notes 20 Revised, and manufacturer's printed instructions.
6. Clean concrete masonry with job-mixed detergent solution by cleaning method indicated in NCMA TEK 8-2A and as applicable to type of stain on exposed surfaces.

3.14 MASONRY WASTE DISPOSAL

A. Waste Disposal as Fill Material: Dispose of clean masonry waste, including excess or soil-contaminated sand, waste mortar, and broken masonry units, by crushing and mixing with fill material as fill is placed.
1. Crush masonry waste to less than 4 inches in each dimension.
2. Mix masonry waste with at least two parts of specified fill material for each part of masonry waste. Fill material is specified in Division 31 Section "Earth Moving."
3. Do not dispose of masonry waste as fill within 18 inches of finished grade.

B. Excess Masonry Waste: Remove excess clean masonry waste that cannot be used as fill, as described above, and other masonry waste, and legally dispose of off Owner's property.

## PART 4 - MEASUREMENT AND PAYMENT:

### 4.01 METHOD OF MEASUREMENT:

Unit Masonry will be measured by the lump sum, complete and accepted. The Unit Masonry limits shall be as shown or described in the Contract Documents.

### 4.02 BASIS OF PAYMENT:

Unit Masonry will be paid for at the contract lump sum price. Payment for Unit Masonry will be under:

| Pay Item | | Pay Unit |
|---|---|---|
| DIV. 4 | Masonry | Lump Sum |

END OF SECTION

# SECTION 04 24 00 - EXTERIOR STONE CLADDING

All work and materials shall conform to the Contract Documents and the provisions of the State of Maine Department of Transportation Standard Specifications, Revision November 2014, with the following additions:

Add the following:

PART 1- GENERAL

1.01 GENERAL CONDITIONS: The General Conditions, Supplementary General Conditions and all Sections of Division 1 shall apply to each and every contract and contractor, person or persons supplying material, labor or entering into the work directly or indirectly.

1.02 CODES: All work shall conform with the requirements of the local building codes. This Contractor shall verify compliance and where non compliance is noted it shall be reported immediately to the Architect. No work shall commence without this certification and no work should proceed unless it is in strict compliance with all applicable code requirements. See Division 1, Article 2.2.

1.03 STANDARDS: All materials and work shall conform with the recommendations of the National Building Granite Quarry Association. All granite shall be obtained from quarries having adequate capacity and facility to meet the specified requirements. Cutting and finishing shall be done by a firm equipped to process the material promptly on order and in accordance with specifications.

1.04 SUBMITTALS:

A. Five prints of erection and shop fabrication drawings.

B. Shop drawings shall show all bedding, bonding, jointing and anchoring details and the dimension and setting number of each piece of granite. No final sizing or finishing shall be done until shop drawings for that part of the work has been approved.
   1. Show location of inserts (for stone anchors and supports) which are to be built into concrete or unit masonry.
   2. Show large scale details of decorative surfaces and inscriptions.

1.05 SAMPLES: Submit to the Architect, one sample for approval of color, texture and surface finish. Sample shall be at least 12” x 12” in size and representative of the proposed finished product.

1.06 QUALITY ASSURANCE:

A. Upon receipt at the site, the granite shall be stacked on timber or platforms at least 4” above the ground and extreme care shall be taken to prevent staining during storage. If storage is to be for a prolonged period, polyethylene shall be placed between any wood and finished surfaces and shall be used also as an overall protective coating. Lewis holes shall be plugged during freezing weather to prevent the accumulation of water. Salt shall not be used for melting of ice formed in Lewis holes or on pieces or for any purpose involving its contact with the granite.

B. If any unit is damaged during handling or erection, it shall be inspected by the Architect to determine whether the unit can be repaired or rejected.

C. Reference Standards: Comply with National Building Granite Quarries Association, Inc. (NBGQA).
   1. Granite: National Building Granite Quarries Association, Inc. (NBGQA).

D. Fabricator: Sub-subcontract fabrication of stone to a firm which has successfully fabricated stone similar to the quality specified for a period of not less than 5 years and is equipped to provide the quantity shown.

1.07 SCOPE: The Section includes all labor, materials, equipment and related services necessary for the fabrication, delivery and installation of the work shown on the drawings and/or specified herein, including but not limited to the following:

A. Fabrication, delivery and erection of all granite veneer panels, cornices, bases, etc. as shown on the drawings.

B. Mortars and sealants.

C. Anchors, cramps, dowels and other anchoring devices.

D. Incidental cutting and drilling.

E. Pointing of joints.

F. Cleaning and protecting the finished work.

1.08 RELATED WORK IN OTHER SECTIONS:

A. Rough Carpentry 06 10 00

1.09 INSTALL ONLY: Install following items, to be furnished under other Sections:

A. Anchors, inserts and other items furnished by other trades required to be built in with stone masonry.

1.10 FURNISH ONLY: Furnish and deliver, to jobsite unless otherwise indicated, the following items for installation under the Designated Sections or as otherwise noted.

A. Anchors, inserts, other accessory items for securing stone masonry to other construction and required to be built in with the other construction: DIVISION 3 and SECTION 06 10 00 – ROUGH CARPENTRY

1.11 PRODUCT DELIVERY, STORAGE AND HANDLING:

A. Comply with requirements of SECTION 042000.

B. Protect stone during storage and construction against moisture, soiling, staining and physical damage.

C. Handle stone to prevent chipping, breakage, soiling or other damage. Do not use pinch or wrecking bars without protecting edges of stone with wood or other rigid materials. Lift with wide belt type slings wherever possible; do not use wire rope or ropes containing tar or other substances which might cause staining. If required, use wood rollers and provide cushion at end of wood slides.

D. Store stone on wood skids or pallets, covered with non-staining, waterproof membrane. Place and stack skids and stones to distribute weight evenly and to prevent breakage or cracking of stones. Protect stored stone from weather with waterproof, non-staining covers or enclosures, but allow air to circulate around stones.

E. Protect mortar materials and stonework accessories from weather, moisture and contamination with earth and other foreign materials.

1.12 JOB CONDITIONS:

A. Comply with requirements of SECTION 042000.

B. Weather Protection, General: During all seasons protect partially completed stonework against weather when work is not in progress. Cover top of walls with strong waterproof, non-staining membrane extending at least 2 ft. down both sides of walls and anchor securely in place.

C. Cold Weather Protection: Refer to SECTION 04200.

PART 2 - MATERIAL

2.01 GRANITE

A. All granite shall be of standard grade, free of cracks, seams or starts which may impair its structural integrity or function. Inherent variation characteristic of the quarry from which it is obtained is acceptable.

B. Granite must conform to ASTM C97, C170 and C99.

C. Granite shall be "Regal Gray" or approved equal with thermal finish. Thickness as indicated in drawings.

2.02 MORTAR AND GROUT MATERIALS:

A. Mortar for setting and pointing shall be: 1 part portland cement, 1 part plastic lime hydrate, and 3 parts clean, non-staining sand.

B. Calcium chloride or accelerator is not permitted.

C. Cement: Provide white cement as follows:
1. Portland Cement: ASTM C 150, except comply also with non-staining staining requirements of ASTM C 91 for not more than 0.13% soluble alkali. Furnish Type I, except Type III may be used for setting stonework in cold weather subject to approval by Architect.
2. Masonry cement: Not acceptable.

D. Hydrated Lime: ASTM C 207, Type S.

E. Sand: ASTM C 144, except graded with 100% passing the No. 16 sieve for 1/4" and narrower joints.
1. For white pointing mortar, provide natural white sand or ground stone meeting specified requirements.
2. For colored pointing mortar, provide marble, granite or other sound stone, meeting specified grading requirements for sand, as required to match Architect's sample.

F. Coloring Pigments: Limeproof, non-fading, mineral pigments as approved by Architect.

2.03 MIXES:

A. Mortar: Non-staining, cement/lime mortar, complying with ASTM C 270, Proportion Specification, using specified materials
1. Use Type S unless otherwise indicated.
2. Use specified mortar for grouting.

2.04 ANCHORS, CRAMPS & DOWELS:

A. All anchors, cramps, dowels and other anchoring devices shall be type 304 stainless steel by Hohmann & Barnard Inc. or suitable non-ferrous metal of the types and sizes shown on approved shop drawings.

B. Schedule of Anchoring devices by Hohmann & Barnard, Inc.

| # | Name | Gauge |
|---|---|---|
| 370 | channel slots | 12 gauge |
| St.2 | storch anchors | 12 gauge |
| 366 | strap anchors | 12 gauge 1" wide length as required |
| 365 | strap anchors | 12 gauge 1" wide length as required |
| 402R | cramp anchor | 14" 0 length as required |
| 406 | dowel | 1/2" 0 length as required |

2.05 FABRICATION:

A. General: Fabricate as shown and as detailed on final shop drawings and in compliance with recommendations of applicable stone association. Provide holes and sinkages cut or drilled for anchors, fasteners, supports and lifting devices, as shown and as necessary to secure stonework in place. Cut and back check as required for proper fit and clearance. Shape beds to fit supports.

B. Contiguous Work: Provide chases, reveals, reglets, openings and similar spaces and features as required for contiguous work. Coordinate with drawings and final shop drawings showing contiguous work.

C. Workmanship: Cut accurately to shape and dimensions shown on final shop drawings, maintaining fabrication tolerances of applicable stone associations.
1. Dress joints (bed and vertical) straight and at 90 degree angle to face, unless otherwise indicated.
2. Provide quirk-mitered corners, unless otherwise shown. Provide for cramp anchorage in top and bottom bed joints of corner units, unless otherwise shown.

D. Joint Widths: Cut to provide joint widths as indicated or, if not indicated, cut to allow for uniform 3/8" wide joints.

E. Thickness: Provide stone of thickness indicated. Saw cut back surfaces which will be concealed in finished work.
1. Allow not less than 1" clearance between back face of units and structure framing (or fireproofing, if any).

F. Reglets:
1. Flashing Reglets: Cut flashing reglets, 5/8" wide x 3/4" deep, unless otherwise indicated.
2. Gasket Reglets: Cut gasket reglets in edges of panels where gasketed joints are shown. Coordinate with profile of gaskets to be used in the work.

G. Moldings: Fabricate molded work to profiles indicated, with arises sharp and true and matched at joints between units.

H. Carvings: Carve and cut decorative surfaces and inscriptions in accordance with final shop drawings.

I. Saddles and Thresholds: Cut to profiles and dimensions shown.

PART 3 - EXECUTION

3.01 INSPECTION:

A. The installation of the granite shall be an indication of this contractor's acceptance of all subsurfaces and he will automatically assume the responsibility of any unacceptable finished work caused by subsurface conditions.

B. Condition of surfaces: Inspect foundations and back-up block wall to assure surface to support granite panel as follows.
1. To proper grades and elevations.
2. Dry and free of all dirt and other deleterious material.
3. All surfaces not properly prepared have been satisfactorily corrected.

C. Granite panels shall be verified to determine any flaws or imperfections upon receipt at the site.

3.02 PREPARATION:

A. Pieces shall be dry and clean of all dirt.

B. Anchors, cramps, dowels and other anchoring devices: remove all dirt, ice, loose rest and scale prior to installation.

C. Mortar shall be mixed in small batches using clean non-alkaline water until it is homogenous, stiff and plastic. After mixing the mortar shall not sit form more than two hours before being used.

3.03 ALLOWABLE TOLERANCES:

A. Maximum variation in the diversion of any piece shall be 1/4 of the specified bed and joint width.

B. Flatness Tolerances shall be determined from a 4 foot long straight edge in any direction. The maximum variation from true plane shall not exceed a/4 of specified joint width.

C. Variation from true plane to face surface shall not exceed 3/16” for thermal finish of moldings, washes and drips shall be constant in profile throughout their length in strict conformity with the details shown on approved shop drawings.

3.04 INSTALLATION:

A. General: Do not install cracked, broken or chipped granite exceeding ASTM allowances.
1. Granite pieces shall be bedded and jointed as shown on the approved shop drawings.
2. 3/8” for beds and joints of thermal finish granite. All mortar joints between stones should be thoroughly filled. The front 1/2” should be filled with pointing mortar after the setting bed has set. Tool a concave mortar joint.
3. Place an adequate number of lead pads or plastic buttons in the horizontal joint under heavy stones in order to sustain weight until mortar has set.
4. Prevent physical contact between back face of stone and concrete slabs and steel beams. Maximum variation of backs of granite shall be:

1/4” on pieces up to modular 2” thick
3/8” on pieces up to modular 2” to 3” thick
1/2” on pieces up to modular 3” thick or more

Sawn back shall be cleared of all rust stains and free of iron particles.
5. Dowel pins should not be embedded solidly when installed through a relieving angle at an expansion joint. Compressible materials should be installed at the base of the dowel pin holes to allow for thermal expansion of the granite.
6. Cavity wall should be kept clear of mortar droppings during construction.
7. Holes and sinkages for anchors, cramps and dowels shall be provided in accordance with approved shop drawings. Holes for other purposes shall be provided only when specifically shown on contract drawings. Fill all holes to prevent water traps.

B. <u>Protection of the Work</u>
1. Protect all cornices, ledges and offsets from mortar drippings or other damage during construction with wood covers and galvanized nails in mortar joints for support.
2. Remove misplaced mortar or grout immediately.
3. Do not permit wash from concrete floors or scaffolding to run down onto or behind walls.

4. Provide protection at all the corners and jambs from damage throughout the duration of construction.

C. Weather

1. Granite shall not be assembled when stone temperatures and surrounding air temperatures are below 50°F or above 95°F. Assembly of units below 50°F is permitted when the temperature of the stone units and the adhesive is raised by artificial heating to a temperature of 50°F. After the units have been joined, artificial heat should continue to be applied to the stone adjacent to the joint area to give the adhesive the curing temperature above 50°F. The contractor shall protect the granite from harm during the cold weather. No calcium chloride or accelerators may be permitted in mortar mix. If stone is set in cold weather construction follow recommendations of International Masonry Industry All Weather Council.

2. Adequately cover all work at the end of the work period during showers or storms and when so covered keep at least 50°F for at least 72 hours.
3. With wind velocities over 15 mph provide wind breaks.
4. Do not install granite pieces having a film of frost on its surface and do not build on any frozen work. Such work shall be required to be removed and rebuilt.

D. Setting

1. Each piece shall be carefully bedded in a full bed of mortar and tapped home with a rawhide mallet to a full and solid bearing.
2. Particular care shall be exercised to equalize bed and joint openings and eliminate the need for redressing of exposed surfaces. Exposed surfaces shall be kept free of mortar at all times.
3. Except at expansion joints shown on the approved shop drawings, all joints and beds shall be completely filled, then raked out to a depth of not less than 3/4", and every precaution shall be taken to prevent direct bearing contact between pieces.
4. Granite facing shall in no case be built up more than two courses above the backing and no piece having a greater bed width that the one below it shall be set until the lower course is backed up. Sills and other pieces subject to uneven pressure shall be bedded at their ends only.
5. Cavity Wall Construction: Where open space between back of stone units and back up or framing is shown, keep cavity open; do not fill with mortar or grout.
   a. Back parge stone wall units with non-staining cement mortar not more than 1/2" thick. Add specified moisture retardant additive to mortar mix in amount equal to not more than 3% of cement weight.
6. Grouted Construction: Where space between back of stone wall units and back up or framing is shown to be grouted, fill open space solidly with non-staining grout. Pour grout in lifts and rod to eliminate voids, allowing each pour to set enough to carry weight of next pour. Exercise care to prevent displacement of stone units during grouting operation.
7. Projecting Courses: Do not set until mortar in courses below has hardened sufficiently to prevent extrusion. Support projecting stone units until wall above is set.
8. Joints: Butter vertical joints for full width before setting and set units in full bed of mortar, unless otherwise indicated.
   a. Rake out joints 3/4" deep before mortar sets to allow for mortar pointing. Clean face of stone after raking. After mortar is set, wet raked joints thoroughly and force pointing mortar into joints. Tool to profile shown or, if not shown, tool slightly concave. Provide pointing mortar using specified materials to match Architect's sample.
   b. Rake out joints before mortar is set to allow for sealant pointing as shown. Refer to SECTION 07900 for backer rod and sealant.
   c. Where joints are shown to be set on shims without mortar, provide quantity of shims required to maintain uniform joint width and alignment of stone units. Sealing joints is specified under SECTION 07900.

E. Anchorage: All granite shall be anchored and/or doweled as shown on approved shop drawings and the anchors, dowels, etc. being inserted with non-expanding filler in holes provided in granite.

F. Pointing and Cleaning

1. Except where otherwise specified all joints and beds previously raked, shall be brushed clean and pointed with mortar to a flat cut joint. When thumb print hard, the joints shall be tooled with a round joiner having a diameter of 1/8" larger than the width of the joint.
2. All open beds and joints, such as under sills, shall be pointed for a depth of at least one inch.
3. At special locations where directed the joints and beds shall be pointed and finished as the setting progresses.
4. After being pointed, the granite work shall be carefully cleaned starting at the top, removing all dirt, excess mortar stains and other defacements.
5. Stainless steel wire brushes or wool may be used but the use of other wire brushes or of acid or other solutions which cause discoloration is expressly prohibited.

PART 4 - MEASUREMENT AND PAYMENT:

4.01 METHOD OF MEASUREMENT:

Exterior Stone Cladding will be measured by the lump sum, complete and accepted. The Exterior Stone Cladding limits shall be as shown or described in the Contract Documents.

4.02 BASIS OF PAYMENT:

Exterior Stone Cladding will be paid for at the contract lump sum price. Payment for Exterior Stone Cladding will be under:

| Pay Item | | Pay Unit |
|---|---|---|
| DIV. 4 | Masonry | Lump Sum |

**END OF SECTION**

# SECTION 05 12 00 – STRUCTURAL STEEL

All work and materials shall conform to the Contract Documents and the provisions of the State of Maine Department of Transportation Standard Specifications, Revision November 2014, with the following additions:

Add the following:

PART 1 GENERAL

1.01 RELATED DOCUMENTS

A. The drawings and general conditions of the Contract, including General and Supplementary Conditions and MaineDOT Division 100, General Conditions, apply to 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 WORK:

A. Extent of structural steel work is shown on drawings, including schedules, notes and details to show size and location of members, typical connections, and type of steel required.

B. Structural steel is that work defined in AISC "Code of Standard Practice" and as otherwise shown on drawings.

1.03 RELATED WORK

1. Section 05 20 00 – Open Web Steel Joists
2. Section 05 30 00 – Metal Deck
3. Section 05 50 00 - Metal Fabrications

1.04 QUALITY ASSURANCE:

A. Codes and Standards: Comply with latest provisions of the following, except as otherwise indicated:

1. AISC "Code of Standard Practice for Steel Buildings and Bridges", Latest Edition.
    a. Exclude the word "structural" in reference to the "Design Drawings" in section 3.1 of the Code.
2. AISC "Specification for Structural Steel Buildings", including "Commentary" and Supplements issued thereto.
3. AISC "Specifications for Structural Joints using ASTM A 325 or A 490 Bolts*"* approved by the Research Council on Structural Connections of the Engineering Foundation.
4. AISC 341, "Seismic Provisions for Steel Buildings".
5. AWS D1.1 - "Structural Welding Code" - Steel.
6. AWS D1.3 - "Structural Welding Code" - Sheet Steel.
7. ASTM A6 "General Requirements for Delivery of Rolled Steel Plates, Shapes, Sheet Piling and Bars for Structural Use."
8. "Code of Federal Regulations, Part 1926" per the Occupational Safety and Health Administration (OSHA), Department of Labor (Latest Revision).

B. Qualifications for Welding Work: Qualify welding processes and welding operators in accordance with AWS D1.1 "Standard Qualification Procedure."

1. Provide certification that welders to be employed in work have satisfactorily passed AWS D1.1 qualification tests and maintained a current certification. Current certification and/or continuity log shall be submitted and be available in the field.
2. If re-certification of welders is required, retesting will be the Contractor's responsibility.

C. Fabricator Qualifications:

1. Fabricator must be a member of the American Institute of Steel Construction (AISC), be certified for BU – Certified Building Fabricator. Fabricator shall be certified at time of bidding and for duration of project.

1.05 SUBMITTALS

A. Unless otherwise specified, submittals required in this section shall be submitted for review. Submittals shall be prepared and submitted in accordance with this section and Division 100.

B. General Contractor shall submit a Submittal Schedule to the engineer within 30 days after they have received the Owner's Notice to Proceed.

C. All submittals shall be reviewed and returned to the Architect within 10 working days.

D. INCOMPLETE SUBMITTALS WILL NOT BE REVIEWED.

E. Submittals not reviewed by the General Contractor prior to submission to the Engineer will not be reviewed. Include on the submittal statement or stamp of approval by Contractor, representing that the Contractor has seen and examined the submittal and that all requirements listed in Division 1 have been complied with.

F. Engineer will review submittals a maximum of two review cycles as part of their normal services. If submittals are incomplete or otherwise unacceptable and re-submitted, General Contractor shall compensate Engineer for additional review cycles.

G. Hardcopy Submittals: Submit three prints. Prints will be reviewed by the Engineer, and then the Architect. One marked print will be returned to Contractor for printing and distribution. Multiple copies will not be marked by the Engineer.

H. Electronic Submittals:

1. Contractor shall include in the submittal schedule an indication of submittals that are intended to be submitted electronically. Upon receipt of the submittal schedule, the Engineer reserves the right to indicate submittals that will not be accepted electronically. Paper copies of such submittals shall be furnished as referenced in this specification.
2. The Engineer reserves the right to require paper copies of submittals that are received electronically. Provide Engineer one (1) paper copies in addition to the electronic submittal. Paper copy will be retained and electronic copy will be returned. Review cycle for such submittals shall not commence until such time that the paper copies are received.
3. Electronic Submittals shall be submitted in Protected Document Format (PDF) compatible with Bluebeam version 12 or later. Electronic files shall not be broken into smaller individual files. File sizes too large to process email or within a file transfer protocol (FTP) site shall be provided on a CD.
4. The submission of submittals electronically does not relieve the contractor of their responsibility to review the submittal prior to transmission to the Engineer. Electronic Submittals shall include contractor comments, and a statement and/or stamp of approval by Contractor, representing that the Contractor has seen and examined the submittal and that all requirements listed in this Section and Division 1 have been complied with. Electronic submittals without the Contractor's approval will be rejected and returned.
5. The Engineer assumes no responsibility for the printed reproduction of submittals reviewed electronically, transmission errors or returned electronic submittals that become corrupted or are otherwise not accessible by the Contractor's or Subcontractor's computer hardware and/or software.

I. Product Data: Submit producer's or manufacturer's specifications and installation instructions for the following products. Include laboratory test reports and other data to show compliance with specifications (including specified standards).

1. Structural steel certified mill reports for each grade of steel covering chemical and physical properties and yield strengths.
2. High-strength bolts (each type), including nuts and washers.
3. Structural steel primer paint (where applicable).
4. Structural steel top coat paint (where applicable). (Refer to Division 9.)
5. AWS D1.1 Welder certifications.
6. Expansion/Adhesive Anchors (coordinate with section 03 30 00).

J. Fabricator's Quality Control Procedures: Fabricator shall submit their written procedural and quality control manuals, and evidence of periodic auditing of fabrication practices by an approved inspection Agency.

K. Fabricator's Certificate of Compliance: At completion of fabrication, fabricator shall submit a certificate of compliance stating that the work was performed in accordance with the construction documents.

L. Shop Drawings:

1. Shop Drawing Review: Electronic files of structural drawings will not be provided to the contractor for preparation of shop drawings. Reproduction of any portion of the Construction Documents for use as Shop drawings and/or Erection Drawings is prohibited. Shop drawings and/or Erection drawings created from reproduced Construction Documents will be returned without review.
    a. Review of the shop drawings will be made for the size and arrangement of the members and strength of the connections. Conformance of the Shop Drawings to the Contract Drawings remains the responsibility of the General Contractor. Engineer's review in no way relieves the General Contractor of this responsibility.
    b. Shop drawings will not be reviewed as partial submittals. A complete submittal shall be provided and shall include; erection and piece drawings indicating all members, braced frames, moment frames and connections. Incomplete submittals will not be reviewed.
2. Connection Design: Submit design calculations prepared and stamped by a Professional Engineer registered in the State of Maine for all beam and column connections not tabulated in the AISC "Manual of Steel Construction" (ASD or LRFD). Submit design for all building braced frames and moment frames where applicable, as indicated on design drawings. Connection designs shall be submitted prior to or with the Shop Drawing Submittal.
    a. Fabricator and Erector are responsible to provide connections that meet the requirements of AISC standards. All shop and field welds, bolts, plates and miscellaneous components required to provide complete connection assemblies shall be provided.
    b. Unless indicated otherwise, simple shear connections shall be provided for the full uniform load capacity of the beam for non-composite construction, and 1.5 times the full uniform load capacity of the beam for composite construction. All connections shall have a minimum of 2 bolts rows in the line of force, and no connection capacity shall be less than 10 kips (unfactored). A tabulation of the simple shear connections shall be provided with the connection submittal.
    c. Braced frame connections: A brace force has been provided on the drawings.
    d. Braced frame connections shall be designed utilizing the Uniform Force Method, with a connection geometry that does not induce a moment on the connected beam or column.
    e. To the greatest extent possible and where required herewithin, welds shall be designed and detailed to be installed downhand.

f. Moment connections not specified, that are part of the lateral resisting system, shall be designed for 1.1 Ry Mp of the beam or girder, where Ry is equal to 1.1, and shall utilize full penetration welds for the flange connections. Unless noted otherwise, moments shall be considered reversible. Design shall include all column and/or beam web stiffener and/or doubler requirements. Backing materials shall be removed and reinforcing fillet welds shall be applied as indicated in the "Execution" portion of this specification.

3. Test Reports: Submit copies of reports of tests conducted on shop and field bolted and welded connections. Include data on type(s) of test conducted and test results.

1.06 DELIVERY, STORAGE AND HANDLING:

A. Deliver materials to site at such intervals to insure uninterrupted progress of work.

B. Deliver anchor bolts and anchorage devices, which are to be embedded in cast-in-place, in ample time to not delay work.

C. Store materials to permit easy access for inspection and identification. Keep steel members off ground, using pallets, platforms, or other supports. Protect steel members and packaged materials from corrosion and deterioration.

D. Do not store materials on structure in a manner that might cause distortion or damage to members or supporting structures. Steel materials shall be stored in a manner to avoid ponding of precipitation on members. Repair or replace damaged materials or structures as directed.

PART 2 PRODUCTS

2.01 MATERIALS:

A. Structural Steel Shapes, Plates and Bars (U.N.O): ASTM A 36 minimum, higher strength steel is acceptable.

B. Structural Steel Hot Rolled Wide Flange Shapes: ASTM A 992 Grade 50 (ASTM A572 Grade 50 with special requirements per AISC Technical Bulletin #3, dated March 1997)

C. Steel Tube: ASTM A 500, Grade B, Fy = 46 ksi.

D. Steel Pipe: ASTM A 53, Grade B.

E. Anchor Bolts: ASTM F1554, Grade 36 weldable steel, unless noted otherwise on drawings. Anchor rods that are to be exposed to weather, located in unheated enclosures, or in contact with pressure treated lumber shall be hot dipped galvanized. All anchor bolts shall be headed or double nutted. "J" or "L" type anchor bolts are not permitted. Unless otherwise noted, specified embedment it to top face of head or nut.

F. Unfinished Threaded Fasteners: ASTM A 307, Grade A, regular low-carbon steel bolts and nuts. Provide hexagonal heads and nuts for all connections.

G. High-Strength Threaded Fasteners: Heavy hexagon structural bolts, heavy hexagon nuts, and hardened washers, as follows:

1. Quenched and tempered medium-carbon steel bolts, nuts and washers, complying with ASTM A325 or ASTM A490. Refer to drawings for diameter.

2. Direct tension indicator washers or bolts may be used at Contractor's option.

H. Electrodes for Welding:

1. Minimum 70 ksi electrodes. Filler material shall meet the grouping requirements per AWS D1.1 Table 3.1 for matching strength of connected materials.

2. All filler metal used welding shall meet the following Charpy V-Notch (CVN) requirements.

a. 20 ft-lb at 0 degrees Fahrenheit unless noted otherwise.

b. 20 ft-lb at -20 degrees Fahrenheit and 40 ft-lb at 70 degrees Fahrenheit at all complete joint penetration (CJP) groove welds.

I. Structural Steel Coatings shall be as specified in the Structural Steel Coatings section of this specification, and as specified in Division 9.

J. Steel Coatings for Exterior Exposed Steel: Except where indicated to be primed and painted, Hot Dipped Galvanized per ASTM A123/A123M (latest edition). Galvanizing shall be applied in a manner to provide Class C faying surfaces for slip critical connections. See Structural Steel Coatings section for additional requirements for galvanizing and painting.

K. Non Shrink Cement-Based Grout: See Section 03 30 00

L. Drilled Anchors: Expansion and adhesive by HILTI, SIMPSON or POWERS/RAWL as indicated on the drawings.

2.02 FABRICATION:

A. Shop Fabrication and Assembly: Fabricate and assemble structural assemblies in shop to greatest extent possible. Fabricate items of structural steel in accordance with AISC Specifications and as indicated on final shop drawings.

1. Properly mark and match-mark materials for field assembly. Fabricate for delivery sequence which will expedite erection and minimize field handling of materials.

2. Where finishing is required, complete assembly, including welding of units, before start of finishing operations. Provide finish surfaces of members exposed in final structure free of markings, burrs and other defects.

B. Connections: Weld or bolt shop connections, as indicated.

1. Provide field bolted connections, except where welded connections or other connections are indicated.

2. Provide high-strength threaded fasteners for principal bolted connections, except where unfinished bolts are indicated.

C. High-Strength Bolted Connection: Install high-strength threaded fasteners in accordance with AISC “Specification for Structural Joints using ASTM A 325 or A 490 Bolts”. Unless otherwise indicated, all bolted connections are to be tightened to the snug tight condition as defined by AISC.

D. Welded Construction: Comply with AWS Codes for procedures, appearance and quality of welds, and methods used in correcting welding work.

E. Holes for Other Work: Provide holes required for securing other work to structural steel framing, and for passage of other work through steel framing members, as shown on final shop drawings.

F. Cut, drill, or punch holes perpendicular to metal surfaces. Do not flame cut holes or enlarge holes by burning. Drill holes in bearing plates.

G. Fabricator, Erector and General Contractor shall coordinate safety requirements for the project, in accordance with OSHA Part 1926. Provide all necessary pieces and fabrications as required to safely erect and access the structure for the duration of project construction.

H. Camber, if any, is indicated on the drawings. Camber indicated is the required camber at time of erection. Contractor shall survey camber prior to placing metal deck.

2.03 STRUCTURAL STEEL COATINGS

A. Coordinate coating requirements with the Architect, and with Division 9 of the specifications.

B. To the greatest extent possible, structural steel coatings shall be shop applied.

C. Coordinate steel markings with coating system to eliminate “bleed through” on steel permanently exposed to view.

D. Galvanizing, priming and painting for structural steel permanently exposed to view shall meet the requirements of Section 10 of the Code of Standard Practice, “Architecturally Exposed Structural Steel”.

E. Provide venting/drainage holes in closed tubular members to be hot-dipped galvanized. Holes shall be provided in a location hidden from view in the final condition and in a manner that will not reduce the strength of the member. Hole locations shall be clearly indicated on the Shop Drawings and are subject to review by the Architect.

F. Follow manufacturer's installation and safety instructions when applying coatings. Adhere to recoat time recommendations set forth by manufacturer.

G. General: Shop prime all interior steel unless noted otherwise, refer to Division 9 specifications for products and surface preparation requirements. Ensure primer and preparation is compatible with top coat (refer to Division 9).

H. Brick masonry loose lintels and relieving angle assemblies, including fasteners, shall be hot dipped galvanized, unless noted otherwise on the Architectural Drawings. Complete all shop fabrication prior to galvanizing assemblies.

I. Steel Embedded in Concrete/Below Grade: Steel which is embedded in concrete, below grade/slab level, or as otherwise indicated on the drawings, shall be field painted with cold-applied asphalt emulsion complying with ASTM D 1187. Paint embedded areas only. Do not paint surfaces which are to be welded until welding is complete.

J. Field Touch-up: Touch-up all paint and galvanizing damage, including but not by limitation, damage caused during shipping, erection, construction damage, and field welded steel. See Division 9 specifications for additional requirements.

PART 3 EXECUTION

3.01 ERECTION:

A. General: Comply with AISC Specifications for bearing, adequacy of temporary connections, alignment, and removal of paint on surfaces adjacent to field welds.

B. Erection Procedures: Comply with "Code of Federal Regulations, Part 1926" per the Occupational Safety and Health Administration (OSHA), Department of Labor (Latest Revision).

C. Surveys: Employ a Registered Land Surveyor to verify elevations of concrete bearing surfaces, and locations of anchor bolts and similar devices, before erection work proceeds, and report discrepancies to Architect and Structural Engineer. Do not proceed with erection until corrections have been made, or until compensating adjustments to structural steel work have been approved by Structural Engineer of Record. Additional surveys required to verify out-of-alignment work and/or corrective work shall be performed at the contractor's expense.

D. Temporary Shoring and Bracing: This is the sole responsibility of the Contractor. Provide temporary shoring and bracing members with connections of sufficient strength to support imposed loads. Remove temporary members and connections when all permanent members are in place, and all final connections are made, including the floor and roof diaphragms. Provide temporary guy lines to achieve proper alignment of structures as erection proceeds. Comply with OSHA Standard referenced previous. Retain the services of a Specialty Structural Engineer (Not the Engineer of Record) to design specialty shoring and bracing.

E. Anchor Bolts: Furnish anchor bolts and other connectors required for securing structural steel to foundations and other in-place work.

1. 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.

2. Welding to anchor bolts for corrective measures is strictly prohibited without prior written approval from the Engineer.

F. Setting Plates and Base Plates:

1. Furnish templates and other devices as necessary for presetting bolts and other anchors to accurate locations. Refer to division 3 of the project Specifications for anchor bolt installation requirements in concrete.

2. Clean concrete bearing surfaces of bond-reducing materials. Clean bottom surface of setting and bearing plates.

3. Set loose and attached base plates for structural members on wedges or shims until fully grouted support is provided. If shown on drawings, anchor bolt nuts under base plates are not intended for erection support of base plate or column.

4. Pack non-shrink grout solidly between bearing surfaces and bases or leveling plates to ensure that no voids remain. Finish exposed surfaces, protect installed materials, and allow to cure. For proprietary grout materials, comply with manufacturer's instructions.

G. Concrete slabs that are part of elevated floors framing systems shall achieve 28-day design strength prior to the application of any superimposed loads such as curtain walls, masonry veneer, mechanical equipment and stairs. Additional testing beyond that specified in division 3 required to verify the concrete strength prior to application of superimposed loads shall be done at the Contractor's expense.

H. When installing expansion bolts or adhesive anchors, the contractor shall take measures to avoid drilling or cutting any existing reinforcement or damaging adjacent concrete. Holes shall be blown clean with compressed air and/or cleaned per manufacturer's recommendations prior to the installation of anchors.

I. Field Assembly:

1. Set structural frames accurately to lines and elevations indicated.

2. Align, adjust, level and plumb members of complete frame in to the tolerances indicated in the AISC Code of Standard Practice and in accordance with OSHA regulations.

3. Clean bearing surfaces and other surfaces which will be in permanent contact before assembly.

4. Perform necessary adjustments to compensate for discrepancies in elevations and alignment.

5. Splice members only where indicated and accepted on shop drawings.

6. Do not enlarge unfair holes in members by burning or by use of drift pins, except in secondary bracing members. Ream holes that must be enlarged to admit bolts.

J. Tolerances: Erection tolerances shall meet the "Code of Standard Practice" except as noted. Cumulative tolerances of framing elements shall not exceed the available tolerances of façade support systems to ensure and provide a plumb façade face.

K. Coat columns, base plates, and brace elements encased in concrete and/or below grade with cold-applied asphalt emulsion. Coordinate coating with concrete work.

L. Erection bolts: Remove erection bolts. On exposed welded construction fill holes with plug welds and grind smooth at exposed surface.

M. Gas Cutting: Do not use gas cutting torches in field for correcting fabrication errors in primary structural framing. Cutting will be permitted only on secondary members which are not under stress, as accepted by the Engineer of Record. Finish gas-cut sections equal to a sheared appearance when permitted.

N. Coating Damage: Touch up shop applied paint or galvanizing whenever damaged or bare. See "Coatings" sections for additional requirements.

O. Field Cut Beam Web Penetrations:

1. Field cut beam web penetrations are not permitted without written approval from the Structural Engineer.

2. Gas cutting torches are not permissible for cutting beam web penetrations without written approval from the Structural Engineer.

3. Beams with field cut beam web penetrations may require reinforcement, subject to the evaluation by the Structural Engineer.

4. The evaluation of field cut web penetrations by the Structural Engineers for Design-Build Subcontractors, including but not by limitation, Mechanical, Electrical, Plumbing and Sprinkler Subcontractors shall be compensated by the General Contractor or Design-Build Subcontractor.

5. The cost of executing field cut web penetrations and the associated beam reinforcement for Design-Build Subcontractors, including but not by limitation, Mechanical, Electrical, Plumbing and Sprinkler Subcontractors shall be paid for by the General Contractor or Design-Build Subcontractor.

6. Field cut beam web penetrations may not be permitted in certain locations, subject to the evaluation by the Structural Engineer.

P. Welders shall have current evidence of passing and maintaining the AWS D1.1 Qualifications test available in the field.

Q. Welding electrodes, welding process, minimum preheat and interpass temperatures shall be in accordance with AISC and AWS specifications. Any structural steel damaged in welding shall be replaced.

R. Field Welded Moment Connections:

1. Backing materials for top and bottom flanges for field welded moment connections shall be removed, backgouge the weld root, and apply a reinforcing fillet weld.

2. Where top flange steel backing materials are utilized, the backing may be left in place. In this case, the backing material shall be welded with a reinforcing fillet weld.

3.02 QUALITY CONTROL:

A. General: Contractor is responsible for maintaining quality control in the field and for providing a structure that is in strict compliance with the Contract Documents.

1. Required inspection and testing services are intended to assist the Contractor in complying with the Contract Documents. These specified services, however, do not relieve the Contractor of his responsibility for compliance, nor are they intended to limit the Contractor's quality control efforts in the field.

B. Testing: Owner shall engage an Independent Testing Agency to inspect all high-strength bolted and welded connections, to perform tests and prepare reports of their findings. All connections must pass these inspections prior to the installation of subsequent work which they support.

1. Testing agency shall conduct tests and state in each report which specific connections were examined or tested, whether the connections comply with requirements, and specifically state any deviations therefrom.

2. Contractor shall provide access for testing agency to places where structural steel work is being fabricated, produced or erected so that required inspection and testing can be accomplished. Testing agency may inspect structural steel at plant before shipment. The Engineer, however, reserves the right, at any time before final acceptance, to reject material not complying with specified requirements.

C. Inspection Requirements (to be performed by the Independent Testing Agency):

1. Bolted Connections: Inspect all bolted connections in accordance with procedures outlined in the AISC "Specification for Structural Joints using ASTM A325 or A490 Bolts.

2. Snug Tight Bolted Connections:

a. The inspector shall monitor the installation of bolts to determine that all plies of connected material have been drawn together and that the selected procedure is used to tighten all bolts.

b. If the inspector does not monitor the installation of bolts, he shall visually inspect the connection to determine that all plies of connected material have been drawn together and conduct tests on a sampling connection bolts to determine if they have been tightened to the snug tight condition. The test sample shall consist of 10% of the bolts in the connection, but not less than two bolts, selected at random. If more than 10% of the tested bolts fail the initial inspection, the engineer reserves the right to increase the number of bolts tested.

3. Slip Critical Bolted Connections:

a. The inspector shall monitor the calibration of torquing equipment and the installation of bolts to determine that all plies of connected material have been drawn together and that the selected procedure is used to tighten all bolts.

b. If the inspector does not monitor the calibration or installation procedures, he shall test all bolts in the affected connection using a manual torque wrench to assure that the required pretension has been reached.

4. Field Welded Connections: inspect and test during fabrication of structural steel assemblies, and during erection of structural steel all welded connections in accordance with procedures outline in AWS D1.1. Record types and location of defects found in work. Record work required and performed to correct deficiencies.

a. Certify welders and conduct inspections and tests as required. Submit welder certifications to Engineer of Record. Perform visual inspection of all welds. Primary and secondary welds, including fillet welds, full penetration welds, and deck puddle welds, applied in the field and/or shop, shall be visually inspected.

b. Welds deemed questionable by visual inspection shall receive non-destructive testing. In addition, all partial and full penetration welds, and any other welds indicated on the drawings are to receive non-destructive testing. Non-destructive testing methods include the following:

1. Radiographic Inspection (RT): ASTM E 94 and ASTM E 142; minimum quality level "2-2T".

2. Ultrasonic Inspection (UT): ASTM E 164.

3. Magnetic Particle (MT) inspection procedures may be utilized at the inspectors discretion in addition to RT or UT inspection. MT procedures shall not replace RT or UT procedures without permission from the Structural Engineer.

c. All welds deemed unacceptable shall be repaired and retested at the Contractor's expense.

D. Inspector shall verify that all ferrules are removed when applicable and that metal deck is free of debris prior to concrete placement.

E. Testing and inspection reports shall be submitted to the Owner, Architect and Engineer within 48 hours of completion of each test or inspection.

F. Nonconforming Work: Contractor shall be responsible for correcting deficiencies in structural steel work which inspections laboratory test reports have indicated to be not in compliance with requirements. Additional tests and/or surveys shall be performed, at the Contractor's expense, as may be necessary to show compliance of corrected work. Any costs associated with the Engineer's review and disposition of faulty works shall be borne by the Contractor.

PART 4 BASIS OF PAYMENT:

4.01 METHOD OF MEASUREMENT:

A. Structural Steel will be measured by the lump sum, complete and accepted. The Structural Steel limits shall be as shown or described in the Contract Documents.

4.02 BASIS OF PAYMENT:

A. Structural Steel will be paid for at the contract lump sum price. Payment for Structural Steel will be under:

| Pay Item | | Pay Unit |
|---|---|---|
| DIV. 5 | Metals | Lump Sum |

**END OF SECTION**

# SECTION 05 20 00 – OPEN WEB STEEL JOISTS

All work and materials shall conform to the Contract Documents and the provisions of the State of Maine Department of Transportation Standard Specifications, Revision November 2014, with the following additions:

Add the following:

## PART 1 GENERAL

### 1.01 RELATED DOCUMENTS:

A. The drawings and general conditions of the Contract, including General and Supplementary Conditions and MaineDOT Division 100, General Conditions, apply to 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 WORK:

A. Extent of steel joists is shown on drawings, including basic layout and type of joists required.

B. Related work specified elsewhere:

1. Section 05 12 00 - Structural Steel
2. Section 05 30 00 - Metal Decking
3. Section 05 50 00 - Metal Fabrications

### 1.03 QUALITY ASSURANCE:

A. Codes and Standards:

1. Steel Joist Institute (SJI) Standard Specifications, Load Tables and Weight Tables-latest revisions-for:
   a. K-Series Open Web Steel Joists as designated on the Contract Drawings.
   b. LH/DLH Series Open Web Long Span Steel Joists as designated on the Contract Drawings.
2. Steel Joist Institute (SJI) Recommended Code of Standard Practice for Steel Joists and Joist Girders, latest revision.
3. AWS D1.1 "Structural Welding Code" – Steel
4. AWS D1.3 "Structural Welding Code" - Sheet Steel
5. “Code of Federal Regulations, Part 1926” per the Occupational Safety and Health Administration (OSHA), Department of Labor (Latest Revision).

B. Qualification for Welding Work: Qualify welding processes and welding operators in accordance with AWS D1.1 "Standard Qualification Procedure".

1. Provide certification that welders to be employed in work have satisfactorily passed AWS qualification tests.
2. If recertification of welders is required, retesting will be the Contractor's responsibility.

### 1.04 SUBMITTALS:

A. Unless otherwise specified, submittals required in this section shall be submitted for review. Submittals shall be prepared and submitted in accordance with this section and Division 100.

B. General Contractor shall submit a Submittal Schedule to the engineer within 30 days after they have received the Owner’s Notice to Proceed.

C. All submittals shall be reviewed and returned to the Architect within 10 working days.

D. Incomplete submittals will not be reviewed.

E. Submittals not reviewed by the General Contractor prior to submission to the Engineer will not be reviewed. Include on the submittal statement or stamp of approval by Contractor, representing that the Contractor has seen and examined the submittal and that all requirements listed in Division 1 have been complied with.

F. Engineer will review submittals a maximum of two review cycles as part of their normal services. If submittals are incomplete or otherwise unacceptable and re-submitted, General Contractor shall compensate Engineer for additional review cycles.

G. Hardcopy Submittals: Submit three prints. Prints will be reviewed by the Engineer, and then the Architect. One marked print will be returned to Contractor for printing and distribution. Multiple copies will not be marked by the Engineer.

H. Electronic Submittals:

1. Contractor shall include in the submittal schedule an indication of submittals that are intended to be submitted electronically. Upon receipt of the submittal schedule, the Engineer reserves the right to indicate submittals that will not be accepted electronically. Paper copies of such submittals shall be furnished as referenced in this specification.

2. The Engineer reserves the right to require paper copies of submittals that are received electronically. Provide Engineer one (1) paper copies in addition to the electronic submittal. Paper copy will be retained and electronic copy will be returned. Review cycle for such submittals shall not commence until such time that the paper copies are received.

3. Electronic Submittals shall be submitted in Protected Document Format (PDF) compatible with Bluebeam version 12 or later. Electronic files shall not be broken into smaller individual files. File sizes too large to process email or within a file transfer protocol (FTP) site shall be provided on a CD.

4. The submission of submittals electronically does not relieve the contractor of their responsibility to review the submittal prior to transmission to the Engineer. Electronic Submittals shall include contractor comments, and a statement and/or stamp of approval by Contractor, representing that the Contractor has seen and examined the submittal and that all requirements listed in this Section and Division 1 have been complied with. Electronic submittals without the Contractor’s approval will be rejected and returned.

5. The Engineer assumes no responsibility for the printed reproduction of submittals reviewed electronically, transmission errors or returned electronic submittals that become corrupted or are otherwise not accessible by the Contractor’s or Subcontractor’s computer hardware and/or software.

I. Product Data: Submit manufacturer's specifications and installation instructions for each type of joist and accessories. Include manufacturer's certification that joists comply with SJI Standard Specifications. Product data shall include:

1. Joist steel component certified mill reports for each grade of steel covering chemical and physical properties and yield strengths.

2. Steel joist primer paint.

3. Welder certifications

J. Shop Drawings:

1. Shop Drawing Review: Electronic files of structural drawings will not be provided to the contractor for preparation of shop drawings. Reproduction of any portion of the Construction Documents for use as Shop drawings and/or Erection Drawings is prohibited. Shop drawings and/or Erection drawings created from reproduced Construction Documents will be returned without review.

a. Review of the shop drawings will be made for the size and arrangement of the members and strength of the connections. Conformance of the Shop Drawings to the Contract Drawings remains the responsibility of the General Contractor. Engineer’s review in no way relieves the General Contractor of

this responsibility.

b. Shop drawings will not be reviewed as partial submittals. A complete submittal shall be provided and shall include; erection and piece drawings indicating all joist members, bridging, connections and accessories. Incomplete submittals will not be reviewed.

2. Design

a. Unless noted otherwise, steel joists shall be designed to support the uniformly distributed loads per the "Standard Load Tables" by the Steel Joist Institute. An allowance for MEP equipment and architectural component loads has been included in the uniformly distributed design loads. The joist design shall allow a 150 pound concentrated hanger load be applied at any location along either the top or bottom chord of the joists that is part of the MEP equipment and architectural component allowance, without additional reinforcement.

b. Calculations for SP joists: Submit design calculations for special steel joists indicated on Contract Drawings by SP designation, Joist Girders or as otherwise noted. Submit calculations stamped by a Registered Professional Engineer licensed to practice in the State of Maine. Design joists for the loads indicated on the Contract Drawings with a vertical deflection due to live load not exceeding: 1/360 of the span for floor joists, 1/360 of the span for roof joists where plaster ceiling is attached or suspended, and 1/240 of the span for all other roof joists. Concentrated loads applied to SP joists are to be applied as Live Loads unless otherwise indicated.

3. Evidence of in-plant inspections: Per SJI requirements, each manufacturer shall verify his ability to manufacturer steel joists through periodic in-plant inspections. Inspections shall be performed by an independent testing agency. Submit evidence of participation in SJI in-plant inspections program.

4. Test Reports: Submit copies of reports of tests conducted on shop and field bolted and welded connections. Include data on type(s) of test conducted and test results.

1.05 DELIVERY, STORAGE AND HANDLING:

A. Deliver materials to site at such intervals to insure uninterrupted progress of work.

B. Store materials to permit easy access for inspection and identification. Keep steel members off ground, using pallets, platforms, or other supports. Protect steel members and packaged materials from corrosion and deterioration.

C. Deliver, store and handle steel joists as recommended in SJI Standard Specifications and SJI Technical Digest #9 "Handling and Erection of Steel Joists and Joist Girders". Store materials to permit easy access for inspection and identification. Keep steel members off ground, using pallets, platforms, or other supports. Handle and store joists in a manner to avoid deforming members and to avoid excessive stresses. Protect joist members and packaged materials from corrosion and deterioration.

PART 2 PRODUCTS

2.01 MATERIALS:

A. Steel: Comply with SJI Standard Specifications.

B. Unfinished Threaded Fasteners: ASTM A 307, Grade A, regular hexagon type, low carbon steel

C. High-Strength Bolts and Nuts: ASTM A325, Type I, heavy hex structural bolts, heavy hex nuts and hardened steel washers.

D. Steel Primer Paint: Manufacturer's standard shop paint conforming to Steel Structures Painting Council Specification: SSPC-Paint 15 "Steel Joist Shop Primer", or a shop paint which meets the minimum performance requirements of SSPC-Paint 15.

2.02 FABRICATION:

A. General: Fabricate steel joists in accordance with SJI Standard Specifications.

B. Holes in Chord Members: Provide holes in chord members where shown for securing other work to steel joists;

deduct area of holes from the area of chord when calculating strength of member.

C. Openings in Web: Coordinate openings in joist and joist girder webs to allow through passage of HVAC, sprinklers, etc. in locations shown on the drawings.

D. Extended Ends: Provide extended ends on joists where shown and where deck extends beyond supports, complying with manufacturer's standards and requirements of applicable SJI Standard Specifications and Load Tables. Unless noted otherwise, “R” type extended ends shall be utilized.

E. Uplift: Roof joists shall be designed for a net uplift of 15 psf.

F. Camber: Camber in accordance with SJI Standard Specifications. Joists shall not be manufactured with negative camber.

G. Bridging:

1. Provide horizontal or diagonal type bridging for "open web" joists, complying with SJI Standard Specifications and any additional requirements shown on Contract Drawings. Bridging layout shall be clearly indicated on the shop drawings.

2. Provide bridging anchors for ends of bridging lines terminating at walls or beams.

3. Provide bottom chord bridging for uplift, in accordance with SJI Standard Specifications, and SJI Technical Digest #6 “Structural Design of Steel Roof Joists to Resist Uplift Loads” when the above noted uplift load is greater than zero.

H. End Anchorage: Provide end anchorages to secure joists to adjacent construction, complying with SJI Standard Specifications, unless otherwise indicated. Roof joists shall be anchored to resist the above noted uplift force.

1. Minimum final connection each side of joist seat, unless noted otherwise, shall be as follows:

a. “K” Joists: 2 inches, 1/8” fillet weld or (2) 1/2" diameter A307 Bolts

b. “LH” Joists: 2 inches, 1/4" fillet weld, or (2) 3/4" diameter A325 Bolts (slip critical)

I. Shop Painting:

1. Remove loose scale, heavy rust and other foreign materials from fabricated joists and accessories before application of shop paint in accordance with SSPC-SP 1 and SSPC-SP 2.

2. Apply one shop coat of primer paint, SSPC-Paint 15, or better, to steel joists 2.0 to 3.0 mils DFT (dry film thickness) measurement in accordance with SSPC-PA 2.

## PART 3 EXECUTION

### 3.01 ERECTION:

A. General: Place and secure steel joists in accordance with SJI Standard Specifications, final shop drawings, and as herein specified. Comply with “Code of Federal Regulations, Part 1926” per the Occupational Safety and Health Administration (OSHA), Department of Labor (Latest Revision).

B. Placing Joists:

1. Do not start placement of steel joists until supporting work is in place and secured.

2. Place joists on supporting work, adjust and align in accurate location and spacing before permanently fastening.

3. Provide temporary bridging, connections and anchors to ensure lateral stability during construction.

C. Bridging: Install bridging simultaneously with joist erection, before construction loads are applied. Anchor ends of bridging lines at top and bottom chords where terminating at walls or beams.

D. Fastening:

1. Joist at column lines shall be bolted with a minimum (2) 3/4" diameter A325 bolts in a slip critical type connection. Stabilizer plates welded to the columns shall be provided at the bottom chord angles at all column lines. Do not weld bottom chord angles to stabilizer plate unless noted otherwise.

2. Field weld joists to supporting steel framework in accordance with SJI Standard Specifications for type of joists used. Coordinate welding sequence and procedure with placing of joists.

3. Bolt joists to supporting steel framework in accordance with SJI Standard Specifications for type of joists used.

E. Reinforcement for Concentrated Loads: Reinforcing angles shall be applied for concentrated loads in excess of 150 pounds applied to joists. The reinforcing angles shall transfer the concentrated loads to a joist panel point. Unless noted otherwise, hung elements shall be attached to the joist top chords. Hangers and hanger accessories shall be designed by a Specialty Structural Engineer Registered in the State of Maine (Not the Engineer of Record).

F. Touch-up painting: Clean field welds, bolted connections, and abraded areas, and apply same type of primer paint as used in shop.

3.02 QUALITY CONTROL:

A. General: Contractor is responsible for maintaining quality control in the field and for providing a structure that is in strict compliance with the Contract Documents.

B. Required inspection and testing services are intended to assist the Contractor in complying with the Contract Documents. These specified services, however, do not relieve the Contractor of his responsibility for compliance, nor are they intended to limit the Contractor’s quality control efforts in the field.

C. Testing: Owner shall engage an Independent Testing Agency to inspect all puddle welded connections, to perform tests and prepare reports of their findings. All connections must pass these inspections prior to the installation of subsequent work which they support.

D. Joist Inspection Requirements (to be performed by the Independent Testing Agency):

E. Testing:

1. Joist connections, bringing connections and field splices shall be tested as indicated in specification section 05120. Work found to be defective will be removed and replaced at the Contractor's expense.

2. Provide certification that welders to be employed in work have satisfactorily passed AWS qualification tests. If re-certification of welders is required, re-testing will be the Contractor's responsibility.

PART 4 BASIS OF PAYMENT

4.01 METHOD OF MEASUREMENT:

A. Open web steel joists will be measured by the lump sum, complete and accepted. The open web steel joist limits shall be as shown or described in the Contract Documents.

4.02 BASIS OF PAYMENT:

A. Open web steel joists will be paid for at the contract lump sum price. Payment for open web steel joists will be under:

| Pay Item | | Pay Unit |
|---|---|---|
| DIV. 5 | Metals | Lump Sum |

**END OF SECTION**

# SECTION 05 30 00 – METAL DECKING

All work and materials shall conform to the Contract Documents and the provisions of the State of Maine Department of Transportation Standard Specifications, Revision November 2014, with the following additions:

Add the following:

PART 1 GENERAL

1.01 RELATED DOCUMENTS

A. The drawings and general conditions of the Contract, including General and Supplementary Conditions and MaineDOT Division 100, General Conditions, apply to 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 WORK

A. Extent of metal floor and roof deck is shown on the drawings and includes roof deck, cell closures, end plates, welding washers and sump plates or pans.

1.03 RELATED WORK

1. Section 05 12 00 - Structural Steel
2. Section 05 20 00 – Open Web Steel Joists
3. Section 05 50 00 - Metal Fabrications

1.04 QUALITY STANDARDS

A. Codes and Standards: Comply with provisions of the following codes and standards, except where more stringent requirements are indicated or specified:

1. AISI "Specification for the Design of Cold Formed Steel Structural Members”.
2. AWS D1.1 "Structural Welding Code" - Steel
3. AWS D1.3 "Structural Welding Code" - Sheet Steel
4. Steel Deck Institute (SDI) " Design Manual for Floor Decks and Roof Decks”.
5. “Code of Federal Regulations, Part 1926” per the Occupational Safety and Health Administration (OSHA), Department of Labor (Latest Revision).

B. Qualification of field welding: Qualify welding process and welding operators in accordance with AWS D1.1 "Standard Qualification Procedure."

1.05 SUBMITTALS

A. Unless otherwise specified, submittals required in this section shall be submitted for review. Submittals shall be prepared and submitted in accordance with this section and Division 100.

B. General Contractor shall submit a Submittal Schedule to the engineer within 30 days after they have received the Owner’s Notice to Proceed.

C. All submittals shall be reviewed and returned to the Architect within 10 working days.

D. Incomplete submittals will not be reviewed.

E. Submittals not reviewed by the General Contractor prior to submission to the Engineer will not be reviewed. Include on the submittal statement or stamp of approval by Contractor, representing that the Contractor has seen and

examined the submittal and that all requirements listed in Division 1have been complied with.

F. Engineer will review submittals a maximum of two review cycles as part of their normal services. If submittals are incomplete or otherwise unacceptable and re-submitted, General Contractor shall compensate Engineer for additional review cycles.

G. Hardcopy Submittals: Submit three prints. Prints will be reviewed by the Engineer, and then the Architect. One marked print will be returned to Contractor for printing and distribution. Multiple copies will not be marked by the Engineer.

H. Electronic Submittals:

1. Contractor shall include in the submittal schedule an indication of submittals that are intended to be submitted electronically. Upon receipt of the submittal schedule, the Engineer reserves the right to indicate submittals that will not be accepted electronically. Paper copies of such submittals shall be furnished as referenced in this specification.

2. The Engineer reserves the right to require paper copies of submittals that are received electronically. Provide Engineer one (1) paper copies in addition to the electronic submittal. Paper copy will be retained and electronic copy will be returned. Review cycle for such submittals shall not commence until such time that the paper copies are received.

3. Electronic Submittals shall be submitted in Protected Document Format (PDF) compatible with Bluebeam version 12 or later. Electronic files shall not be broken into smaller individual files. File sizes too large to process email or within a file transfer protocol (FTP) site shall be provided on a CD.

4. The submission of submittals electronically does not relieve the contractor of their responsibility to review the submittal prior to transmission to the Engineer. Electronic Submittals shall include contractor comments, and a statement and/or stamp of approval by Contractor, representing that the Contractor has seen and examined the submittal and that all requirements listed in this Section and Division 1 have been complied with. Electronic submittals without the Contractor's approval will be rejected and returned.

5. The Engineer assumes no responsibility for the printed reproduction of submittals reviewed electronically, transmission errors or returned electronic submittals that become corrupted or are otherwise not accessible by the Contractor's or Subcontractor's computer hardware and/or software.

I. Product Data: Submit manufacturer's specifications and installation instructions for each type of decking and accessories. Include manufacturer's certification as may be required to show compliance with these specifications.

J. Shop Drawings:

1. Shop Drawing Review: Electronic files of structural drawings **will not** be provided to the contractor for preparation of shop drawings.

a. Submit detailed drawings showing layout and types of deck panels, galvanizing, shop paint, anchorage details, and conditions requiring closure panels, supplementary framing, sump pans, cant strips, cut openings, special jointing, and all other accessories. Conformance of the Shop Drawings to the Contract Drawings remains the responsibility of the General Contractor. Engineer's review in no way relieves the General Contractor of this responsibility.

b. Shop drawings will not be reviewed as partial submittals. A complete submittal shall be provided and shall include; erection and piece drawings. Incomplete submittals will not be reviewed**.**

1.06 DELIVERY, STORAGE AND HANDLING:

A. Deliver materials to site at such intervals to insure uninterrupted progress of work.

B. Store materials to permit easy access for inspection and identification. Keep deck sheets off ground, using pallets, platforms, or other supports. Protect deck sheets and packaged materials from corrosion and deterioration.

C. Do not store materials on structure in a manner that might cause distortion or damage to members or supporting structures. Materials shall be stored in a manner to avoid ponding of precipitation on members. Repair or replace damaged materials or structures as directed.

PART 2 PRODUCTS

2.01 GENERAL:

A. Acceptable Manufacturers: Subject to compliance with requirements, manufacturers offering products which may be incorporated in the work include, but are not limited to, the following:

1. United Steel Deck
2. Wheeling Corrugating Co.
3. Epic Metals Corporation
4. Vulcraft

B. Materials:

1. Steel for Metal Deck Units:
    a. Roof Deck Units: ASTM A653, Structural Quality, grade 33 or higher.
2. Miscellaneous Steel Shapes: ASTM A36 minimum.
3. Sheet metal Accessories: ASTM A526, commercial quality, galvanized.

C. Galvanizing: Conform to ASTM 924-94 with minimum coating class of G60 (Z180) as defined in ASTM A653-94.

D. Paint: Manufacturer's baked on, rust inhibitive paint, for application to metal surfaces which have been chemically cleaned and phosphate chemical treated.

E. Flexible closure Strips: Manufacturer standard vulcanized, closed-cell, synthetic rubber.

2.02 FABRICATION:

A. General: Form deck units in lengths to span 3 or more supports, unless otherwise noted on the drawings, with flush, telescoped or nested 2" laps at ends and interlocking or nested side laps, unless otherwise indicated. For roof deck units, provide deck configurations complying with SDI "Roof Deck Specifications," of metal thickness, depth and width as shown.

B. Metal Cover Plates: Fabricate metal cover plates for end-abutting floor deck units of not less than same thickness as decking. Form to match contour of deck units and approximately 6" wide.

C. Metal Closure Strips: Fabricate metal closure strips, cell closures, "Z" closures, column closures, pour stops, girder fillers and openings between decking and other construction, of not less than 0.045" min. (18 gage) sheet steel or as indicated on the drawings. Form to provide tight fitting closures at open ends of cells or flutes and sides of decking.

D. Pour Stops: Minimum material thickness shall be 18 gage or as indicate on drawings.. Fabricate vertical leg to accommodate specified slab thickness. Fabricate horizontal leg to minimize field cuts. Provide welded attachment sufficient to resist forces during concrete placement.

E. Roof Sump Pans: Fabricate from a single piece of 0.071" min. (14 gage) galvanized sheet steel with level bottoms and sloping sides to direct water flow to the drains, unless otherwise shown. Provide sump pans of adequate size to receive roof drains and with bearing flanges not less than 3" wide. Recess pans not less than 1 1/2" below roof deck surface, unless otherwise shown or required by deck configuration. Holes for drains will be cut in the field.

F. Provide all pour stops and accessories necessary to contain concrete for poured concrete surfaces.

PART 3 EXECUTION

3.01 INSTALLATION:

A. Install deck units and accessories in accordance with manufacturer's recommendations and final shop drawings, and as specified herein.

B. Place deck units on supporting steel framework and adjust to final position with ends accurately aligned and bearing on supporting members before permanently fastened. Deck shall be in full contact with members parallel to ribs and attached as indicated. Do not stretch or contact side lap interlocks.

C. Place deck units in straight alignment for entire length of run of cells and with close alignment between cells at ends of abutting units.

D. Place deck units flat and square, secured to adjacent framing without warp or excessive deflection.

E. Coordinate and cooperate with the structural steel erector in locating decking bundles to prevent overloading of structural members.

F. Do not use decking units for storage or working platforms until permanently installed.

3.02 FASTENING:

A. Roof Deck: Each deck is to be fastened with a minimum of 5/8" diameter puddle welds spaced in a 36/7 pattern (1.5B deck) with a minimum of 2 welds per unit at each support if incomplete sheet is utilized. Where support is parallel to support, at edge of building, at brace lines, at edge of opening or deck discontinuity provide puddle welds at 6” o.c. Secure deck to each supporting member in ribs where sidelaps occur. Deck units shall bear over the ends of supports by a minimum of 1.5”. Sidelaps: #10 Tek screws, 5 per span for B deck.

B. Welding: Comply with AWS requirements and procedures for manual shielded metal arc welding, appearance and quality of welds, and methods used in correcting welding work.

C. Uplift loading: Floor deck units are not required to resist uplift loads. Decking units used at the roof level shall be designed for a net uplift of 15 psf.

D. Cutting and Fitting: Cut and neatly fit deck units and accessories around other work projecting through or adjacent to the decking.

E. Reinforcement at openings: Provide additional metal reinforcement and closures pieces as required for strength, continuity of decking and support of other work shown.

1. Deck penetrations affecting no more than (1) deck rib need not be reinforced.

2. For deck penetration affecting more than (1) deck rib, but less than 10", reinforce the opening with a 0.057" thick plate spanning between unaffected ribs, unless otherwise shown on the Design Drawings or supporting a piece of mechanical equipment (see item 3).

3. Reinforce deck penetrations larger than 10" with the structural frame described in the Design Drawings.

F. Joint Covers: Provide metal joint covers at abutting ends and changes in direction of floor deck units.

G. Roof Sump Pans: Place over openings provided in roof decking and weld to top decking surface. Space welds not more than 12" on center with at least 1 weld in each corner. Cut opening in roof sump bottom to accommodate drain size indicated.

H. Closure Strips: Provide metal closure strips at open uncovered ends and edges of roof decking, and in voids between decking and other construction. Weld into position to provide a complete decking installation.

I. Touch-Up Painting:

1. Painted Deck: After decking installation, wire brush, clean and paint scarred areas, welds and rust spots on top and bottom surfaces of decking units and supporting steel members.

a. Touch up painted surfaces with same type paint used on adjacent surfaces.

b. In areas where shop-painted surfaces are to be exposed, apply touch-up paint to blend into adjacent surfaces.

3.03 QUALITY CONTROL:

A. General: Contractor is responsible for maintaining quality control in the field and for providing a structure that is in strict compliance with the Contract Documents.

B. Required inspection and testing services are intended to assist the Contractor in complying with the Contract Documents. These specified services, however, do not relieve the Contractor of his responsibility for compliance, nor are they intended to limit the Contractor's quality control efforts in the field.

C. Testing: Owner shall engage an Independent Testing Agency to inspect all puddle welded connections, to perform tests and prepare reports of their findings. All connections must pass these inspections prior to the installation of subsequent work which they support.

D. Deck Testing Requirements (to be performed by the Independent Testing Agency):

1. Deck and accessory welding and/or attachments subject to inspection and testing. Work found to be defective will be removed and replaced at the Contractor's expense.

2. Provide certification that welders to be employed in work have satisfactorily passed AWS qualification tests. If re-certification of welders is required, re-testing will be the Contractor's responsibility.

PART 4 BASIS OF PAYMENT:

4.01 METHOD OF MEASUREMENT:

A. Metal decking will be measured by the lump sum, complete and accepted. The metal decking limits shall be as shown or described in the Contract Documents.

4.02 BASIS OF PAYMENT:

A. Metal decking will be paid for at the contract lump sum price. Payment for metal decking will be under:

| Pay Item | | Pay Unit |
|---|---|---|
| DIV. 5 | Metals | Lump Sum |

**END OF SECTION**

# SECTION 05 40 00 – EXTERIOR COLD FORMED METAL FRAMING

All work and materials shall conform to the Contract Documents and the provisions of the State of Maine Department of Transportation Standard Specifications, Revision November 2014, with the following additions:

Add the following:

PART 1 GENERAL

1.01 RELATED DOCUMENTS

A. The drawings and general conditions of the Contract, including General and Supplementary Conditions and MaineDOT Division 100, General Conditions, apply to 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 steel stud structural framing system at exterior walls as noted on the Drawings.
2. Providing and installing miscellaneous fasteners, hat channels, stiffeners, bridging, expansion joints, and accessories necessary to complete the work.

B. Related work specified elsewhere:

1. Interior Partition Walls: Division 9
2. Exterior Gypsum Sheathing: Division 9

1.03 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, *"Specification for the Design of Cold-Formed Steel Structural Members"*.
2. AWS D1.1 "Structural Welding Code" - Steel.
3. AWS D1.3 "Structural Welding Code" - Sheet Steel.
4. ASTM C 954, Standard specification for steel drill screws for the application of gypsum board or metal plaster bases to steel studs from 0.033 in. to 0.112 in. thickness.
5. ASTM C 955, Standard Specification for Load-Bearing Steel Studs, Runners, and Bracing or Bridging, for Screw Application of Gypsum Board and Metal Plaster Bases.
6. ASTM C 1007 Standard Specification for installation of load bearing steel studs and related accessories.
7. Standard Specification for installation of load bearing steel studs and related accessories.
8. ASCE 7-05 "Minimum Design Loads for Building and Other Structures."
9. International Building Code, 2009 Edition
10. "Code of Federal Regulations, Part 1926" per the Occupational Safety and Health Administration (OSHA), Department of Labor (Latest Revision).

B. Maximum Allowable Deflections: Deflection limitations, (either horizontal or vertical), include the effect of studs only, not sheathing or facing material. Spans are measured in inches between the attachments to structural steel or concrete.

1. Supporting Stone Veneer: 1/600 of span or 0.3 inches
2. Supporting Siding: 1/360 of span

C. Design wind pressures: Design wind pressures calculated in accordance with ASCE 7-05 for Components and Cladding, shall be used in the design of the exterior cold formed steel framing system. Utilize wind speed, importance factor and exposure indicated on the project General Notes.

D. 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 3/4" Live Load deflection of the supporting member. Minimum depth of slip track shall be 2". Minimum thickness shall be 14 gage. Slide clips are also acceptable where applicable.

1.04 SUBMITTALS

A. Unless otherwise specified, submittals required in this section shall be submitted for review. Submittals shall be prepared and submitted in accordance with this section and Division 100.

B. General Contractor shall submit a Submittal Schedule to the engineer within 30 days after they have received the Owner's Notice to Proceed.

C. All submittals shall be reviewed and returned to the Architect within 10 working days.

D. Incomplete submittals will not be reviewed.

E. Submittals not reviewed by the General Contractor prior to submission to the Engineer will not be reviewed. Include on the submittal statement or stamp of approval by Contractor, representing that the Contractor has seen and examined the submittal and that all requirements listed in Division 1 have been complied with.

F. Engineer will review submittals a maximum of two review cycles as part of their normal services. If submittals are incomplete or otherwise unacceptable and re-submitted, General Contractor shall compensate Engineer for additional review cycles.

G. Hardcopy Submittals: Submit three prints. Prints will be reviewed by the Engineer, and then the Architect. One marked print will be returned to Contractor for printing and distribution. Multiple copies will not be marked by the Engineer.

H. Electronic Submittals:

1. Contractor shall include in the submittal schedule an indication of submittals that are intended to be submitted electronically. Upon receipt of the submittal schedule, the Engineer reserves the right to indicate submittals that will not be accepted electronically. Paper copies of such submittals shall be furnished as referenced in this specification.
2. The Engineer reserves the right to require paper copies of submittals that are received electronically. Provide Engineer one (1) paper copies in addition to the electronic submittal. Paper copy will be retained and electronic copy will be returned. Review cycle for such submittals shall not commence until such time that the paper copies are received.
3. Electronic Submittals shall be submitted in Protected Document Format (PDF) compatible with Bluebeam version 12 or later. Electronic files shall not be broken into smaller individual files. File sizes too large to process email or within a file transfer protocol (FTP) site shall be provided on a CD.
4. The submission of submittals electronically does not relieve the contractor of their responsibility to review the submittal prior to transmission to the Engineer. Electronic Submittals shall include contractor comments, and a statement and/or stamp of approval by Contractor, representing that the Contractor has seen and examined the submittal and that all requirements listed in this Section and Division 1 have been complied with. Electronic submittals without the Contractor's approval will be rejected and returned.

5. The Engineer assumes no responsibility for the printed reproduction of submittals reviewed electronically, transmission errors or returned electronic submittals that become corrupted or are otherwise not accessible by the Contractor's or Subcontractor's computer hardware and/or software.

I. 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
2. Anchors and anchor bolts
3. Self drilling screws

J. Shop Drawings:

1. Shop Drawing Review: Electronic files of structural drawings **will not** be provided to the contractor for preparation of shop drawings. Reproduction of any portion of the Construction Documents for use as Shop drawings and/or Erection Drawings is prohibited. Shop drawings and/or Erection drawings created from reproduced Construction Documents will be returned without review.
2. General: Submit shop drawings showing the following:
   a. Stud gages and spacings.
   b. Sizes, gages and fastenings for all built-up members including but not limited to headers and jambs.
   c. Shop Coatings
   d. Type, size, quantity, locations and spacings 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.
3. Conformance of the Shop Drawings to the Contract Drawings remains the responsibility of the General Contractor. Engineer's review in no way relieves the General Contractor of this responsibility.
4. Shop drawings will not be reviewed as partial submittals. A complete submittal shall be provided and shall include; erection and piece drawings. **Incomplete submittals will not be reviewed.**

K. Design calculations shall be prepared by a Professional Engineer (Specialty Engineer) registered in the State of Maine, illustrating the design of exterior steel stud wall systems including all all necessary stiffeners and bracing connections and anchorage required for a complete structural system.

L. Professional Engineer responsible for design of cold formed framing shall review the installation and submit a correspondence indicating compliance with the design. Review shall include all work. Any discrepancies noted shall be corrected and reviewed by the Engineer prior to the submittal of the correspondence.

1.05 DELIVERY, STORAGE AND HANDLING:

A. Deliver materials to site at such intervals to insure uninterrupted progress of work.

B. Deliver anchorage devices, which are to be embedded in cast-in-place, in ample time to not delay work.

C. Store materials to permit easy access for inspection and identification. Keep cold formed members off ground, using pallets, platforms, or other supports. Protect cold formed members and packaged materials from corrosion and deterioration.

D. Do not store materials on structure in a manner that might cause distortion or damage to members or supporting structures. Materials shall be stored in a manner to avoid ponding of precipitation on members. Repair or replace damaged materials or structures as directed.

PART 2 PRODUCTS

2.01 FRAMING MEMBERS

A. Steel Studs:

1. Acceptable manufacturers: Manufacturer shall be a member of the Steel Stud Manufacturers Association.
2. Minimum stud shall be 6", 18 gage with 1.625" flange.
3. Maximum Spacing: 16 inches, on-center.
4. Minimum studs indicated have not been engineered, but are provided as a general guideline. Engineering of studs is the responsibility of the Specialty Design Engineer referenced in the Submittals Section, and not the Engineer of Record nor the Architect of Record. Any exterior stud size, gage, spacing, bracing and connection information shown on the Contract Documents is schematic only. The Contractor shall provide the studs and built-up sections, engineered by the Specialty Engineer. If studs of a thicker gage or lesser spacing are required by the Specialty Engineer's design, the studs shall be provided at no additional cost to the Owner.
5. Provide channel-shaped load-bearing studs, channel-shaped joists, runners (tracks), blocking, lintels, clip angles, shoes, reinforcements, stiffeners, fasteners, and other accessories recommended by manufacturer for complete framing system
6. Steel framing materials shall comply with ASTM A 446, A 570, or A 611, as applicable. Fabricate all components from structural quality sheet steel with the following minimum yield points:
    a. 16 ga. and heavier 50,000 psi
    b. 18 ga., 33,000 psi
    c. 20 ga., 33,000 psi (permitted for bottom track only).
7. Manufacture of studs, runners (track), and other framing members shall comply with ASTM C 955.
8. Framing components shall be galvanized per ASTM A 525, minimum G-60 coating.

B. Screws and other attachment devices:

1. Provide a protective cadmium or zinc plated coating 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.

C. Standard Steel Shapes: Standard steel shapes, plates, etc. shall conform to material and finish specifications in Division 5 -Miscellaneous Metals.

PART 3 EXECUTION

3.01 INSTALLATION

A. Product Storage: Store studs, 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: 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. Provide blocking and strapping within 12" of slip joint and at 8'-0" o.c., or as required for member bracing.

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.

E. Anchorage to Structure: Securely anchor studs and track to floor construction and overhead structure. Provide fasteners at a maximum of 16" on center. Provide slip joints where non-bearing vertical studs meet floor or roof structural steel, or as indicated on the drawings. Provide sill sealer beneath all floor tracks.

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. Lintels: Lintels supporting masonry veneer shall be secured to studs by screws or power-driven anchors. Method of anchorage shall be sufficient to support veneer with a factor of safety of 3.0.

I. Bridging/Bracing: Provide horizontal strap bracing for all walls. Minimum requirements are as follows: Horizontal bracing shall be continuous 20 gage x 1 1/2" wide steel straps on each face of the stud, located at 4'-0" maximum for the full height of the wall. Provide CR runner solid bridging at 8'-0" for the full height of the wall at each line of bracing. An additional row of bracing shall be provide within 12 inches of the slip joint.

J. Tolerances: Finished installation shall be level and plumb within a tolerance of 1/8 inch in 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.

PART 4 BASIS OF PAYMENT:

4.01 METHOD OF MEASUREMENT:

A. Exterior cold formed metal framing will be measured by the lump sum, complete and accepted. The exterior cold formed metal framing limits shall be as shown or described in the Contract Documents.

4.02 BASIS OF PAYMENT:

A. Exterior cold formed metal framing will be paid for at the contract lump sum price. Payment for exterior cold formed metal framing will be under:

| Pay Item | | Pay Unit |
|---|---|---|
| DIV. 5 | Metals | Lump Sum |

**END OF SECTION**

# SECTION 05 50 00 - METAL FABRICATIONS

All work and materials shall conform to the Contract Documents and the provisions of the State of Maine Department of Transportation Standard Specifications, Revision December 2002, with the following additions:

Add the following:

## PART 1 - GENERAL

### 1.1 RELATED DOCUMENTS

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

### 1.2 SUMMARY

A. This Section includes the following:
1. Steel framing and supports for mechanical and electrical equipment.
2. Steel framing and supports for applications where framing and supports are not specified in other Sections.
3. Metal ladders.
4. Metal guard rails.

B. Products furnished, but not installed, under this Section include the following:

1. Loose steel lintels.

C. Related Sections include the following:
1. Division 04 Section "Unit Masonry" for installing loose lintels, anchor bolts, and other items indicated to be built into unit masonry.
2. Division 05 Section "Structural Steel Framing."
3. Division 05 Section "Pipe and Tube Railings."
4. Division 06 Section "Rough Carpentry" for metal framing anchors.

### 1.3 PERFORMANCE REQUIREMENTS

A. Structural Performance of Ladders: Provide ladders capable of withstanding the effects of loads and stresses within limits and under conditions specified in ANSI A14.3.
1. Provide ladders meeting the OSHA requirements of 29CFR 1910.27.

B. Thermal Movements: Provide exterior metal fabrications that allow for thermal movements resulting from the following maximum change (range) in ambient and surface temperatures by preventing buckling, opening of joints, overstressing of components, failure of connections, and other detrimental effects. Base engineering calculation on surface temperatures of materials due to both solar heat gain and nighttime-sky heat loss.
1. Temperature Change (Range): 120 deg F, ambient; 180 deg F, material surfaces.

### 1.4 SUBMITTALS

A. Product Data: For the following:
1. Nonslip aggregates and nonslip-aggregate surface finishes.
2. Paint products.
3. Grout.

B. Shop Drawings: Show fabrication and installation details for metal fabrications.

1. Include plans, elevations, sections, and details of metal fabrications and their connections. Show anchorage and accessory items.
2. Provide templates for anchors and bolts specified for installation under other Sections.
3. For installed products indicated to comply with design loads, include structural analysis data signed and sealed by the qualified professional engineer responsible for their preparation.

C. Welding certificates.

1.5 QUALITY ASSURANCE

A. Welding: Qualify procedures and personnel according to the following:

1. AWS D1.1, "Structural Welding Code--Steel."
2. AWS D1.3, "Structural Welding Code--Sheet Steel."

1.6 PROJECT CONDITIONS

A. Field Measurements: Verify actual locations of walls and other construction contiguous with metal fabrications by field measurements before fabrication and indicate measurements on Shop Drawings.

1. Established Dimensions: Where field measurements cannot be made without delaying the Work, establish dimensions and proceed with fabricating metal fabrications without field measurements. Coordinate wall and other contiguous construction to ensure that actual dimensions correspond to established dimensions.
2. Provide allowance for trimming and fitting at site.

1.7 COORDINATION

A. Coordinate installation of anchorages for metal fabrications. Furnish setting drawings, templates, and directions for installing anchorages, including sleeves, concrete inserts, anchor bolts, and items with integral anchors, that are to be embedded in concrete or masonry. Deliver such items to Project site in time for installation.

B. Coordinate installation of steel weld plates and angles for casting into concrete that are specified in this Section but required for work of another Section. Deliver such items to Project site in time for installation.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. In other Part 2 articles where titles below introduce lists, the following requirements apply to product selection:

1. Available Products: Subject to compliance with requirements, products that may be incorporated into the Work include, but are not limited to, products specified.
2. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, manufacturers specified.

2.2 METALS, GENERAL

A. Metal Surfaces, General: Provide materials with smooth, flat surfaces, unless otherwise indicated. For metal fabrications exposed to view in the completed Work, provide materials without seam marks, roller marks, rolled trade names, or blemishes.

## 2.3 FERROUS METALS

A. Recycled Content of Steel Products: Provide products with an average recycled content of steel products so postconsumer recycled content plus one-half of preconsumer recycled content is not less than 25 percent.

B. Steel Plates, Shapes, and Bars: ASTM A 36/A 36M.

C. Steel Tubing: ASTM A 500, cold-formed steel tubing.

D. Steel Pipe: ASTM A 53/A 53M, standard weight (Schedule 40), unless another weight is indicated or required by structural loads.

E. Cast Iron: ASTM A 48/A 48M, Class 30, unless another class is indicated or required by structural loads.

## 2.4 FASTENERS

A. General: Unless otherwise indicated, provide Type 304 stainless-steel fasteners for exterior use and zinc-plated fasteners with coating complying with ASTM B 633, Class Fe/Zn 5, at exterior walls. Provide stainless-steel fasteners for fastening aluminum. Select fasteners for type, grade, and class required.

B. Steel Bolts and Nuts: Regular hexagon-head bolts, ASTM A 307, Grade A; with hex nuts, ASTM A 563; and, where indicated, flat washers.

C. Stainless-Steel Bolts and Nuts: Regular hexagon-head annealed stainless-steel bolts, nuts and, where indicated, flat washers; ASTM F 593 for bolts and ASTM F 594 for nuts, Alloy Group 1.

D. Anchor Bolts: ASTM F 1554, Grade 36.

1. Provide hot-dip or mechanically deposited, zinc-coated anchor bolts where item being fastened is indicated to be galvanized.

E. Eyebolts: ASTM A 489.

F. Machine Screws: ASME B18.6.3.

G. Lag Bolts: ASME B18.2.1.

H. Wood Screws: Flat head, ASME B18.6.1.

I. Plain Washers: Round, ASME B18.22.1.

J. Lock Washers: Helical, spring type, ASME B18.21.1.

K. Cast-in-Place Anchors in Concrete: Anchors capable of sustaining, without failure, a load equal to four times the load imposed, as determined by testing according to ASTM E 488, conducted by a qualified independent testing agency.

1. Threaded or wedge type; galvanized ferrous castings, either ASTM A 47/A 47M malleable iron or ASTM A 27/A 27M cast steel. Provide bolts, washers, and shims as needed, hot-dip galvanized per ASTM A 153/A 153M.

L. Expansion Anchors: Anchor bolt and sleeve assembly with capability to sustain, without failure, a load equal to six times the load imposed when installed in unit masonry and four times the load imposed when installed in

concrete, as determined by testing according to ASTM E 488, conducted by a qualified independent testing agency.

1. Material for Anchors in Interior Locations: Carbon-steel components zinc-plated to comply with ASTM B 633, Class Fe/Zn 5.
2. Material for Anchors in Exterior Locations: Alloy Group 1 stainless-steel bolts complying with ASTM F 593 and nuts complying with ASTM F 594.

## 2.5 MISCELLANEOUS MATERIALS

A. Welding Rods and Bare Electrodes: Select according to AWS specifications for metal alloy welded.

B. Universal Shop Primer: Fast-curing, lead- and chromate-free, universal modified-alkyd primer.

1. Use primer containing pigments that make it easily distinguishable from zinc-rich primer.

C. Zinc-Rich Primer: Complying with SSPC-Paint 20 or SSPC-Paint 29 and compatible with topcoat.

1. Available Products:

a. Benjamin Moore & Co.; Epoxy Zinc-Rich Primer CM18/19.
b. ICI Devoe Coatings; Catha-Coat 313.
c. International Coatings Limited; Interzinc 315 Epoxy Zinc-Rich Primer.
d. PPG Architectural Finishes, Inc.; Aquapon Zinc-Rich Primer 97-670.
e. Sherwin-Williams Company (The); Corothane I GalvaPac Zinc Primer.
f. Tnemec Company, Inc.; Tneme-Zinc 90-97.

D. Galvanizing Repair Paint: High-zinc-dust-content paint for regalvanizing welds in steel, complying with SSPC-Paint 20.

E. Bituminous Paint: Cold-applied asphalt emulsion complying with ASTM D 1187.

1. Available Products:

a. Sealmastic, Type 1; W. R. Meadows
b. Hydrocide 600; Sonneborn Building Products.
c. Karnak 100 AF; Karnac Chemical Corp.

F. Nonshrink, Nonmetallic Grout: Factory-packaged, nonstaining, noncorrosive, nongaseous grout complying with ASTM C 1107. Provide grout specifically recommended by manufacturer for interior and exterior applications.

1. Available Products:

a. Five Star Grout by Five Star Products, Inc.
b. Masterflow 928 Grout by Master Builders Technologies.
c. Sonogrout 10K by Sonneborn.
d. 14K Hy Flow by Sonneborn.

G. Concrete: Comply with requirements in Division 03 Section "Cast-in-Place Concrete" for normal-weight, air-entrained, concrete with a minimum 28-day compressive strength of 3000 psi.

## 2.6 FABRICATION, GENERAL

A. Shop Assembly: Preassemble items in the shop to greatest extent possible. Disassemble units only as necessary for shipping and handling limitations. Use connections that maintain structural value of joined pieces. Clearly mark units for reassembly and coordinated installation.

B. Cut, drill, and punch metals cleanly and accurately. Remove burrs and ease edges to a radius of approximately 1/32 inch, unless otherwise indicated. Remove sharp or rough areas on exposed surfaces.

C. Form bent-metal corners to smallest radius possible without causing grain separation or otherwise impairing work.

D. Form exposed work true to line and level with accurate angles and surfaces and straight edges.

E. Weld corners and seams continuously to comply with the following:

1. Use materials and methods that minimize distortion and develop strength and corrosion resistance of base metals.
2. Obtain fusion without undercut or overlap.
3. Remove welding flux immediately.
4. At exposed connections, finish exposed welds and surfaces smooth and blended so no roughness shows after finishing and contour of welded surface matches that of adjacent surface.

F. Form exposed connections with hairline joints, flush and smooth, using concealed fasteners where possible. Where exposed fasteners are required, use Phillips flat-head (countersunk) screws or bolts, unless otherwise indicated. Locate joints where least conspicuous.

G. Fabricate seams and other connections that will be exposed to weather in a manner to exclude water. Provide weep holes where water may accumulate.

H. Cut, reinforce, drill, and tap metal fabrications as indicated to receive finish hardware, screws, and similar items.

I. Provide for anchorage of type indicated; coordinate with supporting structure. Space anchoring devices to secure metal fabrications rigidly in place and to support indicated loads.

1. Where units are indicated to be cast into concrete or built into masonry, equip with integrally welded steel strap anchors, 1/8 by 1-1/2 inches, with a minimum 6-inch embedment and 2-inch hook, not less than 8 inches from ends and corners of units and 24 inches o.c., unless otherwise indicated.

## 2.7 MISCELLANEOUS FRAMING AND SUPPORTS

A. General: Provide steel framing and supports not specified in other Sections as needed to complete the Work.

B. Fabricate units from steel shapes, plates, and bars of welded construction, unless otherwise indicated. Fabricate to sizes, shapes, and profiles indicated and as necessary to receive adjacent construction retained by framing and supports. Cut, drill, and tap units to receive hardware, hangers, and similar items.

1. Fabricate units from slotted channel framing where indicated.
2. Furnish inserts if units are installed after concrete is placed.

C. Galvanize miscellaneous framing and supports where indicated.

## 2.8 LOOSE STEEL LINTELS

A. Fabricate loose steel lintels from steel angles and shapes of size indicated for openings and recesses in masonry walls and partitions at locations indicated. Weld adjoining members together to form a single unit where indicated.

B. Size loose lintels to provide bearing length at each side of openings equal to 1/12 of clear span but not less than 8 inches, unless otherwise indicated.

C. Galvanize loose steel lintels located in exterior walls.

## 2.9 LOOSE BEARING AND LEVELING PLATES

A. Provide loose bearing and leveling plates for steel items bearing on masonry or concrete construction. Drill plates to receive anchor bolts and for grouting.

B. Prime plates with zinc-rich primer.

## 2.10 METAL LADDERS

A. General:

1. Comply with ANSI A14.3, unless otherwise indicated.
2. For elevator pit ladders, comply with ASME A17.1.

B. Fabricate ladders from materials as detailed on the drawings or if not indicated, as follows:

1. Siderails: Continuous, 1/2-by-2-1/2-inch steel flat bars, with eased edges, spaced 18 inches .
2. Rungs: 3/4-inch- diameter steel bars, spaced 12 inches .
3. Fit rungs in centerline of siderails; plug-weld and grind smooth on outer rail faces.
4. Support each ladder at top and bottom and not more than 60 inches o.c. with welded or bolted steel brackets. Size brackets to support design loads specified in ANSI A14.3.
5. Provide nonslip surfaces on top of each rung, either by coating rung with aluminum-oxide granules set in epoxy-resin adhesive or by using a type of manufactured rung filled with aluminum-oxide grout.
6. Available Products:

    a. IKG Industries, a Harsco company; Mebac.
    b. W. S. Molnar Company; SlipNOT.

7. Galvanize exterior ladders, including brackets and fasteners.
8. Prime interior ladders, where indicated, including brackets and fasteners, with zinc-rich primer.

## 2.11 FINISHES, GENERAL

A. Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for recommendations for applying and designating finishes.

B. Finish metal fabrications after assembly.

## 2.12 STEEL AND IRON FINISHES

A. Galvanizing: Provide coating for iron and steel fabrications applied by the hot-dipped process, Durogalv by Duncan Galvanizing. The galvanizing bath shall contain high grade zinc and other earthly materials. Immediately before galvanizing, the steel shall be immersed in a bath of zinc ammonium chloride. The use of the wet kettle process is prohibited. Comply with ASTM A123 for fabricated products and ASTM A 153 for hardware. Provide thickness of galvanizing specified in referenced standards.

B. Preparation for Shop Priming: Prepare uncoated ferrous-metal surfaces to comply with minimum requirements indicated below for SSPC surface preparation specifications and environmental exposure conditions of installed metal fabrications:

1. Exteriors (SSPC Zone 1B) and Items Indicated to Receive Zinc-Rich Primer: SSPC-SP 6/NACE No. 3, "Commercial Blast Cleaning."
2. Interiors (SSPC Zone 1A): SSPC-SP 3, "Power Tool Cleaning."

C. Shop Priming: Apply shop primer to uncoated surfaces of metal fabrications, except those with galvanized finishes and those to be embedded in concrete, sprayed-on fireproofing, or masonry, unless otherwise indicated. Comply with SSPC-PA 1, "Paint Application Specification No. 1: Shop, Field, and Maintenance Painting of Steel," for shop painting.

1. Stripe paint corners, crevices, bolts, welds, and sharp edges.

# PART 3 - EXECUTION

## 3.1 INSTALLATION, GENERAL

A. Cutting, Fitting, and Placement: Perform cutting, drilling, and fitting required for installing metal fabrications. Set metal fabrications accurately in location, alignment, and elevation; with edges and surfaces level, plumb, true, and free of rack; and measured from established lines and levels.

B. Fit exposed connections accurately together to form hairline joints. Weld connections that are not to be left as exposed joints but cannot be shop welded because of shipping size limitations. Do not weld, cut, or abrade surfaces of exterior units that have been hot-dip galvanized after fabrication and are for bolted or screwed field connections.

C. Field Welding: Comply with the following requirements:

1. Use materials and methods that minimize distortion and develop strength and corrosion resistance of base metals.
2. Obtain fusion without undercut or overlap.
3. Remove welding flux immediately.
4. At exposed connections, finish exposed welds and surfaces smooth and blended so no roughness shows after finishing and contour of welded surface matches that of adjacent surface.

D. Fastening to In-Place Construction: Provide anchorage devices and fasteners where metal fabrications are required to be fastened to in-place construction. Provide threaded fasteners for use with concrete and masonry inserts, toggle bolts, through bolts, lag bolts, wood screws, and other connectors.

E. Provide temporary bracing or anchors in formwork for items that are to be built into concrete, masonry, or similar construction.

F. Corrosion Protection: Coat concealed surfaces of aluminum that will come into contact with grout, concrete, masonry, wood, or dissimilar metals with a heavy coat of bituminous paint.

3.2 INSTALLING MISCELLANEOUS FRAMING AND SUPPORTS

A. General: Install framing and supports to comply with requirements of items being supported, including manufacturers' written instructions and requirements indicated on Shop Drawings.

3.3 INSTALLING BEARING AND LEVELING PLATES

A. Clean concrete and masonry bearing surfaces of bond-reducing materials, and roughen to improve bond to surfaces. Clean bottom surface of plates.

B. Set bearing and leveling plates on wedges, shims, or leveling nuts. After bearing members have been positioned and plumbed, tighten anchor bolts. Do not remove wedges or shims but, if protruding, cut off flush with edge of bearing plate before packing with grout.

1. Use nonshrink grout, nonmetallic, in concealed and exposed locations, unless otherwise indicated.
2. Pack grout solidly between bearing surfaces and plates to ensure that no voids remain.

3.4 ADJUSTING AND CLEANING

A. Touchup Painting: Immediately after erection, clean field welds, bolted connections, and abraded areas. Paint uncoated and abraded areas with the same material as used for shop painting to comply with SSPC-PA 1 for touching up shop-painted surfaces.

1. Apply by brush or spray to provide a minimum 2.0-mil dry film thickness.

B. Galvanized Surfaces: Clean field welds, bolted connections, and abraded areas and repair galvanizing to comply with ASTM A 780.

PART 4 - MEASUREMENT AND PAYMENT:

4.01 METHOD OF MEASUREMENT:

Metal Fabrications will be measured by the lump sum, complete and accepted. The Metal Fabrications limits shall be as shown or described in the Contract Documents.

4.02 BASIS OF PAYMENT:

Metal Fabrications will be paid for at the contract lump sum price. Payment for Metal Fabrications will be under:

| Pay Item | | Pay Unit |
|---|---|---|
| DIV. 5 | Metals | Lump Sum |

**END OF SECTION**

# SECTION 06 10 13 - ROOF RELATED AND MISCELLANEOUS ROUGH CARPENTRY

All work and materials shall conform to the Contract Documents and the provisions of the State of Maine Department of Transportation Standard Specifications, Revision November 2014, with the following additions:

Add the following:

## PART 1 - GENERAL

### 1.1 SUMMARY

A. This Section includes the following:
   1. Rooftop equipment bases and support curbs.
   2. Rooftop perimeter blocking.
   3. Wood blocking and nailers.
   4. Wood furring.
   5. Plywood backing panels.

### 1.2 DEFINITIONS

A. Rough Carpentry: Carpentry work not specified in other Sections and not exposed, unless otherwise indicated.

B. Exposed Framing: Dimension lumber not concealed by other construction.

C. Lumber grading agencies, and the abbreviations used to reference them, include the following:
   1. NELMA - Northeastern Lumber Manufacturers Association.
   2. NLGA - National Lumber Grades Authority.
   3. RIS - Redwood Inspection Service.
   4. SPIB - Southern Pine Inspection Bureau.
   5. WCLIB - West Coast Lumber Inspection Bureau.
   6. WWPA - Western Wood Products Association.

### 1.3 SUBMITTALS

A. Product Data: For each type of process and factory-fabricated product. Indicate component materials and dimensions and include construction and application details.
   1. Include data for wood-preservative treatment from chemical treatment manufacturer and certification by treating plant that treated materials comply with requirements. Indicate type of preservative used, net amount of preservative retained, and chemical treatment manufacturer's written instructions for handling, storing, installing, and finishing treated material.
   2. Include copies of warranties from chemical treatment manufacturers for each type of treatment.

B. Material Certificates: For dimension lumber specified to comply with minimum allowable unit stresses. Indicate species and grade selected for each use and design values approved by the American Lumber Standards Committee Board of Review.

C. Research/Evaluation Reports: For the following, showing compliance with building code in effect for Project:
   1. Preservative-treated wood.

2. Engineered wood products.
3. Expansion anchors.
4. Metal framing anchors.

1.4 QUALITY ASSURANCE

A. Source Limitations for Engineered Wood Products: Obtain each type of engineered wood product through one source from a single manufacturer.

1.5 DELIVERY, STORAGE, AND HANDLING

A. Stack lumber, plywood, and other panels; place spacers between each bundle to provide air circulation. Provide for air circulation around stacks and under coverings.

PART 2 - PRODUCTS

2.1 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:
1. Metal Framing Anchors:
a. Simpson Strong-Tie Company, Inc.
2. Pressure-Treated Wood:
a. Arch Treatment Technologies, Inc.

2.2 WOOD PRODUCTS, GENERAL

A. Lumber: DOC PS 20 and applicable rules of lumber grading agencies certified by the American Lumber Standards Committee Board of Review.
1. Factory mark each piece of lumber with grade stamp of grading agency.
2. Where nominal sizes are indicated, provide actual sizes required by DOC PS 20 for moisture content specified. Where actual sizes are indicated, they are minimum dressed sizes for dry lumber.
3. Provide dressed lumber, S4S, unless otherwise indicated.
4. Provide dry lumber with 15 percent maximum moisture content at time of dressing for 2-inch nominal (38-mm actual) thickness or less, unless otherwise indicated.

B. Wood Structural Panels:
1. C-D Exposure 1 or better, APA Rated Sheathing, non-preservative treated, meeting U.S. Products Standard PS1 or Performance Standard PRP-108 for Soft Wood Plywood Construction and Industrial, with less than 19 percent moisture content at time of installation and at the time of installation.
2. Thickness: As needed to comply with requirements specified but not less than thickness indicated.
3. Factory mark panels according to indicated standard.
4. Do not use composite wood and agrifiber products containing urea-formaldehyde resins. Additionally, the laminating adhesive used in fabrication of on-site and shop-applied composite wood and agrifiber assemblies must contain no added urea formaldehyde resins.

C. Provide wood-based materials and products produced from wood obtained from forests certified in accordance with Forest Stewardship Council’s Principles and Criteria.

2.3 WOOD-PRESERVATIVE-TREATED MATERIALS

A. Pressure-Treated Wood: In accordance with AWPA C2 (lumber) and AWPA C9 (plywood).

1. Preservative Chemicals: Acceptable to authorities having jurisdiction and the following:
   a. (West Coast) Copper Boron Azole, Type A (CBA-A).
   b. Copper azole, Type B (CA-B).
2. Preservative Retention:
   a. Decking: 0.08 pcf.
   b. Above Ground: 0.10 pcf.
   c. Ground or Fresh Water Contact: 0.21 pcf.
3. Species: Mixed southern pine; SPIB.
4. For exposed items indicated to receive a stained or natural finish, use chemical formulations that do not require incising, contain colorants, bleed through, or otherwise adversely affect finishes.

B. Kiln-dry material after treatment to a maximum moisture content of 19 percent for lumber and 15 percent for plywood. Do not use material that is warped or does not comply with requirements for untreated material.

C. Mark each treated item with the treatment quality mark of an inspection agency approved by the American Lumber Standards Committee Board of Review.
1. For exposed lumber indicated to receive a stained or natural finish, mark end or back of each piece, or omit marking and provide certificates of treatment compliance issued by inspection agency.

D. Application: Treat items indicated on Drawings, and the following:
1. Wood cants, nailers, curbs, equipment support bases, blocking, stripping, and similar members in connection with roofing, flashing, vapor barriers, and waterproofing.
2. Wood sills, sleepers, blocking, furring, stripping, and similar concealed members in contact with masonry or concrete.
3. Wood framing members less than 18 inches (460 mm) above grade.
4. Wood floor plates that are installed over concrete slabs directly in contact with earth.

E. Product: Acceptable products include but are not limited to the following:
1. Wolmanized Natural Select Wood by Arch Treatment Technologies, Inc.

F. Substitutions: The specified product can be used with hot dipped galvanized fasteners meeting ASTM A 153 and connectors meeting ASTM A 653 Class G185 Sheet. Any proposed substitution must be made with the understanding that stainless steel fasteners will have to be used unless written verification can be provided to show that galvanized fasteners are allowed with substitute product.

## 2.4 DIMENSION LUMBER

A. General: Provide dimension lumber of grades indicated according to the American Lumber Standards Committee National Grading Rule provisions of the grading agency indicated.

B. Framing, Rafters, Joists, and Partitions: No. 2 grade and any of the following species:
1. Spruce-pine-fir (south) or Spruce-pine-fir; NELMA, NLGA, WCLIB, or WWPA.

## 2.5 MISCELLANEOUS LUMBER

A. General: Provide lumber for support or attachment of other construction, including the following:
1. Rooftop equipment bases and support curbs.
2. Blocking.
3. Furring.
4. Nailers.

B. For items of dimension lumber size, provide No. 2 grade lumber with 15 percent maximum moisture content and any of the following species:

1. Spruce-pine-fir (south) or Spruce-pine-fir; NELMA, NLGA, WCLIB, or WWPA.

## 2.6 PLYWOOD BACKING PANELS

A. Telephone and Electrical Equipment Backing Panels: DOC PS 1, Exposure 1, C-D Plugged, fire-retardant treated, in thickness indicated or, if not indicated, not less than 3/4 inch (19 mm) thick. Paint flat black as required by electrical code.

## 2.7 FASTENERS

A. General: Provide fasteners of size and type indicated that comply with requirements specified in this Article for material and manufacture.
   1. Where rough carpentry is exposed to weather, in ground contact, or in area of high relative humidity, provide fasteners with hot-dip zinc coating complying with ASTM A 153/A 153M.

B. Nails, Brads, and Staples: ASTM F 1667.

C. Power-Driven Fasteners: CABO NER-272.

D. Wood Screws: ASME B18.6.1.

E. Screws for Fastening to Cold-Formed Metal Framing: Hilti Kwik-Flex or Elco Dril-Flex; no substitutes,
   1. Plywood sheathing: 10-24 x 1-1/4 inch wafer head #3.
   2. 2 x wood blocking: 12-24 x 2-1/2 inch wafer head #3.

F. Lag Bolts: ASME B18.2.1. (ASME B18.2.3.8M).

G. Bolts: Steel bolts complying with ASTM A 307, Grade A (ASTM F 568M, Property Class 4.6); with ASTM A 563 (ASTM A 563M) hex nuts and, where indicated, flat washers.

H. Expansion Anchors: Anchor bolt and sleeve assembly of material indicated below with capability to sustain, without failure, a load equal to 6 times the load imposed when installed in unit masonry assemblies and equal to 4 times the load imposed when installed in concrete as determined by testing per ASTM E 488 conducted by a qualified independent testing and inspecting agency.
   1. Material: Carbon-steel components, zinc plated to comply with ASTM B 633, Class Fe/Zn 5.

## 2.8 MISCELLANEOUS MATERIALS

A. Adhesives for Field Gluing Panels to Framing: Formulation complying with APA AFG-01 that is approved for use with type of construction panel indicated by both adhesive and panel manufacturers.
   1. Use adhesives that have a VOC content of 70 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).

# PART 3 - EXECUTION

## 3.1 INSTALLATION, GENERAL

A. Set rough carpentry to required levels and lines, with members plumb, true to line, cut, and fitted. Fit rough carpentry to other construction; scribe and cope as needed for accurate fit. Locate nailers, blocking, and similar supports to comply with requirements for attaching other construction.

B. Do not use materials with defects that impair quality of rough carpentry or pieces that are too small to use with minimum number of joints or optimum joint arrangement.

C. Apply field treatment complying with AWPA M4 to cut surfaces of preservative-treated lumber and plywood.

D. Securely attach rough carpentry work to substrate by anchoring and fastening as indicated, complying with the following:
1. CABO NER-272 for power-driven fasteners.
2. Published requirements of metal framing anchor manufacturer.
3. Table 2305.2, "Fastening Schedule," in the BOCA National Building Code.

E. Use common wire nails, unless otherwise indicated. Select fasteners of size that will not fully penetrate members where opposite side will be exposed to view or will receive finish materials. Make tight connections between members. Install fasteners without splitting wood; predrill as required.

F. Use finishing nails for exposed work, unless otherwise indicated. Countersink nail heads and fill holes with wood filler.

3.2 WOOD BLOCKING, AND NAILER INSTALLATION

A. Install where indicated and where required for attaching other work. Form to shapes indicated and cut as required for true line and level of attached work. Coordinate locations with other work involved.
1. Install blocking for Owner-installed furnishings. Coordinate with Architect for locations and refer to drawings.

B. Attach items to substrates to support applied loading. Recess bolts and nuts flush with surfaces, unless otherwise indicated. Build anchor bolts into masonry during installation of masonry work. Where possible, secure anchor bolts to formwork before concrete placement.

3.3 WOOD FURRING INSTALLATION

A. Install level and plumb with closure strips at edges and openings. Shim with wood as required for tolerance of finish work.

B. Furring to Receive Gypsum Board: Install 1-by-2-inch nominal- (19-by-38-mm actual-) size furring vertically at 16 inches (406 mm) o.c.

3.4 WOOD STRUCTURAL PANEL INSTALLATION

A. General: Comply with applicable recommendations contained in APA Form No. E30K, "APA Design/Construction Guide: Residential & Commercial," for types of structural-use panels and applications indicated.

B. Fastening Methods: Fasten panels as indicated below:
Plywood Backing Panels: Nail or screw to supports.

PART 4 - MEASUREMENT AND PAYMENT:

4.01 METHOD OF MEASUREMENT:

Miscellaneous Rough Carpentry will be measured by the lump sum, complete and accepted. The Miscellaneous Rough Carpentry limits shall be as shown or described in the Contract Documents.

4.02 BASIS OF PAYMENT:

Miscellaneous Rough Carpentry will be paid for at the contract lump sum price. Payment for Miscellaneous Rough Carpentry will be under:

| Pay Item | | Pay Unit |
|---|---|---|
| DIV. 6 | Wood and Plastics | Lump Sum |

**END OF SECTION**

# SECTION 06 40 00 - ARCHITECTURAL WOODWORK

All work and materials shall conform to the Contract Documents and the provisions of the State of Maine Department of Transportation Standard Specifications, Revision November 2014, with the following additions:

Add the following:

PART 1 - GENERAL

1.01 GENERAL CONDITIONS The General Conditions, Supplementary General Conditions and all Sections of Division 1 shall apply to each and every contract and contractor, person or persons supplying material, labor or entering into the work directly or indirectly.

1.02 SCOPE This section includes all labor, materials, equipment and related services necessary for the fabrication, delivery and installation of the work shown on the drawings and or specified herein, including but not limited to the following:

A. Counters

B. Cabinets and Related Hardware

C. Adjustable and Fixed Shelving

D. Coat Pegs

E. Interior Standing and Running Trim

1.03 RELATED WORK SPECIFIED ELSEWHERE

| | |
|---|---|
| A. Rough Carpentry | 06 10 00 |
| B. Flush Wood Doors | 08 14 16 |
| C. Finishing of Painted Woodwork | 09 91 00 |

1.04 STANDARDS: Except where otherwise noted, all millwork shall conform to, or exceed, the requirements of "Custom Grade" as established by "Quality Standards of the Architectural Woodworking Industry", as published by the American Woodworking Institute. Where conflicts occur between these standards and drawings or specifications, the more stringent requirements shall govern in each case.

1.05 SHOP DRAWINGS: Before fabrication of any millwork, the Contractor shall submit shop drawings for Architect's approval showing dimensions, hardware type and location, materials, details of assembly, relation to fixed construction of the building and any other items of millwork which relate to each other. No fabrication shall commence until shop drawings are approved.

1.06 QUALITY ASSURANCE:

A. General: It shall be the responsibility of the Millwork supplier to assure complete off site assembly of all items specified herein. All items should be ready for installation and should be planned for easy building entry. Where unit size prohibits easy entry, arrangements should be made with the Contractor so that there will be a minimum number of attachable sections for job reconnection.

B. Finish and Protection: All work should be fine sanded to remove all feather edges, glue smears, pencil and finger markings, and where necessary protected by a non staining paper.

C. Field Dimensions: It shall be the responsibility of the Millwork supplier to verify all dimensions in the field prior to fabrication. Any discrepancies which occur between field dimensions and delivered millwork shall be the responsibility of the Millwork supplier and shall be rectified at no cost to the General Contractor or the Owner.

1.07 PRODUCT HANDLING:

A. All Lumber: Shall be piled in a manner which ensures proper ventilation and drainage. It shall also be covered to protect it from the elements.

B. Millwork: Shall be protected against dampness during and after delivery. It shall be stored in well ventilated buildings and where not exposed to extreme changes in temperature and/or humidity.

PART 2 - PRODUCTS

2.01 WOOD TRIM

A. Birch Trim for Natural Finish shall be select White Birch, plain sawn, for transparent finish and shall be kiln dried to a moisture content not exceeding 12%.

2.03 INTERIOR ARCHITECTURAL WOODWORK

A. Plastic Laminate Countertops:
1. Grade: Premium, for all countertops.
2. Plastic Laminate Type: 0.050 in. thick; UL tested and labeled ratings of 25 for flame spread, 25 for fuel contributed and 100 for smoke developed when bonded to wood particle board.
3. Edging and Backsplashes: Solid Maple – clear finished unless otherwise indicated.
4. Core Material: Particle board for dry areas. Countertops with integral sinks shall have plywood core.
5. Sealant: Type as manufactured or recommended in writing by manufacturer of plastic laminate, color to match plastic laminate.
   a. Silicone Sealant: Mildew resistant type, formulated for pointing of tile, color to match the plastic laminate where feasible; or clear as directed by Architect.

B. Plastic Laminate Casework:
1. Grade: Custom.
2. Construction: Flush overlay or reveal overlay at Option of Installer.
3. Base Construction: Provide separate full ladder design subbase of Exterior Grade Plywood, high PVC molding channel around bottom of base, or snap in base with Exterior Grade Plywood and adjustable leveling legs, to protect against spilled or standing water on floor.
4. Hang Rails and Stiffeners: Provide 3/4” x 3” hardwood handrail top and bottom for wall cabinets, top of cabinet for base cabinets, sufficient stiffeners to support cabinets without backing material.
   a. Designs depending on cabinet backing for support will not be acceptable.
5. Back of Cabinets: 1/2” minimum particleboard.
6. Exposed Portions:
   a. Door and drawer fronts, end panels, divider panels at open cabinets and similar locations: High pressure plastic laminate on particleboard.
   b. Exposed edges: Self edged plastic laminate, same material as face.
   c. Adjustable Shelving: Edge banding at both edges to allow for reversing; and at ends where exposed to view in the finished work.
   d. PVC Edging: 3mm PVC edging, as specified for door and drawer edges will be acceptable in lieu of edging materials specified above.
7. Semi Exposed Surfaces, (Concealed when doors are closed): One of following at option of Installer:
   a. Plastic laminate.
   b. Transparent finish, on plywood (birch acceptable).
   c. Prefinished particleboard, edge banded.

C. Fixed Utility and Adjustable Shelving (non part of casework): Prefinished particleboard with edge banding.
   1. Thickness: 1”
   2. For adjustable shelving provide edge banding both edges to allow for reversing, and one on ends where exposed to view in the finished work.

2.04 FINISH FOR ARCHITECTURAL WOODWORK:

A. General: Finish architectural woodwork at shop or factory. Defer only final touch up, cleaning and polishing for time after delivery and installation.

B. Preparations for Finishing: Comply with AWI Quality Standards, Section 1500, for sanding, filling countersunk fasteners, back priming and similar preparations for finishing of architectural woodwork, as applicable to each unit of work.

C. Transparent Finish: Provide transparent except where opaque finish is specifically indicated on Drawings or allowed in these Specifications.
   1. General Finish Standard: AWI Finish System No. 3, Premium Grade, closed grain finish.
   2. Final Finish: Sanding, followed by 2 coats of clean alkyd conversion varnish, rubbed to satin medium sheen.

2.05 CABINET HARDWARE AND ACCESSORY MATERIALS :

A. General: Provide cabinet hardware and accessory materials associated with architectural woodwork, except for units which are specified as “door hardware” in other Sections of these Specifications.
   1. Hardware Standards: Except as otherwise indicated, comply with ANSI A156.9 “American National Standard for Cabinet Hardware”, quality level - Type 2 (institutional), unless otherwise indicated.

B. Cabinet Hardware Schedule:
   1. Shelf Supports, Plug-In Type: Hafele No. 282.11.761, nickel-plated, or equal.
   2. Vertical Slotted Shelf Standards and Brackets: Spur.
   3. Drawer Slides: Accuride No. C3732.
   4. Door Hinges: Blum CLIP 120º Concealed Hinges.
   5. Door and Drawer Pulls: Ives #38 B26D.
   6. Metal Counter Brackets: A+M Hardware, 1/8” powder coated steel, 15” x 21”.
   6. Desk Grommets: 2” ø black ABS.

C. Exposed Hardware Finish: Except where not available, provide exposed hardware with BHMA Code 626 satin chromium plate finish (US26D); where not available, provide either satin aluminum or satin stainless steel finish.

PART 3 - EXECUTION

3.01 PREPARATION

A. General: Condition woodwork to average prevailing humidity conditions in installation areas prior to installing.

B. Pre-Installation Meeting: Meet at project site prior to delivery of architectural woodwork and review coordination and environmental controls required for proper installation and ambient conditioning in areas to receive work. Include in meeting the Contractor; architect and other Owner Representatives (if any); installers of architectural woodwork, modular laminate casework, wet work such as plastering, other finishes, painting, mechanical work and electrical work; and firms or persons responsible for continued operation (whether temporary or permanent) of HVAC system as required to maintain temperature and humidity conditions. Proceed with woodwork installation only when everyone concerned agrees that required ambient conditions can be properly maintained.

3.02 INSTALLATION

A. Install work plumb, level, true and straight with no distortions. Shim as required using concealed shims.

B. Scribe and cut work to fit adjoining work, and refinish cut surfaces or repair damaged finish at cuts.

C. Anchor woodwork to anchors or blocking built in or directly attached to substrates. Secure to grounds, strapping and blocking with countersunk, concealed fasteners and blind nailing as required for a complete installation. Except where prefinished matching fasteners heads are required, use fine finishing nails for exposed nailing, countersunk and filled flush with woodwork, and matching final finish where transparent finish is indicated.

D. Countertops and other plastic laminate: Anchor securely to base units and other support systems as indicated.
   1. Seal joints at internal corners countertops and backsplashes or other construction with sealant matching color of plastic laminate.
   2. Scribe countertops without backsplashes to wall; seal with silicone sealant matching color of plastic laminate; or clear if directed by Architect.

E. Casework: Install without distortion so that doors and drawers will fit openings properly and be accurately aligned. Adjust hardware to center doors and drawers in openings and to provide unencumbered operation. Complete installation of hardware and accessory items as indicated.

3.03 ADJUSTMENT, CLEANING, FINISHING AND PROTECTION:

A. Repair damaged and defective woodwork wherever possible to eliminate defects functionally and visually; where not possible to repair properly, replace woodwork. Adjust joinery for uniform appearance.

B. Clean hardware, lubricate and make final adjustments for proper operation.

C. Clean woodwork on exposed and semi exposed surfaces. Touch up shop applied finishes to restore damaged or soiled areas.

D. Complete finishing work specified as work of this Section, to whatever extent not completed at shop or prior to installation of woodwork.

E. Protection: Installer of architectural woodwork shall advise Contractor of procedures required to protect architectural woodwork during remainder of construction period to ensure that work will be without damage or deterioration at time of acceptance.

PART 4 - MEASUREMENT AND PAYMENT:

4.01 METHOD OF MEASUREMENT:

Architectural Woodwork will be measured by the lump sum, complete and accepted. The Architectural Woodwork limits shall be as shown or described in the Contract Documents.

4.02 BASIS OF PAYMENT:

Architectural Woodwork will be paid for at the contract lump sum price. Payment for Architectural Woodwork will be under:

| Pay Item | | Pay Unit |
|---|---|---|
| DIV. 6 | Wood and Plastics | Lump Sum |

**END OF SECTION**

# SECTION 07 21 00 - THERMAL AND ACOUSTIC INSULATION

All work and materials shall conform to the Contract Documents and the provisions of the State of Maine Department of Transportation Standard Specifications, Revision November 2014, with the following additions:

Add the following:

## PART 1 - GENERAL

1.01 GENERAL CONDITIONS: The General Conditions, Supplementary General Conditions and all Sections of Division 1 shall apply to each and every contract and contractor, person or persons supplying material, labor or entering into the work directly or indirectly.

1.02 SUMMARY:

A. This Section includes the following:
1. Foam-plastic board insulation.
2. Foil-faced polyisocyanurate board insulation.
3. Damp-blown cellulosic insulation
4. Sprayed foam insulation.
5. Mineral fiber batt insulation.

B. Related Sections include the following:
1. Division 09 21 16 Gypsum Board Assemblies for insulation specified in that Section.

1.03 DEFINITIONS:

A. Mineral-Fiber Insulation: Insulation composed of rock-wool fibers, slag-wool fibers, or glass fibers; produced in boards and blanket with latter formed into batts (flat-cut lengths) or rolls.

1.04 SUBMITTALS:

A. Product Data: For each type of product indicated.

B. Samples for Verification: Full-size units for each type of exposed insulation indicated.

C. Product Test Reports: Based on evaluation of comprehensive tests performed by a qualified testing agency for insulation products.

D. Research/Evaluation Reports: For foam-plastic insulation.

1.05 QUALITY ASSURANCE:

A. Source Limitations: Obtain each type of building insulation through one source from a single manufacturer.

B. Fire-Test-Response Characteristics: Provide insulation and related materials with the fire-test-response characteristics indicated, as determined by testing identical products per test method indicated below by UL or another testing and inspecting agency acceptable to authorities having jurisdiction. Identify materials with appropriate markings of applicable testing and inspecting agency.

1. Surface-Burning Characteristics: ASTM E 84.
2. Fire-Resistance Ratings: ASTM E 119.
3. Combustion Characteristics: ASTM E 136.

1.06 DELIVERY, STORAGE, AND HANDLING

A. Protect insulation materials from physical damage and from deterioration by moisture, soiling, and other sources. Store inside and in a dry location. Comply with manufacturer's written instructions for handling, storing, and protecting during installation.

B. Protect plastic insulation as follows:
1. Do not expose to sunlight, except to extent necessary for period of installation and concealment.
2. Protect against ignition at all times. Do not deliver plastic insulating materials to Project site before installation time.
3. Complete installation and concealment of plastic materials as rapidly as possible in each area of construction.

PART 2 - PRODUCTS

2.01 MANUFACTURERS:

A. In other Part 2 articles where titles below introduce lists, the following requirements apply to product selection:
1. Available Products: Subject to compliance with requirements, products that may be incorporated into the Work include, but are not limited to, products specified.
2. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, manufacturers specified.

2.02 FOAM-PLASTIC BOARD INSULATION:

A. Rigid Insulation: Extruded-Polystyrene Board Insulation; ASTM C 578, of type and density indicated below, with maximum flame-spread and smoke-developed indexes of 75 and 450, respectively:
1. Available Products:
a. Foamular 250; Owens Corning.
b. Styrofoam by Dow Chemical Co.
c. Amofoam-CM by Tenneco Building Products
2. Type IV, 1.60 lb/cu. ft., unless otherwise indicated.
3. Application: Foundation insulation. Rigid insulation below concrete slab-on-grade.

2.03 FOIL-FACED POLISOCYANURATE BOARD INSULATION:

A. Rigid Insulation: Foil-faced Polyisocyanurate Board Insulation; ASTM C 1289, Type I, Class 1 or 2, with maximum flame-spread and smoke-development indexes of 75 and 450, respectively, based on tests performed on unfaced core o thickness up to 4” (101 mm):
1. Thickness: As indicated on drawings.
2. R value: 6/IN.
3. Provide manufacturer’s sealing tape at all joints
4. Available Products:
a. Atlas Roofing Corporation
b. Dow Chemical Co.
c. Rmax, Inc.
5. Application: Exterior walls, under siding.

2.04 DAMP SPRAY-APPLIED CELLULOSIC INSULATION:

A. Self-Supported, Spray-Applied Cellulosic Insulation: ASTM C 739, chemically treated for flame-resistance, processing, and handling characteristics, sprayed-in-place to a density of 3.0 to 3.5 lbs per cubic foot.
   1. Available Products:
      d. Nu-Wool WallSeal Cellulose Insulation.
      e. Cocoon2 Stabilized Borate Formula Insulation, product no. INS735.
   2. Application: Exterior wall assembly insulation.

2.05 SPRAYED FOAM INSULATION

A. Sprayed Polyurethane Foam Sealant for Perimeter of Doors and Windows: 1- or 2-component, foamed-in-place, polyurethane foam sealant, 1.5 to 2.0 lb/cu. ft. density; flame spread index of 25 or less according to ASTM E 162; with primer and noncorrosive substrate cleaner recommended by foam sealant manufacturer.
   1. Available Products:
      a. Great Stuff Window & Door by Dow
      b. Froth-Pak by Insta-Foam Products, Inc.
      c. Pur-Fill 1G by Todol Products, Inc.
      d. Handi-Seal Window and Door Sealant by Fomo Products, Inc.
   2. Application: Perimeter wall air infiltration sealant.

2.06 MINERAL FIBER BATT INSULATION

A. Sound Attenuation Blankets: ASTM C 665, Type I (blankets without membrane facing) produced by combining thermosetting resins with mineral fibers manufactured from glass, slag wool, or rock wool.
   1. Fire-Resistance-Rated Assemblies: Comply with mineral-fiber requirements of assembly.
   2. Application: Sound proofing for shaft-walls.

PART 3 - EXECUTION

3.01 EXAMINATION

A. Examine substrates and conditions, with Installer present, for compliance with requirements of Sections in which substrates and related work are specified and for other conditions affecting performance.
   1. Proceed with installation only after unsatisfactory conditions have been corrected.

3.02 PREPARATION

A. Clean substrates of substances harmful to insulation or of interfering with insulation attachment.

3.03 INSTALLATION, GENERAL

A. Comply with insulation manufacturer's written instructions applicable to products and application indicated.

B. Install insulation that is undamaged, dry, and unsoiled and that has not been left exposed at any time to ice, rain, and snow.

C. Extend insulation in thickness indicated to envelope entire area to be insulated. Cut and fit tightly around obstructions and fill voids with insulation. Remove projections that interfere with placement.

D. Water-Piping Coordination: If water piping is located within insulated exterior walls, coordinate location of piping to ensure that it is placed on warm side of insulation and insulation encapsulates piping.

E. For preformed insulating units, provide sizes to fit applications indicated and selected from manufacturer's standard thicknesses, widths, and lengths. Apply single layer of insulation units to produce thickness indicated unless multiple layers are otherwise shown or required to make up total thickness.

## 3.04 INSTALLATION OF PERIMETER AND UNDER-SLAB INSULATION

A. On vertical surfaces, set insulation units in adhesive applied according to manufacturer's written instructions. Use adhesive recommended by insulation manufacturer.
   1. If not otherwise indicated, extend insulation to top of footing.

B. On horizontal surfaces, loosely lay insulation units according to manufacturer's written instructions. Stagger end joints and tightly abut insulation units.

C. Protect below-grade insulation on vertical surfaces from damage during backfilling by applying protection course with joints butted. Set in adhesive according to insulation manufacturer's written instructions.

D. Protect top surface of horizontal insulation from damage during concrete work by applying protection course with joints butted.Delete paragraph and subparagraphs below if no cellular-glass insulation.

## 3.05 INSTALLATION OF GENERAL BUILDING INSULATION

A. Apply insulation units to substrates by method indicated, complying with manufacturer's written instructions. If no specific method is indicated, bond units to substrate with adhesive or use mechanical anchorage to provide permanent placement and support of units.

B. Seal joints between foam-plastic insulation units by applying adhesive, mastic, or sealant to edges of each unit to form a tight seal as units are shoved into place. Fill voids in completed installation with adhesive, mastic, or sealant as recommended by insulation manufacturer.

C. Install mineral-fiber insulation in cavities formed by framing members according to the following requirements:
   1. Use insulation widths and lengths that fill the cavities formed by framing members. If more than one length is required to fill cavity, provide lengths that will produce a snug fit between ends.
   2. Place insulation in cavities formed by framing members to produce a friction fit between edges of insulation and adjoining framing members.
   3. Maintain 3-inch clearance of insulation around recessed lighting fixtures.
   4. Install eave ventilation troughs between roof framing members in insulated attic spaces at vented eaves.
   5. For metal-framed wall cavities where cavity heights exceed 96 inches, support unfaced blankets mechanically and support faced blankets by taping flanges of insulation to flanges of metal studs.

D. Place loose-fill insulation into spaces indicated, by machine blowing, to comply with ASTM C 1015. Level horizontal applications to uniform thickness as indicated, lightly settle to uniform density, but do not compact excessively.

E. Apply foamed-in-place insulation, by spray or froth method to a uniform monolithic density without voids into miscellaneous voids and cavity spaces where shown.

## 3.06 PROTECTION:

A. Protect installed insulation from damage due to harmful weather exposures, physical abuse, and other causes. Provide temporary coverings or enclosures where insulation is subject to abuse and cannot be concealed and protected by permanent construction immediately after installation.

## PART 4 - MEASUREMENT AND PAYMENT:

### 4.01 METHOD OF MEASUREMENT:

Thermal and Acoustic Insulation will be measured by the lump sum, complete and accepted. The Thermal and Acoustic Insulation limits shall be as shown or described in the Contract Documents.

### 4.02 BASIS OF PAYMENT:

Thermal and Acoustic Insulation will be paid for at the contract lump sum price. Payment for Thermal and Acoustic Insulation will be under:

| Pay Item | | Pay Unit |
|---|---|---|
| DIV. 7 | Thermal and Moisture | Lump Sum |

**END OF SECTION**

# SECTION 07 22 16 - NAILBOARD INSULATION

All work and materials shall conform to the Contract Documents and the provisions of the State of Maine Department of Transportation Standard Specifications, Revision November 2014, with the following additions:

Add the following:

PART 1 - GENERAL

1.01 SECTION INCLUDES

A. Rigid board type roof insulation for thermal protection as part of roofing assemblies.

1.02 RELATED SECTIONS

A. Section 06 10 00 - Rough Carpentry: Wood roof blocking and nailers.

B. Section 06 12 00 - Structural Panels

1.03 REFERENCES

A. ASTM C 1289 - Standard Specification for Faced Rigid Cellular Polyisocyanurate Insulation Board.

B. ASTM E 119 - Standard Test Methods for Fire Tests of Building Constructions and Materials.

C. LTTR – Long Term Thermal Resistance, based on CAN/ULC S770 based on ASTM C1303.

D. UL 263 - Fire Tests of Building Construction and Materials.

E. UL 790 - Tests for Fire Resistance of Roof Covering Materials.

1.04 DEFINITIONS

A. HCFC FREE “Green” Polyiso Roof Board Insulation is defined as environmentally friendly, with Zero Global Warming, Zero Ozone Depletion (ODP) as in compliance with the US EPA requirements of January 1, 2003 requirement to eliminate production of HCFC 141b.

B. LTTR (Long Term Thermal Resistance) is defined as using techniques from ASTM C1303, CAN/ULC S770 predicting a foam’s R-Value that has been shown to be equivalent to the average performance of a permeably faced foam insulation product over 15 years. In Canada this method is used as the Design R-Value. This applies to ALL foam insulation products with blowing agents other than air, such as Polyiso, “Green” Polyiso, extruded polystyrene and polyurethane. The new method is based on consensus standards in the US and Canada. PIMA has reported this method as providing a better understanding of the thermal performance of foam.

1.05 SUBMITTALS

A. Submit under provisions of Section 01 33 00 and 01 60 00.

B. Product Data:
1. Manufacturer´s specifications

C. Shop Drawings: Roof plan showing layout of boards, and fastening patterns, and ventilation and roof edge details.

D. Thermal Warranty: Submit sample warranty indicating conditions and limitations.

1.06 QUALITY ASSURANCE

A. Manufacturer Qualifications:
   1. Show evidence of ability to manufacturer products specified with sufficient manufacturing facilities.

B. Regulatory Requirements:
   1. American Society for Testing and Materials (ASTM).
   2. Factory Mutual (FM).
   3. Underwriters Laboratories Inc. (UL) Classification.
   4. California State Insulation Quality Standards and Title 25 Foam Flammability Criteria.
   5. IBC Sections on Foam Insulation.

1.07 DELIVERY, STORAGE AND HANDLING

A. Deliver insulation in packages labeled with material name, thermal value and product code.

B. When stored outdoors, stack insulation on pallets above ground or roof deck and cover with tarpaulin or other suitable waterproof coverings. Slit or remove manufacturer´s packaging before covering with waterproof covering.

1.08 PROJECT CONDITIONS

A. Comply with insurance underwriter´s requirements applicable for products of this Section.

B. Do not install insulation on roof deck when water of any type is present. Do not apply roofing materials when substrate is damp or wet.

PART 2 - PRODUCTS

2.01 MANUFACTURERS

A. Acceptable Manufacturers:
   1. Atlas Roofing Corporation, Atlanta, GA
   2. Apache Products, Dallas, TX

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

C. Provide all insulating sheathing from a single manufacturer.

2.02 MATERIALS

A. ACFoam Nail Base: Closed-cell HCFC FREE “Green” polyisocyanurate foam board manufactured using blowing agent and bonded to 7/16 inch thick APA/TECO rated OSB on the top side and a fiber-reinforced felt facer on the bottom; for use with metal roofing, FM 1-90 wind rating; compressive strength - 20 psi.

B. Related Materials:
   1. Fasteners: Factory Mutual approved.
   2. Base Ply: As recommended by membrane manufacturer.
   3. Fasteners: For Nail Base and Vented-R: Atlas Nail Base Fasteners.

PART 3 - EXECUTION

3.01 EXAMINATION

A. Examine roof deck for suitability to receive insulation. Verify that substrate is dry, clean and free of foreign material that will damage insulation or impede installation.

B. Verify that roof drains, scuppers, roof curbs, nailers, equipment supports, vents and other roof accessories are secured properly and installed in conformance with Contract Drawings and submittals.

C. Verify that deck is structurally sound to support installers, materials and equipment without damaging or deforming work.
   1. Start of installation indicates installer accepts conditions of existing deck surfaces.

3.02 APPLICATION / INSTALLATION

A. Install specified insulation using approved mechanical fasteners in accordance with manufacturer´s latest written instructions and as required by governing codes and Owner´s insurance carrier.

B. Install with end joints staggered to avoid having insulation joints coinciding with joints in deck. In multi-layer installations, stagger joints in top and bottom layers.

3.03 CLEANING / PROTECTION

A. Remove trash and construction debris from insulation surface prior to application of roofing membrane.

B. Do not leave installed insulation exposed to weather. Cover and waterproof with completed roof system immediately after installation.
   1. Temporarily seal exposed insulation edges at the end of each day.
   2. Remove and replace installed insulation that has become wet or damaged with new insulation.

C. Protect installed insulation and roof cover from traffic by use of protective covering materials during and after installation

PART 4 - MEASUREMENT AND PAYMENT:

4.01 METHOD OF MEASUREMENT:

Nailboard Insulation will be measured by the lump sum, complete and accepted. The Nailboard Insulation Insulation limits shall be as shown or described in the Contract Documents.

4.02 BASIS OF PAYMENT:

Nailboard Insulation Insulation will be paid for at the contract lump sum price. Payment for Nailboard Insulation Insulation will be under:

| Pay Item | | Pay Unit |
|---|---|---|
| DIV. 7 | Thermal and Moisture | Lump Sum |

**END OF SECTION**

# SECTION 07 26 16 - BELOW-GRADE VAPOR RETARDERS

All work and materials shall conform to the Contract Documents and the provisions of the State of Maine Department of Transportation Standard Specifications, Revision November 2014, with the following additions:

Add the following:

## PART 1 - GENERAL

### 1.01 RELATED DOCUMENTS

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

### 1.02 SUMMARY

A. This Section includes the following:
   1. Vapor retarders under slabs-on-grade.

### 1.03 DEFINITIONS

A. Vapor Retarder: Material with a water vapor transmission rating of not over 0.04g per square foot per hour.

B. Vapor Barrier: Material with a water vapor transmission rating of not over 0.015g per square foot per hour.

### 1.04 SUBMITTALS

A. Product Data: For each type of product indicated.

B. Samples for Verification: 12 inch (300 mm) square units for each type of vapor retarder, vapor barrier, or air barrier indicated.

### 1.05 DELIVERY, STORAGE, AND HANDLING

A. Protect materials from physical damage and from deterioration by moisture, soiling, and other sources. Store inside and in a dry location. Comply with manufacturer's written instructions for handling, storing, and protecting during installation.

### 1.06 PROJECT CONDITIONS

A. Separate and recycle waste materials.

## PART 2 - PRODUCTS

### 2.01 MANUFACTURERS

A. Available Manufacturers and Products: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following products listed in Part 2 of this Section.

### 2.02 VAPOR RETARDERS FOR UNDER SLABS

A. Vapor Retarder for VCT and other moisture vapor sensitive flooring applications having the following qualities:
   1. Minimum Permeance: ASTM E-96, not greater than 0.04 perms.
   2. Tensile Strength: ASTM E154 or D638, Class B – over 30 lbs/in.
   3. Puncture Resistance: ASTM E-154, Class C – over 475 grams.
   4. Water Vapor Barrier: ASTM E-1745, meets or exceeds Class C.
   5. Thickness of Barrier (Plastic) ACI 302.1R-96, not less than 10 mils.

B. Available Products: Subject to compliance with requirements, products that may be incorporated into the Work include, but are not limited to, the following:
   1. Stego Wrap, 10 mil thick vapor retarder by Stego Industries LLC, (877) 464-7834.
   2. Griffolyn Type-65 by Reef Industries.
   3. Vapor Block 10 by Raven Industries.
   4. MoistStop Ultra A by Fortifiber.
   5. Sealtight Perminator 10 mil Underslab Vapor-Mat by W.R. Meadows, Inc.
   6. Viper VaporCheck 10 by Insulation Solutions, Inc.

C. Vapor-Retarder Tape (for slabs): Stego Warp red polyethylene tape or tape as recommended by the manufacturer.

D. Double-Stick Edge Tape: Preformed 1-1/2" wide two-sided adhesive. Available products include “Fab Tape” by Reef Industries.

## PART 3 - EXECUTION

### 3.01 EXAMINATION

A. Examine substrates and conditions, with Installer present, for compliance with requirements for Sections in which substrates and related work are specified and other conditions affecting performance.

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

### 3.02 PREPARATION

A. Clean substrates of substances harmful to vapor retarders, including removing projections capable of puncturing vapor retarders, or of interfering with attachment.

### 3.03 INSTALLATION, GENERAL

A. Comply with manufacturer's written instructions applicable to products and application indicated.

B. Extend retarders in thickness indicated to envelop entire area to be covered. Cut and fit tightly around obstructions. Remove projections that interfere with placement.

### 3.04 INSTALLATION OF UNDER-SLAB VAPOR RETARDERS

A. Moisture vapor retarder system shall be installed at all interior floor slabs and as otherwise indicated in the drawings in strict accordance with the manufacturer's printed instructions and as follows:

   1. Snap chalk line along inside perimeter of foundation walls at top of slab elevation.
   2. Without wetting, clean a 3" wide band on the surface of the concrete below the chalk line at approximately mid-slab height. Remove dirt, residual form release, or other bond inhibiting surface contaminates. Grind smooth any surface projections within the band.

3. While removing the contact paper on the backside, firmly press 2" wide double-stick edge tape onto wall, parallel to the chalk line on the cleaned band at mid-slab elevation.
4. Remove contact paper on the face side.
5. Apply a 12" wide strip of vapor retarder covering only the bottom 1" of contact surface on the edge tape. Cut, fit, and seal corner details with vapor retarder seaming tape.
6. Align top edge of Iso-Strip isolation joint material to chalk line, and press material onto remaining 1" of exposed perimeter strip adhesive.
7. Roll out vapor retarder material, overlapping edge rolls and all seams by 3". Tape all seams with vapor retarder seaming tape.
8. All tears, punctures, etc. to be repaired and taped as required to maintain the watertight integrity of the vapor retarder system.

3.05 PROTECTION

A. Protect installed vapor retarders from damage due to harmful weather exposures, physical abuse, and other causes. Provide temporary coverings or enclosures where vapor retarders are subject to abuse and cannot be concealed and protected by permanent construction immediately after installation.

PART 4 - MEASUREMENT AND PAYMENT:

4.01 METHOD OF PAYMENT

A. Below-Grade Vapor Retarders will be measured by lump sum, complete and accepted. The Below-Grade Vapor Retarders limits shall be as shown or described in the Contract Documents.

4.02 BASIS OF PAYMENT:

A. Below-Grade Vapor Retarders will be paid for at the contract lump sum price. Payment for Below-Grade Vapor Retarders will be under:

| Pay Item | | Pay Unit |
|---|---|---|
| DIV. 7 | Thermal and Moisture | Lump Sum |

**END OF SECTION**

# SECTION 07 27 13 - AIR BARRIERS

All work and materials shall conform to the Contract Documents and the provisions of the State of Maine Department of Transportation Standard Specifications, Revision November 2014, with the following additions:

Add the following:

PART I - GENERAL

1.01 GENERAL CONDITIONS The General Conditions, Supplementary General Conditions and all Sections of Division 1 shall apply to each and every contract and contractor, person or persons supplying material, labor or entering into the work directly or indirectly.

1.02 DESCRIPTION OF WORK

A. Work Included: Provide labor, materials and equipment necessary to complete the work of this Section, including but not limited to the following:
   1. Air barrier and transition strips at the following locations.
      a. Air barrier at plywood sheathing substrate.
      b. Air barrier transition strips to adjacent and penetrating materials at all substrates.

B. Related Work: The following items are not included in this Section and will be performed under the designated Sections:
   1. Section 06 10 00 − ROUGH CARPENTRY for sheathing substrate for air and vapor barrier system.

1.03 DEFINITIONS

A. Air Barrier Assembly: The collection of air barrier materials and auxiliary materials applied to an opaque wall or soffit, including joints and junctions to abutting construction, to control air movement through the wall.

1.04 PERFORMANCE REQUIREMENTS

A. General: Air barrier shall be capable of performing as a continuous vapor-retarding air barrier and as a liquid-water drainage plane flashed to discharge to the exterior incidental condensation or water penetration. Air barrier assemblies shall be capable of accommodating substrate movement and of scaling substrate expansion and control joints, construction material changes, penetrations, and transitions at perimeter conditions without deterioration and air leakage exceeding specified limits.

B. Air Barrier Assembly Air Leakage: Not to exceed 0.03 cfin/sq. ft. of surface area at 1.57 lbf/sq. ft., ASTM E 283.

1.05 SUBMITTALS

A. Product Data: Include manufacturer's written instructions for evaluating, preparing, and treating substrate; technical data; and tested physical and performance properties of air barrier.

B. Shop Drawings: Show locations and extent of air barrier. Include details for substrate joints and cracks, counterflashing strip, penetrations, inside and outside comers, terminations, and tie-ins with adjoining construction.

   1. Include details of interfaces with other materials that form part of air barrier.
   2. Include details of mockups.

C. Product Certificates: For air barriers, certifying compatibility of air barrier and accessory materials with Project materials that connect to or that come in contact with air barrier; signed by product

manufacturer.

D. Qualification Data: For Applicator.

E. Product Test Reports: Based on evaluation of comprehensive tests performed by a qualified testing agency, for air barriers.

1.06 QUALITY ASSURANCE

A. Applicator Qualifications: A firm experienced in applying air barrier materials similar in material, design, and extent to those indicated for this Project, whose work has resulted in applications with a record of successful in-service performance.

B. Mockups: Before beginning installation of air barrier, build mockups of exterior wall assembly 150 sq. ft., incorporating backup wall construction, external cladding, window, door frame and sill, insulation, and flashing to demonstrate, surface preparation, crack and joint treatment, and scaling of gaps, terminations, and penetrations of air barrier membrane.
1. Coordinate construction of mockup to permit inspection by Contractor's independent testing agency of
barrier before external insulation and cladding is installed.
2. Include junction with roofing membrane, building comer condition, and foundation wall intersection.
3. If the Architect determines mockups do not comply with requirements, reconstruct mockups and apply air barrier until mockups are approved.
4. Approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

C. Pre-installation Conference: Conduct conference at Project site.
1. Include installers of other construction connecting to air barrier, such as roofing, waterproofing, architectural stone cladding , joint sealants, windows, glazed curtain walls, and door frames.
2. Review air barrier requirements including surface preparation, substrate condition and pretreatment, minimum substrate curing period, forecasted weather conditions, special details and sheet flashings, mockups, installation procedures, sequence of installation, testing and inspecting procedures, and protection and repairs.

1.08 DELIVERY, STORAGE, AND HANDLING

A. Store liquid materials in their original undamaged packages in a clean, dry, protected location and within temperature range required by air barrier manufacturer.

B. Remove and replace liquid materials that cannot be applied within their stated shelf life. C. Store rolls according to manufacturer's written instructions. D. Protect stored materials from direct sunlight.

1.09 PROJECT CONDITIONS

A. Environmental Limitations: Apply air barrier within the range of ambient and substrate temperatures recommended by air barrier manufacturer. Protect substrates from environmental conditions that affect performance of air barrier. Do not apply air barrier to a damp or wet substrate or during snow, rain, fog, or mist.

PART 2 - PRODUCTS

2.01 AIR BARRIER

A. Modified Bituminous Sheet: 40-mil-thick, self-adhering sheet consisting of 36 mils of rubberized

asphalt laminated to a 4-mil-thick, cross-laminated polyethylene film with release liner on adhesive side[and formulated for application with primer that complies with VOC limits of authorities having jurisdiction.

1. Available Products: Subject to compliance with requirements, products that may be incorporated into the Work include, but are not limited to, the following
   a. Carlisle Coatings & Waterproofing; CCW-705.
   b. Grace, W. R. & Co.; Perm-A-Barrier.
   c. Henry Company; Blueskin SA.
   d. Meadows, W. R., Inc.; Sea]Tight Air-Shield.
   e. Rubber Polymer Corporation; Rub-R-Wall SA.
   f. Tremco, Inc.; ExoAir 110.
   g. Or approved equal.
2. Physical and Performance Properties:
   a. Membrane Air Permeance: Not to exceed 0.004 cfm/sq. ft. of surface area at 1.57 lbf/sq. ft. pressure difference; ASTM E 2178.
   b. Tensile Strength: 250 psi minimum; ASTM D 412, Die C, modified.
   c. Ultimate Elongation. 200 percent minimum; ASTM D 412, Die C, modified.
   d. Low-Temperature Flexibility: Pass at minus 20 deg F, ASTM D 1970.
   e. Crack Cycling: Unaffected after 100 cycles of 1/8-inch movement- AS'TM C 836.
   f. Puncture Resistance: 40 lbf minimum; ASTM E 154.
   g. Water Absorption: 0.15 percent weight-gain maximum after 48-hour immersion at 70 deg F; ASTM D 570.
   h. Vapor Permeance: 0.05 perms, ASTM E 96, Water Method.

B. Fluid-Applied, Vapor-Retarding Membrane Air Barrier: Elastomeric, modified bituminous or synthetic polymer membrane.
1. Available Products: Subject to compliance with requirements, products that may be incorporated into the Work include, but are not limited to, the following:
   a. Elastomeric Modified Bituminous Membrane:
      1) Carlisle Coatings & Waterproofing; Barriseal.
      2) Henry Company; Air-Bloc 06.
      3) Meadows, W. R., In c.; Air-Shield LM.
      4) Tremco Incorporated; ExoAir.
   b. Synthetic Polymer Membrane:
      1) Grace, W. R. & Co.; Perm-A-Barrier Liquid.
      2) Polymer Corporation-, Rub-R-Wall Airtight.
2. Physical and Performance Proper-ties:
   a. Membrane Air Permeance: Not to exceed 0.004 cfm x sq. ft. of surface area at 1.57-lbf/sq. ft. pressure difference; ASTM E 2178.
   b. Membrane Vapor Permeance: Not to exceed 0. 1 perm; ASTM E 96

## 2.02 AUXILIARY MATERIALS

A. General: Auxiliary materials recommended by air barrier manufacturer for intended use and compatible with air barrier. Liquid-type auxiliary materials shall comply with VOC limits of authorities having jurisdiction.

B. Primer: Liquid waterborne or solvent-borne primer recommended for substrate by manufacturer of air barrier material.

C. Counterflashing Strip: Modified bituminous 40-mil-thick, self-adhering sheet consisting of 32 mils of rubberized asphalt laminated to an 8-mil-thick, cross-laminated polyethylene film with release liner backing.

D. Butyl Strip at Termination with EPDM or TPO Roofing Membrane: Vapor-retarding, 30- to

40-mil-thick, self adhering; polyethylene-film-reinforced top surface laminated to layer of butyl adhesive, with release liner backing.

E. Modified Bituminous Strip To Cover Cracks and Joints and Terminate Air Barrier to Compatible Roofing Membrane: Vapor-retarding, 40-mil-thick, smooth-surfaced, self-adhering; consisting of 36 mils of rubberized asphalt laminated to a 4-mil- polyethylene film with release liner backing.

F. Termination Mastic: Cold fluid-applied elastomeric-liquid; trowel-grade.

G. Joint Reinforcing Strip: Air barrier manufacturer's glass-fiber-mesh tape.

H. Substrate Patching Membrane: Manufacturer's standard trowel-grade substrate filler.

I. Adhesive and Tape: Air barrier manufacturer's standard adhesive and pressure-sensitive adhesive tape.

J. Stainless-Steel Sheet: ASTM A 240/A 240M, Type 304, 0.0187 inch thick, and Series 300 stainless-steel fasteners.

K. Sprayed Polyurethane Foam Sealant to Fill Gaps at Penetrations and Openings: I - or 2 component, foamed -in -place, polyurethane foam sealant, 1.5 to 2.0 lb/cu. ft. density; flame spread index of 25 or less according to MTM E 162; with primer and noncorrosive substrate cleaner recommended by foam sealant manufacturer.

L. Modified Bituminous Transition Strip to Seal Air Barrier Terminations with Glazing Systems: Vapor-retarding, 40-mil-thick, smooth-surfaced, self-adhering; consisting of 36 mils of rubberized asphalt laminated to a 4-mil-thick polyethylene film with release liner backing.

M. Preformed Silicone-Sealant Extrusion to Seal Air Barrier Terminations with Glazing Systems: Manufacturer's standard system consisting of cured low-modulus Silicone extrusion, sized to fit opening widths, with a single-component, neutral-curing, Class 100150 (low-modulus) silicone sealant for bonding extrusions to substrates.
   1. Available Products: Subject to compliance with requirements, products that may be incorporated into the Work include, but are not limited to, the following
      a. Dow Coming Corporation, 123 Silicone Seal.
      b. GE Silicone, UltraSpan US 1100.
      c. Pecora Corporation, Sil-Span. d. Tremco, Incorporated, Spectrem EZ Simple Seal. e. Or approved equal.

N. Joint Sealant: ASTM C 920, single-component, neutral-curing silicone; Class 100/50 (low modulus), Grade NS, Use NT related to exposure, and, as applicable to joint substrates indicated, Use

0. Comply with Section 07 92 00 - JOINT SEALANTS.

## PART 3 - EXECUTION

### 3.01 EXAMINATION

A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements and other conditions affecting performance.
   1. Verify that substrates are sound and free of oil, grease, dirt, excess mortar, or other contaminants.
   2. Verify that concrete has cured and aged for minimum time period recommended by air barrier manufacturer.
   3. Verify that concrete is visibly dry and -free of moisture. Test for capillary moisture by plastic sheet method according to ASTM D 4263.

4. Verify that masonry joints are flush and completely filled with mortar.
5. Proceed with installation only after unsatisfactory conditions have been corrected.

3.02 SURFACE PREPARATION

A. Clean, prepare, and treat substrate according to manufacturer's written instructions. Provide clean, dust-free, and dry substrate for air barrier application.

B. Mask off adjoining surfaces not covered by air barrier to prevent spillage and overspray affecting other construction.

C. Remove grease, oil, bitumen, form release agents, paints, curing compounds, and other penetrating contaminants or film-forming coatings from concrete.

D. Remove fins, ridges, mortar, and other projections and fill honeycomb, aggregate pockets, holes, and other voids in concrete with substrate-patching membrane.

E. Remove excess mortar from masonry ties, shelf angles, and other obstructions.

F. Prepare, fill, prime, and treat joints and cracks in substrates. Remove dust and dirt from joints and cracks according to ASTM D 4258.
1. Install modified bituminous strips and center over treated construction and contraction joints and cracks exceeding a width of 1/16 inch

G. Bridge and cover isolation joints expansion joints and discontinuous deck-to-wall and deck-to-deck joints with overlapping modified bituminous strips.

H. At changes in substrate plane, apply sealant or termination mastic beads at sharp comers and edges to form a smooth transition from one plane to another.
1. Cover gaps in substrate plane and form a smooth transition from one substrate plane to another with stainless-steel sheet mechanically fastened to structural framing to provide continuous support for air barrier.

3.03 INSTALLATION OF MODIFIED BITUMINOUS SHEETS

A. Install modified bituminous sheets according to air barrier manufacturer's written instructions and according to recommendations in ASTM D 6135.
1. When ambient and substrate temperatures range between 25 and 40 deg F, install self-adhering, modified bituminous air barrier sheets produced for low-temperature application. Do not use low-temperature sheets if ambient or substrate temperature is higher than 60 deg F.

B. Corners: Prepare, prime, and treat inside and outside corners according to ASTM D 6135.
1. Install modified bituminous strips centered over vertical inside comers. Install 3/4-inch fillets of termination mastic on horizontal inside corners.

C. Prepare, treat, and seal vertical and horizontal surfaces at terminations and penetrations with termination mastic and according to ASTM D 6135.

D. Apply primer to substrates at required rate and allow to dry: Limit priming to areas that will be covered by air barrier sheet in same day. Re-prime areas exposed for more than 24 hours.
1. Prime glass-fiber-surfaced gypsum. sheathing with number of prime coats needed to achieve required bond, with adequate drying time between coats.

E. Apply and firmly adhere modified bituminous sheets horizontally or vertically over area to receive air barrier sheets. Accurately align sheets and maintain a uniform 2-1/2-inchminimum lap widths and end laps. Overlap and seal seams and stagger end laps to ensure airtight installation.

1. Apply sheets in a shingled manner to shed water without interception by any exposed sheet edges.
2. Roll sheets firmly to enhance adhesion to substrate.
3. Apply termination mastic on any horizontal, field-cut or non-factory edges.

F. Apply continuous modified bituminous sheets over modified bituminous strips bridging substrate cracks, construction, and contraction joints.

G. Seal top of non-metallic through-wall flashings to air barrier sheet with an additional 6inch wide strip

H. Seal exposed edges of metallic sheets at seams, cuts, penetrations, and terminations not concealed by metal counterflashings or ending in reglets with termination mastic.

I. Install air barrier sheets and auxiliary materials to form a sea] with adjacent construction and to maintain a continuous air barrier.
1. Coordinate the installation of air barrier with installation of roofing membrane and base flashing to ensure continuity of air barrier with roofing membrane.
2. Install compatible strip on roofing membrane or base flashing so that a minimum of 3 inches of coverage is achieved over both substrates.

J. Connect and seal exterior wall air barrier membrane continuously to roofing membrane air barrier, concrete below-grade structures, floor-to floor construction, exterior glazing and window systems, glazed curtain-wall systems, storefront systems, exterior louvers, exterior door framing, and other construction used in exterior wall openings using accessory materials.

K. Wall Openings: Prime concealed perimeter frame surfaces of windows, curtain walls, storefronts, and doors. Apply membrane specified below so that a minimum of 3 inches of coverage is achieved over both substrates. Maintain 3 inches of full contact over firm bearing to perimeter frames with not less than I inch of full contact.
1. Modified Bituminous Transition Strip: Roll firmly to enhance adhesion.
2. Elastomeric Flashing Sheet: Apply adhesive to wall, frame, and flashing sheet. Install flashing sheet and termination bars, fastened at 6 inches o.c. Apply lap sealant over exposed edges and on cavity side of flashing sheet.
3. Preformed Silicone-Sealant Extrusion: Set in full bed of silicone sealant applied to walls, frame, and membrane.

L. Fill gaps in perimeter frame surfaces of windows, curtain walls, storefronts, doors, and miscellaneous penetrations of air barrier membrane with foam sealant.

M. At end or each working day, seal top edge of membrane to substrate with termination mastic.

N. Apply joint sealants forming part of air barrier assembly within manufacturer's recommended application temperature ranges. Consult manufacturer when sealant cannot be applied within these temperature ranges.

0. Repair punctures, voids, and deficient lapped seams in air barrier. Slit and flatten fishmouths and blisters. Patch with air barrier sheet extending 6 inches beyond repaired areas in all directions.

P. Do not cover air barrier until it has been tested and inspected by Owner's testing agency.

Q. Correct deficiencies in or remove air barrier that does not comply with requirements; repair substrates and reapply air barrier components

## 3.04 INSTALLATION OF FLUID-APPLIED AIR BARRIER MEMBRANE

A. Apply air barrier membrane to form a seal with strips and transition strips and to achieve a continuous

air barrier according to air barrier manufacturer's written instructions.

B. Apply air barrier membrane within manufacturer's recommended application temperature ranges.

C. Apply primer to substrates at required rate and allow to dry. Limit priming to areas that will be covered by air barrier sheet in same day. Re-prime areas exposed for more than 24 hours.
1. Prime glass-fiber-surfaced gypsum sheathing with number of prime coats needed to achieve required bond, with adequate drying time between coats.

D. Apply a continuous unbroken air barrier to substrates according to the following minimum thickness. Apply membrane in fall contact around protrusions such ~s masonry ties.
1. Vapor-Retarding Membrane Air Barrier: 60-mil dry film thickness.

E. Apply strip and transition strip a minimum of 1 inch onto cured air membrane or strip and transition strip over cured air membrane overlapping 3 inches onto each surface according to air barrier manufacturer's written instructions.

F. Do not cover air barrier until it has been tested and inspected by Owner's testing agency,

G. Correct deficiencies in or remove air barrier that does not comply with requirements; repair substrates and reapply air barrier components.

## 3.05 FIELD QUALITY CONTROL

A. Testing Agency: Engage a qualified testing agency to perform tests and inspections and prepare test reports.

B. Inspections: Air barrier materials and installation are subject to inspection for compliance with requirements. Inspections may include the following:
1. Continuity of air barrier system has been achieved throughout the building envelope with no gaps or holes.
2. Continuous structural support of air barrier system has been provided.
3. Masonry and concrete surfaces are smooth, clean and free of cavities, protrusions, and mortar droppings.
4. Site conditions for application temperature and dryness of substrates have been maintained.
5. Maximum exposure time of materials to UV deterioration has not been exceeded.
6. Surfaces have been primed.
7. Laps in sheet materials have complied with the minimum requirements and have been shingled in the correct direction (or mastic applied on exposed edges), with no fishmouths.
8. Termination mastic has been applied on cut edges.
9. Air barrier has been firmly adhered to substrate.
10. Compatible materials have been used.
11. Transitions at changes in direction and structural support at gaps have been provided.
12. Connections between assemblies (membrane and sealants) have complied with requirements for cleanliness, preparation and priming of surfaces, structural support, integrity, and continuity of seal.
13. All penetrations have been sealed.

C. Tests:
1. Qualitative Testing: Air barrier assemblies will be tested for evidence of air leakage according to ASTM E 1186.
2. Quantitative Air Leakage Testing: Testing not to exceed the test pressure differential, positive and negative, indicated in "Performance Requirements" Article for air barrier assembly air leakage according to ASTM E 283.

D. Remove and replace deficient air barrier components and retest as specified above.

## 3.06 CLEANING AND PROTECTION

A. Protect air barrier system from damage during application and remainder of construction period, according to manufacturer's written instructions.

1. Protect air barrier from exposure to UV- light and harmful weather exposure as required by manufacturer. Remove and replace air barrier exposed to these conditions for more than 30 days.
2. Protect air barrier from contact with creosote, uncured coal-tar products, TPO, EPDM, flexible PVC membranes, and sealants not approved by air barrier manufacturer.

B. Clean spills, stains, and soiling from adjacent construction that would be exposed in the completed work using cleaning agents and procedures recommended by manufacturer of affected construction.

PART 4 - MEASUREMENT AND PAYMENT:

4.01 METHOD OF MEASUREMENT:

Air Barriers will be measured by the lump sum, complete and accepted. The Air Barriers limits shall be as shown or described in the Contract Documents.

4.02 BASIS OF PAYMENT:

Air Barriers will be paid for at the contract lump sum price. Payment for Air Barriers will be under:

| Pay Item | | Pay Unit |
|---|---|---|
| DIV. 7 | Thermal and Moisture | Lump Sum |

**END OF SECTION**

# SECTION 07 41 13 - METAL ROOF PANELS

All work and materials shall conform to the Contract Documents and the provisions of the State of Maine Department of Transportation Standard Specifications, Revision November 2014, with the following additions:

Add the following:

PART 1 - GENERAL

1.01 GENERAL CONDITIONS: The General Conditions, Supplementary General Conditions and all Sections of Division 1 shall apply to each and every contract and contractor, person or persons supplying material, labor or entering into the work directly or indirectly.

1.02 SUMMARY:

A. This Section includes the following:
1. Factory-formed and field-assembled, standing-seam metal roof panels.
2. Metal soffit panels.

1.03 DEFINITIONS:

A. Metal Roof Panel Assembly: Metal roof panels, attachment system components, miscellaneous metal framing, and accessories necessary for a complete weathertight roofing system.

1.04 PERFORMANCE REQUIREMENTS:

A. General: Provide manufactured roof panel assemblies complying with performance requirements indicated and capable of withstanding structural movement, thermally induced movement, and exposure to weather without failure or infiltration of water into the building interior.

B. Wind-Uplift Resistance: Provide metal roof panel assemblies that comply with UL 580 for wind-uplift resistance class indicated.
1. Class: 1-60.

C. Thermal Movements: Provide metal roof panel assemblies that allow for thermal movements resulting from the following maximum change (range) in ambient and surface temperatures by preventing buckling, opening of joints, overstressing of components, failure of joint sealants, failure of connections, and other detrimental effects. Base engineering calculation on surface temperatures of materials due to both solar heat gain and nighttime-sky heat loss.

1. Temperature Change (Range): 120 deg F (67 deg C), ambient; 180 deg F (100 deg C), material surfaces.

1.05 SUBMITTALS

A. Product Data: Include manufacturer's product specifications, standard details, certified product test results, and general recommendations, as applicable to materials and finishes for each component and for total panel assemblies.

B. Shop Drawings: Show layouts of panels on roofs, details of edge conditions, joints, panel profiles, supports, anchorages, trim, flashings, underlayment, closures, and special details. Distinguish between factory- and field-assembled work.

C. Samples for Selection: Manufacturer's color charts or chips showing the full range of colors, textures, and patterns available for roof panels with factory-applied finishes.

D. Maintenance Data: For metal roof panels to include in maintenance manuals.

E. Warranties: Special warranties specified in this Section.

## 1.06 QUALITY ASSURANCE

A. Installer Qualifications: Engage an experienced installer who has completed metal roof panel projects similar in material, design, and extent to that indicated for this Project and with a record of successful in-service performance.

## 1.07 DELIVERY, STORAGE, AND HANDLING

A. Deliver panels and other components so they will not be damaged or deformed. Package panels for protection against damage during transportation or handling.

B. Handling: Exercise care in unloading, storing, and erecting roof panels to prevent bending, warping, twisting, and surface damage.

C. Stack materials on platforms or pallets, covered with tarpaulins or other suitable weathertight and ventilated covering. Store panels to ensure dryness. Do not store panels in contact with other materials that might cause staining, denting, or other surface damage.

D. Protect strippable protective covering on metal roof panels from exposure to sunlight and high humidity, except to extent necessary for period of metal roof panel installation.

## 1.08 PROJECT CONDITIONS

A. Weather Limitations: Proceed with installation only when existing and forecasted weather conditions permit assembly of metal roof panels to be performed according to manufacturers' written instructions and warranty requirements.

B. Field Measurements: Verify location of structural members and openings in substrates by field measurements before fabrication and indicate measurements on Shop Drawings. Coordinate fabrication schedule with construction progress to avoid delaying the Work.

1. Established Dimensions: Where field measurements cannot be made without delaying the Work, either establish opening dimensions and proceed with fabricating roof panels without field measurements or allow for trimming panel units. Coordinate roof construction to ensure actual locations of structural members and to ensure opening dimensions correspond to established dimensions.

## 1.09 COORDINATION

A. Coordinate metal panel roof assemblies with rain drainage work, flashing, trim, and construction of decks, and other adjoining work to provide a leakproof, secure, and noncorrosive installation.

## 1.010 WARRANTY

A. General Warranty: Special warranties specified in this Article shall not deprive the Owner of other rights the Owner may have under other provisions of the Contract Documents and shall be in addition to, and run concurrent with, other warranties made by the Contractor under requirements of the Contract Documents.

B. Special Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace components of metal roof panel assemblies that fail in materials or workmanship within specified warranty period.

1. Failures include, but are not limited to, the following:
   a. Structural failures, including rupturing, cracking, or puncturing.
   b. Deterioration of metals, metal finishes, and other materials beyond normal weathering.

2. Warranty Period: Two years from date of Substantial Completion.

3. Warranty Requirements: Building is located in a marine environment. Warranty shall be equal to Manufacturer's standard form for buildings not located in a marine environment without limitations or exclusions.

C. Special Finish Warranty: Submit a written warranty, signed by manufacturer, covering failure of the factory-applied exterior finish on metal roof panels within the specified warranty period and agreeing to repair finish or replace roof panels that show evidence of finish deterioration. Deterioration of finish includes, but is not limited to, color fade, chalking, cracking, peeling, and loss of film integrity.
1. Finish Warranty Period: 20 years from date of Substantial Completion.
2. Finish Warranty Requirements: Building is located in a marine environment. Warranty shall be equal to Manufacturer's standard form for buildings not located in a marine environment without limitations or exclusions.

## PART 2 - PRODUCTS

### 2.01 MANUFACTURERS

A. Available Manufacturers and Products: Subject to compliance with requirements, manufacturers offering metal panels that may be incorporated into the Work include, but are not limited to, the manufacturers listed in the following paragraphs of Part 2.

### 2.02 PANEL MATERIALS

A. Metallic-Coated Steel Sheet Prepainted with Coil Coating: Steel sheet metallic coated by the hot-dip process and prepainted by the coil-coating process to comply with ASTM A 755/A 755M.
1. Zinc-Coated (Galvanized) Steel Sheet: ASTM A 653/A 653M, G90 (Z275) coating designation; structural quality.
2. Surface: Smooth, flat finish.
3. Exposed Finishes: Apply the following coil coating, as specified or indicated on Drawings.
a. Fluoropolymer Two-Coat System: Manufacturer's standard two-coat, thermocured system consisting of specially formulated inhibitive primer and fluoropolymer color topcoat containing not less than 70 percent polyvinylidene fluoride resin by weight; complying with physical properties and coating performance requirements of AAMA 2605.

B. Panel Sealants:
1. Sealant Tape: Pressure-sensitive, 100 percent solids, gray polyisobutylene compound sealant tape with release-paper backing. Provide permanently elastic, nonsag, nontoxic, nonstaining tape 1/2 inch (13 mm) wide and 1/8 inch (3 mm) thick.
2. Joint Sealant: ASTM C 920; elastomeric polyurethane, polysulfide, or silicone sealant; of type, grade, class, and use classifications required to seal joints in metal roof panels and remain weathertight; and as recommended in writing by metal roof panel manufacturer.
3. Butyl-Rubber-Based, Solvent-Release Sealant: ASTM C 1311.

### 2.03 UNDERLAYMENT MATERIALS

A. Waterproof Underlayment: ASTM D 1970, 40 mils (1.0 mm) thick minimum, consisting of slip-resisting polyethylene-film reinforcing and top surface laminated to SBS-modified asphalt adhesive, with release-paper backing; cold applied.

1. Available Products:
a. Grace, W. R. & Co.; Grace Ice and Water Shield.

### 2.04 ROOF PANEL ASSEMBLIES

A. General: Provide factory-formed metal roof panels designed to be field assembled by lapping side edges of adjacent panels and mechanically attaching panels to supports using exposed fasteners in side laps. Include accessories required for weathertight installation.

B. Standing-Seam Metal Roof Panels: Formed with vertical ribs at panel edges and flat pan between ribs; designed for sequential installation by mechanically attaching panels to supports using concealed clips located under one side of panels and engaging opposite edge of adjacent panels, and snapping panels together.
   1. Available Manufacturers:
      a. ARS Architectural Roofing & Siding: Snap Rib (16").
      b. Berridge: Cee-Lock (16").
      c. BHP Steel Building Products USA, Inc.: Design Span (17").
      d. Centria: SDP (16").
      e. Fabral Metal Roofing and Siding: Slim Seam (16").
      f. Merchant & Even, Inc.: Zip Rib, No. 305 Series (15")
      g. McElroy Metal, Inc.: Medallian-Lok (16").
      h. Morin Corporation: SSL 15-1/2.
   2. Material: Zinc-coated (galvanized) steel sheet, 24 gage thick.
      a. Exterior Finish: Fluoropolymer.
      b. Color: As selected by Architect from manufacturer's full range.
   3. Uplift Rating: UL 60.

## 2.05 METAL SOFFIT PANELS

A. General: Provide factory-formed metal soffit panels designed to be field assembled by lapping and interconnecting side edges of adjacent panels and mechanically attaching through panel to supports using concealed fasteners in side laps. Include accessories required for weathertight installation.

B. Metal Soffit Panels: Match profile and material of metal roof panels.

C. Flush-Profile Metal Soffit Panels: Solid panels formed with vertical panel edges and flat pan between panel edges; with flush joint between panels.
   1. Available Manufacturers:
      a. ARS Architectural Roofing & Siding: F16FN, F18FN.
      b. Atas International, Inc.: DWF120 (12").
      c. BHP Steel Building Products USA, Inc.: Prestige (R-0)-12.
      d. Centria: IW-10A. (12").
      e. MBCI Metal Roof and Wall Systems: Artisan 1 Series, L-12.
      f. VicWest Steel: Select Series - 12.
   2. Material: Zinc-coated (galvanized) steel sheet, 24 gage thick.
      a. Exterior Finish: Fluoropolymer.
      b. Color: As selected by Architect from manufacturer's full range.

## 2.06 MISCELLANEOUS MATERIALS

A. General: Provide materials and accessories required for a complete roof panel assembly and as recommended by panel manufacturer, unless otherwise indicated.

B. Fasteners: Self-tapping screws, bolts, nuts, self-locking rivets and bolts, end-welded studs, and other suitable fasteners designed to withstand design loads.

   1. Use stainless-steel fasteners for exterior applications and galvanized steel fasteners for interior applications.

C. Accessories: Unless otherwise specified, provide components required for a complete roof panel assembly including trim, copings, fasciae, mullions, sills, corner units, ridge closures, clips, seam covers, battens, flashings, gutters, sealants, gaskets, fillers, closure strips, and similar items. Match materials and finishes of panels.
   1. Closure Strips: Closed-cell, self-extinguishing, expanded, cellular, rubber or cross-linked, polyolefin-foam flexible closure strips. Cut or premold to match configuration of panels. Provide closure strips where indicated or necessary to ensure weathertight construction.

2. Sealing Tape: Pressure-sensitive, 100 percent solids, polyisobutylene compound sealing tape with release paper backing. Provide permanently elastic, nonsag, nontoxic, nonstaining tape.
3. Elastomeric Joint Sealant: ASTM C 920, of base polymer, type, grade, class, and use classifications required to seal joints in panel roofing and remain weathertight. Provide sealant recommended by panel manufacturer.

D. Bituminous Coating: Cold-applied asphalt mastic, SSPC-Paint 12, compounded for 15-mil (0.4-mm) dry film thickness per coat, unless otherwise indicated. Provide inert-type noncorrosive compound free of asbestos fibers, sulfur components, and other deleterious impurities.

E. Expansion-Joint Sealant: For hooked-type expansion joints that must be free to move, provide nonsetting, nonhardening, nonmigrating, heavy-bodied polyisobutylene sealant.

F. Snow Guards: Prefabricated, noncorrosive units designed to be installed without penetrating metal roof panels, and complete with predrilled holes, clamps, or hooks for anchoring.
1. Surface-Mounted, Plastic, Stop-Type Snow Guards: Clear polycarbonate stops designed for attachment to pan surface of metal roof panels using construction adhesive, silicone or polyurethane sealant, or adhesive tape.
2. Available Products:
   a. Berger Bros. Co.; CL Snow Guards.
   b. Polar Blox; Polar Blox.
   c. Sno-Gem, Inc.; SNO-GEM.
   d. Snojax Inc.; SNOJAX.

## 2.07 FABRICATION

A. General: Fabricate and finish panels and accessories at the factory to greatest extent possible, by manufacturer's standard procedures and processes, as necessary to fulfill indicated performance requirements demonstrated by laboratory testing. Comply with indicated profiles and with dimensional and structural requirements.

B. Provide panel profile, including major ribs and intermediate stiffening ribs, if any, for full length of panel.

C. Fabricate panel joints with captive gaskets or separator strips that provide a tight seal and prevent metal-to-metal contact, in a manner that will minimize noise from movements within panel assembly.

D. Sheet Metal Accessories: Fabricate flashing and trim to comply with recommendations in SMACNA's "Architectural Sheet Metal Manual" that apply to the design, dimensions, metal, and other characteristics of item indicated.
1. Form exposed sheet metal accessories that are without excessive oil canning, buckling, and tool marks and that are true to line and levels indicated, with exposed edges folded back to form hems.
2. Seams for Other Than Aluminum: Fabricate nonmoving seams in accessories with flat-lock seams.
3. Sealed Joints: Form nonexpansion but movable joints in metal to accommodate elastomeric sealant to comply with SMACNA standards.
4. Conceal fasteners and expansion provisions where possible. Exposed fasteners are not allowed on faces of accessories exposed to view.
5. Fabricate cleats and attachment devices from same material as accessory being anchored or from compatible, noncorrosive metal recommended by metal roof panel manufacturer.
   a. Size: As recommended by SMACNA's "Architectural Sheet Metal Manual" or metal roof panel manufacturer for application but not less than thickness of metal being secured.

## 2.08 FINISHES, GENERAL

A. Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for recommendations for applying and designating finishes.

B. Protect mechanical and painted finishes on exposed surfaces from damage by applying a strippable, temporary protective covering before shipping.

C. Appearance of Finished Work: Variations in appearance of abutting or adjacent pieces are acceptable if they are within one-half of the range of approved Samples. Noticeable variations in the same piece are not acceptable. Variations in appearance of other components are acceptable if they are within the range of approved Samples and are assembled or installed to minimize contrast.

## PART 3 - EXECUTION

### 3.01 EXAMINATION

A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements for installation tolerances, metal roof panel supports, and other conditions affecting performance of work.
1. Examine primary and secondary roof framing to verify that rafters, purlins, angles, channels, and other structural panel support members and anchorages have been installed within alignment tolerances required by metal roof panel manufacturer.
2. Examine solid roof sheathing to verify that sheathing joints are supported by framing or blocking and that installation is within flatness tolerances required by metal roof panel manufacturer.
3. For the record, prepare written report, endorsed by Installer, listing conditions detrimental to performance of work.

B. Examine roughing-in for components and systems penetrating metal roof panels to verify actual locations of penetrations relative to seam locations of metal roof panels before metal roof panel installation.

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

### 3.02 PREPARATION

A. Clean substrates of substances harmful to insulation, including removing projections capable of interfering with insulation attachment.

B. Install flashings and other sheet metal to comply with requirements specified in Division 7 Section “Sheet Metal Flashing and Trim.”

C. Coordinate metal panel roofing with rain drainage work; flashing; trim; and construction of decks, parapets, walls, and other adjoining work to provide a leakproof, secure, and noncorrosive installation.

D. Miscellaneous Framing: Install subpurlins, eave angles, furring, and other miscellaneous roof panel support members and anchorage according to metal roof panel manufacturer’s written recommendations.
1. Soffit Framing: Wire-tie or clip furring channels to supports, as required to comply with requirements for assemblies indicated.

E. Promptly remove protective film, if any, from exposed surfaces of metal panels. Strip with care to avoid damage to finish.

### 3.03 UNDERLAYMENT INSTALLATION

A. Waterproof Underlayment: Install self-adhering sheet underlayment, wrinkle free, on roof sheathing under metal roof panels. Apply primer if required by manufacturer. Comply with temperature restrictions of underlayment manufacturer for installation; use primer rather than nails for installing underlayment at low temperatures. Apply over entire roof in shingle fashion to shed water, with end laps of not less than 6 inches (150 mm) staggered 24 inches (600 mm) between courses. Overlap side edges not less than 3-1/2 inches (90 mm). Roll laps with roller. Cover underlayment within 14 days.
1. Roof to wall intersections for a distance from wall of 18 inches (460 mm).

B. Install flashings to cover underlayment to comply with requirements specified in Division 7 Section "Sheet Metal Flashing and Trim."

## 3.04 PANEL INSTALLATION

A. General: Comply with panel manufacturer's written instructions and recommendations for installation, as applicable to project conditions and supporting substrates. Anchor panels and other components of the Work securely in place, with provisions for thermal and structural movement.
1. Field cutting exterior panels by torch is not permitted.
2. Install panels with concealed fasteners, unless otherwise indicated.

B. Fasteners:
1. Steel Roof Panels: Use stainless-steel fasteners for surfaces exposed to the exterior and galvanized steel fasteners for surfaces exposed to the interior.

C. Accessories: Install components required for a complete roof panel assembly including trim, copings, fasciae, ridge closures, clips, seam covers, battens, flashings, gutters, sealants, gaskets, fillers, closure strips, and similar items.

D. Separate dissimilar metals by painting each metal surface in area of contact with a bituminous coating, by applying rubberized-asphalt underlayment to each metal surface, or by other permanent separation as recommended by manufacturers of dissimilar metals.

E. Coat back side of metal panels with bituminous coating where it will contact wood, ferrous metal, or cementitious construction.

F. Joint Sealers: Install gaskets, joint fillers, and sealants where indicated and where required for weatherproof performance of panel assemblies. Provide types of gaskets, fillers, and sealants indicated or, if not otherwise indicated, types recommended by panel manufacturer.
1. Install weatherseal under ridge cap. Flash and seal panels at eave and rake with rubber, neoprene, or other closures to exclude weather.
2. Seal panel end laps with double beads of tape or sealant, full width of panel. Seal side joints where recommended by panel manufacturer.
3. Prepare joints and apply sealants to comply with requirements of Division 7 Section "Joint Sealants."

G. Standing-Seam Metal Roof Panels: Fasten metal roof panels to supports with concealed clips at each standing-seam joint at location, spacing, and with fasteners recommended by manufacturer.
1. Install clips to supports with self-tapping fasteners.
2. Install pressure plates at locations indicated in manufacturer's written installation instructions.
3. Snap Joint: Nest standing seams and fasten together by interlocking and completely engaging factory-applied sealant.

H. Metal Soffit Panels: Provide metal soffit panels full width of soffits. Install panels perpendicular to support framing.
1. Flash and seal panels with weather closures where metal soffit panels meet walls and at perimeter of all openings.

I. Fascia Panels: Align bottom of panels and fasten with blind rivets, bolts, or self-tapping screws. Flash and seal panels with weather closures where fasciae meet soffits, along lower panel edges, and at perimeter of all openings.

J. Installation Tolerances: Shim and align panel units within installed tolerance of 1/4 inch in 20 feet (6 mm in 6 m) on slope and location lines as indicated and within 1/8-inch (3-mm) offset of adjoining faces and of alignment of matching profiles.

## 3.05 ACCESSORY INSTALLATION

A. General: Install accessories with positive anchorage to building and weathertight mounting and provide for thermal expansion. Coordinate installation with flashings and other components.

1. Install components required for a complete metal roof panel assembly including trim, copings, ridge closures, seam covers, flashings, sealants, gaskets, fillers, closure strips, and similar items.

B. Flashing and Trim: Comply with performance requirements, manufacturer's written installation instructions, and SMACNA's "Architectural Sheet Metal Manual." Provide concealed fasteners where possible, and set units true to line and level as indicated. Install work with laps, joints, and seams that will be permanently watertight and weather resistant.
1. Install exposed flashing and trim that is without excessive oil canning, buckling, and tool marks and that is true to line and levels indicated, with exposed edges folded back to form hems. Install sheet metal flashing and trim to fit substrates and to result in waterproof and weather-resistant performance.
2. Expansion Provisions: Provide for thermal expansion of exposed flashing and trim. Space movement joints at a maximum of 10 feet (3 m) with no joints allowed within 24 inches (600 mm) of corner or intersection. Where lapped or bayonet-type expansion provisions cannot be used or would not be sufficiently weather resistant and waterproof, form expansion joints of intermeshing hooked flanges, not less than 1 inch (25 mm) deep, filled with mastic sealant (concealed within joints).

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

D. Stop-Type Snow Guards: Attach snow guards to metal roof panels with adhesive, sealant, or adhesive tape, as recommended by manufacturer. Do not use fasteners that will penetrate metal roof panels.
1. Provide 4 rows of snow guards, at locations indicated on Drawings, spaced 24 inches apart, beginning 12 inches up from roof edge, with each snow guard centered between panel ribs.

3.06 ERECTION TOLERANCES

A. Installation Tolerances: Shim and align metal roof panel units within installed tolerance of 1/4 inch in 20 feet (6 mm in 6 m) on slope and location lines as indicated and within 1/8-inch (3-mm) offset of adjoining faces and of alignment of matching profiles.

3.07 CLEANING AND PROTECTING

A. Damaged Units: Replace panels and other components of the Work that have been damaged or have deteriorated beyond successful repair by finish touchup or similar minor repair procedures.

B. Cleaning: Remove temporary protective coverings and strippable films, if any, as soon as each panel is installed. On completion of panel installation, clean finished surfaces as recommended by panel manufacturer and maintain in a clean condition during construction.

3.08 WASTE MANAGEMENT

A. Collect offcuts and scrap and place in designated areas for recycling

PART 4 - MEASUREMENT AND PAYMENT:

4.01 METHOD OF MEASUREMENT:

Metal Roof Panels will be measured by the lump sum, complete and accepted. The Metal Roof Panels limits shall be as shown or described in the Contract Documents.

4.02 BASIS OF PAYMENT:

Metal Roof Panels will be paid for at the contract lump sum price. Payment for Metal Roof Panels will be under:

| Pay Item | | Pay Unit |
|---|---|---|
| DIV. 7 | Thermal and Moisture | Lump Sum |

**END OF SECTION**

# SECTION 07 42 13 - METAL WALL PANELS

All work and materials shall conform to the Contract Documents and the provisions of the State of Maine Department of Transportation Standard Specifications, Revision November 2014, with the following additions:

Add the following:

PART 1 - GENERAL

1.01 SUMMARY

A. This Section includes the following:
1. Metal wall panels with concealed fasteners.

1.02 PERFORMANCE REQUIREMENTS

A. General: Provide manufactured wall panel assemblies complying with performance requirements indicated and capable of withstanding structural movement, thermally induced movement, and exposure to weather without failure or infiltration of water into the building interior.

1.03 SUBMITTALS

A. Product Data: Include manufacturer's product specifications, standard details, certified product test results, and general recommendations, as applicable to materials and finishes for each component and for total panel assemblies.

B. Shop Drawings: Show layouts of panels, details of corner conditions, joints, panel profiles, supports, anchorages, trim, flashings, closures, and special details. Distinguish between factory- and field-assembled work.

C. Samples for Selection: Manufacturer's color charts or chips showing the full range of colors, textures, and patterns available for wall panels with factory-applied finishes.

D. Product Test Reports: Indicate compliance of manufactured wall panel assemblies and materials with performance and other requirements based on comprehensive testing of current products.

1.04 QUALITY ASSURANCE

A. Installer Qualifications: Engage an experienced installer who has completed metal wall panel projects 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. Deliver panels and other components so they will not be damaged or deformed. Package panels for protection against damage during transportation or handling.

B. Handling: Exercise care in unloading, storing, and erecting wall panels to prevent bending, warping, twisting, and surface damage.

C. Stack materials on platforms or pallets, covered with tarpaulins or other suitable weathertight and ventilated covering. Store panels to ensure dryness. Do not store panels in contact with other materials that might cause staining, denting, or other surface damage.

1.06 PROJECT CONDITIONS

A. Field Measurements: Verify location of structural members and openings in substrates by field measurements before fabrication and indicate measurements on Shop Drawings. Coordinate fabrication schedule with construction progress to avoid delaying the Work.
   1. Established Dimensions: Where field measurements cannot be made without delaying the Work, either establish opening dimensions and proceed with fabricating wall panels without field measurements or allow for trimming panel units. Coordinate wall construction to ensure actual locations of structural members and to ensure opening dimensions correspond to established dimensions.

1.07 COORDINATION

A. Coordinate metal wall roof assemblies with rain drainage work, flashing, trim, and construction of substrate, and other adjoining work to provide a leakproof, secure, and noncorrosive installation.

1.08 WARRANTY

A. General Warranty: Special warranties specified in this Article shall not deprive the Owner of other rights the Owner may have under other provisions of the Contract Documents and shall be in addition to, and run concurrent with, other warranties made by the Contractor under requirements of the Contract Documents.

B. Special Finish Warranty: Submit a written warranty, signed by manufacturer, covering failure of the factory-applied exterior finish on metal wall panels within the specified warranty period and agreeing to repair finish or replace wall panels that show evidence of finish deterioration. Deterioration of finish includes, but is not limited to, color fade, chalking, cracking, peeling, and loss of film integrity.

C. Finish Warranty Period: 20 years from date of Substantial Completion.
   1. Finish Warranty Requirements: Building is located in a marine environment. Warranty shall be equal to Manufacturer’s standard form for buildings not located in a marine environment without limitations or exclusions.

PART 2 - PRODUCTS

2.01 MANUFACTURERS

A. Available Manufacturers and Products: Subject to compliance with requirements, manufacturers offering metal panels that may be incorporated into the Work include, but are not limited to, the manufacturers listed in the following paragraphs of Part 2.

2.02 PANEL MATERIALS

A. Metallic-Coated Steel Sheet Prepainted with Coil Coating: Steel sheet metallic coated by the hot-dip process and prepainted by the coil-coating process to comply with ASTM A 755/A 755M.
   1. Zinc-Coated (Galvanized) Steel Sheet: ASTM A 653/A 653M, G90 coating designation; structural quality.
   2. Surface: Smooth, flat finish.
   3. Exposed Finishes: Apply the following coil coating, as specified or indicated on Drawings.
      a. High-Performance Organic Finish: Prepare, pretreat, and apply coating to exposed metal surfaces to comply with coating and resin manufacturers' written instructions.
         1) Fluoropolymer Two-Coat System: Manufacturer's standard two-coat, thermocured system consisting of specially formulated inhibitive primer and fluoropolymer color topcoat containing not less than 70 percent polyvinylidene fluoride resin by weight; complying with physical properties and coating performance requirements of AAMA 2605.

B. Panel Sealants:

1. Sealant Tape: Pressure-sensitive, 100 percent solids, gray polyisobutylene compound sealant tape with release-paper backing. Provide permanently elastic, nonsag, nontoxic, nonstaining tape 1/2 inch wide and 1/8 inch thick.
2. Joint Sealant: ASTM C 920; elastomeric polyurethane, polysulfide, or silicone sealant; of type, grade, class, and use classifications required to seal joints in metal roof panels and remain weathertight; and as recommended in writing by metal roof panel manufacturer.
3. Butyl-Rubber-Based, Solvent-Release Sealant: ASTM C 1311.

## 2.03 UNDERLAYMENT MATERIALS

A. Felt Paper: ASTM D 226, Type I (No. 15), asphalt-saturated organic felts.

## 2.04 WALL PANEL ASSEMBLIES

A. General: Fabricate panel face sheets to the profile or configuration indicated; and of the material, finish, and thickness indicated. Design joints between panels to form weathertight seals.

B. Flush-Profile, Concealed-Fastener Metal Wall and Soffit Panels: Solid panels formed with vertical panel edges and flat pan between panel edges; with flush joint between panels.

1. Available Manufacturers:
   a. Berridge: FW-12.
2. Material: Zinc-coated (galvanized) steel sheet, 24 gage thick.
   a. Exterior Finish: Fluoropolymer.
   b. Color: As selected by Architect from manufacturer's full range.

## 2.05 MISCELLANEOUS MATERIALS

A. Fasteners: Self-tapping screws, bolts, nuts, self-locking rivets and bolts, end-welded studs, and other suitable fasteners designed to withstand design loads.
1. Use stainless-steel fasteners for exterior applications and galvanized steel fasteners for interior applications.

B. Accessories: Unless otherwise specified, provide components required for a complete wall panel assembly including trim, copings, fasciae, mullions, sills, corner units, clips, seam covers, flashings, louvers, sealants, gaskets, fillers, closure strips, and similar items. Match materials and finishes of panels.
1. Closure Strips: Closed-cell, self-extinguishing, expanded, cellular, rubber or cross-linked, polyolefin-foam flexible closure strips. Cut or premold to match configuration of panels. Provide closure strips where indicated or necessary to ensure weathertight construction.
2. Sealing Tape: Pressure-sensitive, 100 percent solids, polyisobutylene compound sealing tape with release paper backing. Provide permanently elastic, nonsag, nontoxic, nonstaining tape.
3. Joint Sealant: One-part elastomeric polyurethane, polysulfide, or silicone-rubber sealant as recommended by panel manufacturer.

C. Bituminous Coating: Cold-applied asphalt mastic, SSPC-Paint 12, compounded for 15-mil dry film thickness per coat, unless otherwise indicated. Provide inert-type noncorrosive compound free of asbestos fibers, sulfur components, and other deleterious impurities.

## 2.06 SECONDARY FRAMING

A. Panel Supports and Anchorage: Provide girts, furring channels, angles, and other secondary framing members.
1. Girts: Z-shaped sections fabricated from 0.0598-inch- thick, shop-painted, roll-formed steel.

## PART 3 - EXECUTION

### 3.01 EXAMINATION

A. Examine substrates and conditions, with Installer present, for compliance with requirements indicated for conditions affecting performance of metal panel walls.
   1. Panel Supports and Anchorage: Examine wall framing to verify that girts, angles, and other secondary structural panel support members and anchorage have been installed to meet requirements of panel manufacturer.
   2. Do not proceed with wall panel installation until unsatisfactory conditions have been corrected.

### 3.02 PREPARATION

A. Felt Paper Application: Cover sheathing with felt as follows:
   1. Cut back felt paper 1/2 inch on each side of break in supporting members at expansion- or control-joint locations.
   2. Apply felt paper horizontally with 2-inch overlap and 6-inch end lap; fasten to sheathing with corrosion-resistant staples.
   3. Apply felt paper to comply with manufacturer's written installation instructions.
   4. Apply felt paper to cover vertical flashing with 4-inch overlap.

B. Coordinate metal wall panels with rain drainage work; flashing; trim; and construction of soffits, roofing, parapets, walls, and other adjoining work to provide a leakproof, secure, and noncorrosive installation.

C. Promptly remove protective film, if any, from exposed surfaces of metal panels. Strip with care to avoid damage to finish.

D. Secondary Structural Supports: Install girts, angles, and other secondary structural panel support members and anchorage according to the Light Gage Structural Institute's "Guide Specifications," Section 07410, "Manufactured Roof and Wall Panels."

### 3.03 PANEL INSTALLATION

A. General: Comply with panel manufacturer's written instructions and recommendations for installation, as applicable to project conditions and supporting substrates. Anchor panels and other components of the Work securely in place, with provisions for thermal and structural movement.
   1. Field cutting exterior panels by torch is not permitted.
   2. Install panels with concealed fasteners.

B. Accessories: Install components required for a complete wall panel assembly including trim, copings, fasciae, mullions, sills, corner units, clips, seam covers, flashings, louvers, sealants, gaskets, fillers, closure strips, and similar items.

C. Joint Sealers: Install gaskets, joint fillers, and sealants where indicated and where required for weatherproof performance of wall panel assemblies. Provide types of gaskets, fillers, and sealants indicated or, if not otherwise indicated, types recommended by panel manufacturer.
   1. Install weatherseal to prevent air and moisture penetration. Flash and seal panels at ends and intersections with other materials with rubber, neoprene, or other closures to exclude weather.
   2. Seal panel end laps with a bead of tape or sealant, full width of panel. Seal side joints where recommended by panel manufacturer.
   3. Prepare joints and apply sealants to comply with requirements of Division 7 Section "Joint Sealants."

D. Wall Panels: Apply elastomeric sealant continuously between metal base channel (sill angle), and elsewhere as necessary for waterproofing. Handle and apply sealant and back-up according to sealant manufacturer's written instructions.

1. Align bottom of wall panels and fasten with blind rivets, bolts, or self-tapping screws. Fasten flashings and trim around openings and similar elements with self-tapping screws.
2. Install screw fasteners with power tools having controlled torque adjusted to compress neoprene washer tightly without damage to washer, screw threads, or panels. Install screws in predrilled holes.
3. Provide weatherproof escutcheons for pipe and conduit penetrating exterior walls.

E. Separate dissimilar metals by painting each metal surface in area of contact with a bituminous coating or by other permanent separation as recommended by manufacturers of dissimilar metals.

F. Coat back side of metal panels with bituminous coating where it will contact wood, ferrous metal, or cementitious construction.

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

3.04 CLEANING AND PROTECTING

A. Damaged Units: Replace panels and other components of the Work that have been damaged or have deteriorated beyond successful repair by finish touchup or similar minor repair procedures.

B. Cleaning: Remove temporary protective coverings and strippable films, if any, as soon as each panel is installed. On completion of panel installation, clean finished surfaces as recommended by panel manufacturer and maintain in a clean condition during construction.

3.05 WASTE MANAGEMENT

A. Collect metal scraps and place in designated area for recycling.

PART 4 - MEASUREMENT AND PAYMENT:

4.01 METHOD OF MEASUREMENT:

Metal Wall Panels will be measured by the lump sum, complete and accepted. The Metal Wall Panels limits shall be as shown or described in the Contract Documents.

4.02 BASIS OF PAYMENT:

Metal Wall Panels will be paid for at the contract lump sum price. Payment for Metal Wall Panels will be under:

| Pay Item | | Pay Unit |
|---|---|---|
| DIV. 7 | Thermal and Moisture | Lump Sum |

**END OF SECTION**

# SECTION 07 53 23 - ETHYLENE-PROPYLENE-DIENE-MONOMER (EPDM) ROOFING

All work and materials shall conform to the Contract Documents and the provisions of the State of Maine Department of Transportation Standard Specifications, Revision November 2014, with the following additions:

Add the following:

## 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. Adhered EPDM membrane roofing system.
   2. Roof insulation.
   3. Walkway pads.

B. Related Sections:
   1. Division 01 Section “Alternates” for alternates related to this section.
   2. Division 06 Section "Rough Carpentry" for wood nailers, curbs, and blocking.
   3. Division 07 Section "Sheet Metal Flashing and Trim" for metal roof penetration flashings, flashings, and counterflashings.
   4. Division 07 Section "Joint Sealants" for joint sealants, joint fillers, and joint preparation.
   5. Division 22 Section "Storm Drainage Piping Specialties" for roof drains.

### 1.3 DEFINITIONS

A. Roofing Terminology: See ASTM D 1079 and glossary of NRCA's "The NRCA Roofing and Waterproofing Manual" for definitions of terms related to roofing work in this Section.

### 1.4 PERFORMANCE REQUIREMENTS

A. General Performance: Installed membrane roofing and base flashings shall withstand specified uplift pressures, thermally induced movement, and exposure to weather without failure due to defective manufacture, fabrication, installation, or other defects in construction. Membrane roofing and base flashings shall remain watertight.

B. Material Compatibility: Provide roofing materials that are compatible with one another under conditions of service and application required, as demonstrated by membrane roofing manufacturer based on testing and field experience.

C. Roofing System Design: Provide membrane roofing system that is identical to systems that have been successfully tested by a qualified testing and inspecting agency to resist wind speed of 100 mph (measured 30 feet above the ground).

D. Energy Performance: Provide roofing system with initial Solar Reflectance Index not less than 78 when calculated according to ASTM E 1980 based on testing identical products by a qualified testing agency.

## 1.5 SUBMITTALS

A. Product Data: For each type of product indicated.

B. Shop Drawings: For roofing system. Include plans, elevations, sections, details, and attachments to other work.
   1. Base flashings and membrane terminations.
   2. Tapered insulation, including slopes.
   3. Insulation fastening patterns for corner, perimeter, and field-of-roof areas.

C. Samples for Verification: For the following products, in manufacturer's standard sizes:
   1. Sheet roofing, of color specified, including T-shaped side and end lap seam.
   2. Roof insulation.
   3. Six insulation fasteners of each type, length, and finish.
   4. Six roof cover fasteners of each type, length, and finish.

D. Qualification Data: For qualified Installer and manufacturer.

E. Manufacturer Certificate: Signed by roofing manufacturer certifying that membrane roofing system complies with requirements specified in "Performance Requirements" Article.
   1. Submit evidence of complying with performance requirements.

F. Manufacturer’s installation rating of the roofing contractor.

G. Product Test Reports: Based on evaluation of comprehensive tests performed by manufacturer and witnessed by a qualified testing agency, for components of membrane roofing system.

H. Maintenance Data: For membrane roofing system to include in maintenance manuals.

I. Warranties: Sample of special warranties.

J. Inspection Report: Copy of roofing system manufacturer's inspection report of completed roofing installation.

## 1.6 QUALITY ASSURANCE

A. Manufacturer Qualifications: A qualified manufacturer that is FM Approvals approved for membrane roofing system identical to that used for this Project.

B. Installer Qualifications: Engage an experienced installer to perform work of this Section who has specialized in installing roofing similar to that required for this Project and who is approved, authorized, or licensed by the roofing system manufacturer to install manufacturer's product. Contractor shall have installed a minimum of 500,000 square feet and have a manufacturer’s installation rating of 9.0 or better.
   1. Installer for GAF products shall be a Master Select or Master Certified Contractor.
   2. Work associated with single-ply membrane roofing, including (but not limited to) insulation, flashing, and membrane sheet joint sealers, shall be performed by Installer of this Work.

C. Source Limitations: Obtain components including roof insulation and fasteners Insert products for membrane roofing system from same manufacturer as membrane roofing or approved by membrane roofing manufacturer.

D. Exterior Fire-Test Exposure: ASTM E 108, Class A; for application and roof slopes indicated, as determined by testing identical membrane roofing materials by a qualified testing agency. Materials shall be identified with appropriate markings of applicable testing agency.

E. Fire-Resistance Ratings: Where indicated, provide fire-resistance-rated roof assemblies identical to those of assemblies tested for fire resistance per ASTM E 119 by a qualified testing agency. Identify products with appropriate markings of applicable testing agency.

F. Preliminary Roofing Conference: Before starting roofing installation, conduct conference at Project site.
1. Meet with Owner, Architect, Owner's insurer if applicable, testing and inspecting agency representative, roofing Installer, roofing system manufacturer's representative, deck Installer, and installers whose work interfaces with or affects roofing, including installers of roof accessories and roof-mounted equipment.
2. Review methods and procedures related to roofing installation, including manufacturer's written instructions.
3. Review and finalize construction schedule and verify availability of materials, Installer's personnel, equipment, and facilities needed to make progress and avoid delays.
4. Review requirements for deck substrate conditions and finishes, including flatness and fastening.
5. Review structural loading limitations of roof deck during and after roofing.
6. Review base flashings, special roofing details, roof drainage, roof penetrations, equipment curbs, and condition of other construction that will affect roofing system.
7. Review governing regulations and requirements for insurance and certificates if applicable.
8. Review temporary protection requirements for roofing system during and after installation.
9. Review roof observation and repair procedures after roofing installation.

G. Upon completion of the installation, an inspection shall be made by the system manufacturer to ascertain that the roofing system has been installed according to the applicable manufacturer's specifications and details. No "early bird" warranty will be accepted. The results of the warranty inspection shall be submitted in writing to Owner for their review and records.

## 1.7 DELIVERY, STORAGE, AND HANDLING

A. Deliver roofing materials to Project site in original containers with seals unbroken and labeled with manufacturer's name, product brand name and type, date of manufacture, approval or listing agency markings, and directions for storing and mixing with other components.

B. Store liquid materials in their original undamaged containers in a clean, dry, protected location and within the temperature range required by roofing system manufacturer. Protect stored liquid material from direct sunlight.

1. Discard and legally dispose of liquid material that cannot be applied within its stated shelf life.

C. Protect roof insulation materials from physical damage and from deterioration by sunlight, moisture, soiling, and other sources. Store in a dry location. Comply with insulation manufacturer's written instructions for handling, storing, and protecting during installation.

D. Handle and store roofing materials and place equipment in a manner to avoid permanent deflection of deck.

## 1.8 PROJECT CONDITIONS

A. Weather Limitations: Proceed with installation only when existing and forecasted weather conditions permit roofing system to be installed according to manufacturer's written instructions and warranty requirements.

## 1.9 WARRANTY

A. General Warranty: The warranties specified in this Article shall not deprive the Owner of other rights the Owner may have under other provisions of the Contract Documents and shall be in addition to, and run concurrent with, other warranties made by the Contractor under requirements of the Contract Documents.

B. A manufacturer's sole source 15-year written Roofing System Warranty shall be provided with a peak gust wind speed limitation of 100 mph (measured 30 feet above the ground). Warranty shall cover both labor and materials with no dollar limitation and shall state that the Total roofing System will remain in a watertight condition. The contractor shall provide as part of the shop drawing submittal process, certification indicating that the manufacturer has reviewed and has agreed to such wind coverage indicated.

1. Roofing System is defined as the following materials and provided by the roof system manufacturer: membrane, flashings, counterflashings, adhesives, sealants, insulation, overlayment, fasteners, fastener plates, fastener strips, hard rubber, metal edging. Metal termination anchor bars, roof drain flashing and sealants, and any other product utilized in this system installation.
2. The warranty shall be for fifteen (15) years starting after final acceptance of the total roofing system by the roof system manufacturer. Defective materials or installation shall be removed, properly disposed of, and replaced at the manufacturer's expense.
3. The warranty shall provide that if within the warranty period the roofing system becomes non-watertight or if the elastomeric sheet splits, tears, or separates at the seams because of defective materials and/or materials and cost thereof shall be the responsibility of the manufacturer. Should the manufacturer or his approve applicator fail to perform repairs within 72 hours of notification, the warranty will not be voided because of work being performed by others to repair the roofing regardless of the manufacturer's warranty to the contrary.
4. The Roofing System shall be applied by a roofing Contractor approved by the system manufacturer. After inspection and acceptance of the installed roof system, the warranty will be issued.
5. Submit an Extended Wind Speed Request Form for acceptance of 85 mph wind warranty prior to start of work. Notify Architect if request form is rejected from the manufacturer.

## PART 2 - PRODUCTS

### 2.1 EPDM MEMBRANE ROOFING

A. EPDM: ASTM D 4637, Type I, non-reinforced, uniform, flexible EPDM sheet.
1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
   a. Carlisle SynTec Incorporated.
   b. Firestone Building Products.
   c. GAF Materials Corporation.
   d. Versico Incorporated.
2. Thickness: 60 mils, nominal.
3. Exposed Face Color: White.

### 2.2 AUXILIARY MEMBRANE ROOFING MATERIALS

A. General: Auxiliary membrane roofing materials recommended by roofing system manufacturer for intended use and compatible with membrane roofing.
1. Liquid-type auxiliary materials shall comply with VOC limits of authorities having jurisdiction.
2. Adhesives and sealants that are not on the exterior side of weather barrier shall comply with the following limits for VOC content when calculated according to 40 CFR 59, Subpart D (EPA Method 24):
   a. Plastic Foam Adhesives: 50 g/L.
   b. Gypsum Board and Panel Adhesives: 50 g/L.
   c. Multipurpose Construction Adhesives: 70 g/L.
   d. Fiberglass Adhesives: 80 g/L.
   e. Contact Adhesive: 80 g/L.
   f. Single-Ply Roof Membrane Sealants: 450 g/L.
   g. Nonmembrane Roof Sealants: 300 g/L.
   h. Sealant Primers for Nonporous Substrates: 250 g/L.
   i. Sealant Primers for Porous Substrates: 775 g/L.
   j. Other Adhesives and Sealants: 250 g/L.

B. Sheet Flashing: 60-mil- thick EPDM, partially cured or cured, according to application.

C. Protection Sheet: Epichlorohydrin or neoprene non-reinforced flexible sheet, 55- to 60-mil- thick, recommended by EPDM manufacturer for resistance to hydrocarbons, non-aromatic solvents, grease, and oil.

D. Bonding Adhesive: Manufacturer's standard.

E. Seaming Material: Manufacturer's standard, synthetic-rubber polymer primer and 6-inch- wide minimum, butyl splice tape with release film.

F. Lap Sealant: Manufacturer's standard, single-component sealant, colored to match membrane roofing.

G. Water Cutoff Mastic: Manufacturer's standard butyl mastic sealant.

H. Metal Termination Bars: Manufacturer's standard, predrilled stainless-steel or aluminum bars, approximately 1 by 1/8 inch thick; with anchors.

I. Fasteners: Factory-coated steel fasteners and metal or plastic plates complying with corrosion-resistance provisions in FM Approvals 4470, designed for fastening membrane to substrate, and acceptable to roofing system manufacturer.

J. Miscellaneous Accessories: Provide pourable sealers, preformed cone and vent sheet flashings, preformed inside and outside corner sheet flashings, reinforced EPDM securement strips, T-joint covers, in-seam sealants, termination reglets, cover strips, and other accessories.

## 2.3 ROOF INSULATION

A. General: Preformed roof insulation boards manufactured or approved by EPDM membrane roofing manufacturer, selected from manufacturer's standard sizes suitable for application, of thicknesses indicated and that produce FM Approvals-approved roof insulation.

B. Polyisocyanurate Board Insulation: ASTM C 1289, Type II, Class 1, Grade 2, felt or glass-fiber mat facer on both major surfaces.
   1. Thickness: Provide a minimum of two (2) layers of insulation, with joints staggered, resulting in the total thickness shown, unless indicated otherwise.

C. Tapered Insulation: Provide factory-tapered insulation boards fabricated to slope of 1/4 inch per 12 inches unless otherwise indicated.

D. Provide preformed saddles, crickets, tapered edge strips, and other insulation shapes where indicated for sloping to drain. Fabricate to slopes indicated.

## 2.4 INSULATION ACCESSORIES

A. General: Furnish roof insulation accessories recommended by insulation manufacturer for intended use and compatibility with membrane roofing.

B. Fasteners: Factory-coated steel fasteners and metal or plastic plates complying with corrosion-resistance provisions in FM Approvals 4470, designed for fastening roof insulation[ **and cover boards**] to substrate, and acceptable to roofing system manufacturer.

C. Cover Board: DOC PS 2, Exposure 1, OSB, 7/16 inch (11 mm) thick.

2.5 WALKWAYS

A. Flexible Walkways: Factory-formed, nonporous, heavy-duty, solid-rubber, slip-resisting, surface-textured walkway pads or rolls, approximately 3/16 inch thick, and acceptable to membrane roofing system manufacturer.

2.6 ROOF DRAINS

A. All roof drains shall be furnished with 15 inch diameter cast iron body, integral flashing flange and clamp device, cast iron dome strainer, top-set deck clamp. Equal to Zurn ZC-100-DP. See plumbing riser piping for sizes.

B. Roofing contractor to supply and install pressure-treated wood blocking as required for roof drains.

2.7 EXPANSION JOINTS

A. Deck-To-Deck and Deck-To-Wall Expansion Joints: Provide manufacturers standard joint system consisting of expansion joint support or support sponge, anchor plates, and flashing.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates, areas, and conditions, with Installer present, for compliance with the following requirements and other conditions affecting performance of roofing system:
   1. Verify that roof openings and penetrations are in place and curbs are set and braced and that roof drain bodies are securely clamped in place.
   2. Verify that wood blocking, curbs, and nailers are securely anchored to roof deck at penetrations and terminations and that nailers match thicknesses of insulation.

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

3.2 PREPARATION

A. Clean substrate of dust, debris, moisture, and other substances detrimental to roofing installation according to roofing system manufacturer's written instructions. Remove sharp projections.

B. Prevent materials from entering and clogging roof drains and conductors and from spilling or migrating onto surfaces of other construction. Remove roof-drain plugs when no work is taking place or when rain is forecast.

C. Complete terminations and base flashings and provide temporary seals to prevent water from entering completed sections of roofing system at the end of the workday or when rain is forecast. Remove and discard temporary seals before beginning work on adjoining roofing.

3.3 SUBSTRATE BOARD

A. Install substrate board with long joints in continuous straight lines, perpendicular to roof slopes with end joints staggered between rows. Tightly butt substrate boards together.
   1. Fasten substrate board to top flanges of steel deck according to manufacturer’s recommendations.
   2. Fasten substrate board to top flanges of steel deck to resist uplift pressure at corners, perimeter, and field of roof according to membrane roofing system manufacturers' written instructions.

## 3.4 INSULATION INSTALLATION

A. Coordinate installing membrane roofing system components so insulation is not exposed to precipitation or left exposed at the end of the workday.

B. Comply with membrane roofing system and insulation manufacturer's written instructions for installing roof insulation.

C. Install tapered insulation under area of roofing to conform to slopes indicated.

D. Install insulation under area of roofing to achieve required thickness. Where overall insulation thickness is 2.7 inches or greater, install two or more layers with joints of each succeeding layer staggered from joints of previous layer a minimum of 6 inches in each direction.

E. Trim surface of insulation where necessary at roof drains so completed surface is flush and does not restrict flow of water.

F. Install insulation with long joints of insulation in a continuous straight line with end joints staggered between rows, abutting edges and ends between boards. Fill gaps exceeding 1/4 inch with insulation.

1. Cut and fit insulation within 1/4 inch of nailers, projections, and penetrations.

G. Loosely Laid Insulation: Loosely lay insulation units over substrate.

H. Install cover boards over insulation with long joints in continuous straight lines with end joints staggered between rows. Offset joints of insulation below a minimum of 6 inches in each direction. Loosely butt cover boards together.
1. Fasten cover boards according to requirements of manufacturer’s warranty.

## 3.5 ADHERED MEMBRANE ROOFING INSTALLATION

A. Adhered membrane roofing over area to receive roofing according to membrane roofing system manufacturer's written instructions. Unroll membrane roofing and allow to relax before installing.

B. Accurately align membrane roofing and maintain uniform side and end laps of minimum dimensions required by manufacturer. Stagger end laps.

C. Bonding Adhesive: Apply to substrate and underside of membrane roofing at rate required by manufacturer and allow to partially dry before installing membrane roofing. Do not apply to splice area of membrane roofing.

D. In addition to adhering, mechanically fasten membrane roofing securely at terminations, penetrations, and perimeters.

E. Apply membrane roofing with side laps shingled with slope of roof deck where possible.

F. Tape Seam Installation: Clean and prime both faces of splice areas, apply splice tape, and firmly roll side and end laps of overlapping membrane roofing according to manufacturer's written instructions to ensure a watertight seam installation. Apply lap sealant and seal exposed edges of membrane roofing terminations.

G. Repair tears, voids, and lapped seams in roofing that does not comply with requirements.

H. Spread sealant or mastic bed over deck drain flange at roof drains and securely seal membrane roofing in place with clamping ring.

## 3.6 BASE FLASHING INSTALLATION

A. Install sheet flashings and preformed flashing accessories and adhere to substrates according to membrane roofing system manufacturer's written instructions.

B. Apply bonding adhesive to substrate and underside of sheet flashing at required rate and allow to partially dry. Do not apply to seam area of flashing.

C. Flash penetrations and field-formed inside and outside corners with cured or uncured sheet flashing.

D. Clean splice areas, apply splicing cement, and firmly roll side and end laps of overlapping sheets to ensure a watertight seam installation. Apply lap sealant and seal exposed edges of sheet flashing terminations.

## 3.7 WALKWAY INSTALLATION

A. Flexible Walkways: Install walkway products in locations indicated. Adhere walkway products to substrate with compatible adhesive according to roofing system manufacturer's written instructions.

## 3.8 ROOF DRAIN INSTALLATION

A. Install roof drain and accessories in strict accordance with manufacturer’s written instructions, providing a permanent weather tight installation.
   1. Inspect and determine substrate to be in satisfactory condition, with deck fully anchored and aligned at proper location and elevation. All surfaces shall be smooth, dry, clean, free of sharp edges, and other irregularities.
   2. Attach deck flange securely to substrate.
   3. Assemble and flash gravel stop flange into roof system per roof system and roof drain manufacturer requirements.
   4. Securely attach strainer basket.

## 3.9 FIELD QUALITY CONTROL

A. Final Roof Inspection: Arrange for roofing system manufacturer's technical personnel to inspect roofing installation on completion.
   1. Notify Architect or Owner 48 hours in advance of the date and time of inspection.

B. Repair or remove and replace components of membrane roofing system where inspections indicate that they do not comply with specified requirements.

C. Additional inspections, at Contractor's expense, will be performed to determine compliance of replaced or additional work with specified requirements.

## 3.10 PROTECTING AND CLEANING

A. Protect membrane roofing system from damage and wear during remainder of construction period. When remaining construction will not affect or endanger roofing, inspect roofing for deterioration and damage, describing its nature and extent in a written report, with copies to Architect and Owner.

B. Correct deficiencies in or remove membrane roofing system that does not comply with requirements, repair substrates and repair or reinstall membrane roofing system to a condition free of damage and deterioration at time of Substantial Completion and according to warranty requirements.

C. Clean overspray and spillage from adjacent construction using cleaning agents and procedures recommended by manufacturer of affected construction.

PART 4 - MEASUREMENT AND PAYMENT:

4.01 METHOD OF MEASUREMENT:

EPDM Roofing will be measured by the lump sum, complete and accepted. The EPDM Roofing limits shall be as shown or described in the Contract Documents.

4.02 BASIS OF PAYMENT:

EPDM Roofing will be paid for at the contract lump sum price. Payment for EPDM Roofing will be under:

| Pay Item | | Pay Unit |
|---|---|---|
| DIV. 7 | Thermal and Moisture | Lump Sum |

**END OF SECTION**

# SECTION 07 62 00 - SHEET METAL FLASHING AND TRIM

All work and materials shall conform to the Contract Documents and the provisions of the State of Maine Department of Transportation Standard Specifications, Revision November 2014, with the following additions:

Add the following:

## PART 1 - GENERAL

### 1.01 SUMMARY

A. This Section includes sheet metal flashing and trim in the following categories:
   1. Exposed trim, gravel stops, and fasciae.
   2. Copings.
   3. Metal flashing.

B. Related Sections: The following Sections contain requirements that relate to this Section:
   1. Division 4 Sections for through-wall flashing and other integral masonry flashings specified as part of masonry work.
   2. Division 7 Section "Roof Accessories" for set-on-type curbs, equipment supports, roof hatches, vents, and other manufactured roof accessory units.
   3. Division 7 Section "Joint Sealants" for elastomeric sealants.
   4. Division 7 Roofing Sections for flashing and roofing accessories installed integral with roofing as part of roofing-system work.

### 1.02 PERFORMANCE REQUIREMENTS

A. General: Install sheet metal flashing and trim to withstand wind loads, structural movement, thermally induced movement, and exposure to weather without failing.

B. Fabricate and install flashings at roof edges to comply with recommendations of FM Loss Prevention Data Sheet 1-49 for the following wind zone:
   1. Wind Zone 2: Wind pressures of 31 to 45 psf.

### 1.03 SUBMITTALS

A. General: Submit each item in this Article according to the Conditions of the Contract and Division 1 Specification Sections.

B. Shop Drawings of each item specified showing layout, profiles, methods of joining, and anchorage details.

C. Samples of sheet metal flashing, trim, and accessory items, in the specified finish. Where finish involves normal color and texture variations, include Sample sets composed of 2 or more units showing the full range of variations expected.
   1. 8-inch- square Samples of specified sheet materials to be exposed as finished surfaces.

### 1.04 QUALITY ASSURANCE

A. Installer Qualifications: Engage an experience Installer who has completed sheet metal flashing and trim work similar in material, design, and extent to that indicated for this Project and with a record of successful in-service performance.

### 1.05 PROJECT CONDITIONS

A. Coordinate Work of this Section with interfacing and adjoining Work for proper sequencing of each installation. Ensure best possible weather resistance, durability of Work, and protection of materials and finishes.

## PART 2 - PRODUCTS

### 2.01 METALS

A. Aluminum Sheet: ASTM B 209, alloy as standard with manufacturer for finish required, with temper as required to suit forming operations and performance required.
   1. Surface: Smooth, flat.
   2. Exposed Coil-Coated Finishes:
      a. Two-Coat Fluoropolymer: AAMA 620. Fluoropolymer finish containing not less than 70 percent PVDF resin by weight in color coat. Prepare, pretreat, and apply coating to exposed metal surfaces to comply with coating and resin manufacturers' written instructions.
      b. Provide finish color on both sides of sheet where shown.

### 2.02 MISCELLANEOUS MATERIALS AND ACCESSORIES

A. Fasteners: Wood screws, annular threaded nails, self-tapping screws, self-locking rivets and bolts, and other suitable fasteners designed to withstand design loads and recommended by manufacturer of primary sheet metal.
   1. Fasteners for Aluminum Sheet: Aluminum or Series 300 stainless steel.

B. Asphalt Mastic: SSPC-Paint 12, solvent-type asphalt mastic, nominally free of sulfur and containing no asbestos fibers, compounded for 15-mil dry film thickness per coat.

C. Mastic Sealant: As specified in Division 7 Section “Joint Sealants”.

D. Elastomeric Sealant: Generic type recommended by sheet metal manufacturer and fabricator of components being sealed and complying with requirements for joint sealants as specified in Division 7 Section "Joint Sealants."

E. Epoxy Seam Sealer: Two-part, noncorrosive, aluminum seam-cementing compound, recommended by aluminum manufacturer for exterior nonmoving joints, including riveted joints.

F. Metal Accessories: Provide sheet metal clips, straps, anchoring devices, and similar accessory units as required for installation of Work, matching or compatible with material being installed; noncorrosive; size and thickness required for performance.

G. Roofing Cement: ASTM D 4586, Type I, asbestos free, asphalt based.

### 2.03 FABRICATION, GENERAL

A. Sheet Metal Fabrication Standard: Fabricate sheet metal flashing and trim to comply with recommendations of SMACNA's "Architectural Sheet Metal Manual" that apply to the design, dimensions, metal, and other characteristics of the item indicated.

   1. Conform to referenced details of SMACNA's "Architectural Sheet Metal Manual" – 5th Edition.

B. Comply with details shown to fabricate sheet metal flashing and trim that fit substrates and result in waterproof and weather-resistant performance once installed. Verify shapes and dimensions of surfaces to be covered before fabricating sheet metal.

C. Form exposed sheet metal Work that is without excessive oil canning, buckling, and tool marks and that is true to line and levels indicated, with exposed edges folded back to form hems.

D. Seams: Fabricate nonmoving seams with flat-lock seams. Form seams and seal with elastomeric sealant unless otherwise recommended by sealant manufacturer for intended use. Rivet joints where necessary for strength.

E. Expansion Provisions: Space movement joints at maximum of 10 feet with no joints allowed within 24 inches of corner or intersection. Where lapped or bayonet-type expansion provisions in Work cannot be used or would not be sufficiently weatherproof and waterproof, form expansion joints of intermeshing hooked flanges, not less than 1 inch deep, filled with mastic sealant (concealed within joints).

F. Sealed Joints: Form nonexpansion, but movable, joints in metal to accommodate elastomeric sealant to comply with SMACNA standards.

G. Separate metal from noncompatible metal or corrosive substrates by coating concealed surfaces at locations of contact with asphalt mastic or other permanent separation as recommended by manufacturer.

H. Conceal fasteners and expansion provisions where possible.

I. Fabricate cleats and attachment devices from same material as sheet metal component being anchored or from compatible, noncorrosive metal recommended by sheet metal manufacturer.
   1. Size: As recommended by SMACNA manual or sheet metal manufacturer for application but never less than thickness of metal being secured.

2.04 SHEET METAL FABRICATIONS

A. General: Fabricate sheet metal items in thickness or weight needed to comply with performance requirements but not less than that listed below for each application and metal.

B. Metal Fasciae: Fabricate from the following material:
   1. Aluminum: 0.032 inch thick.
   2. Conform to drawings and applicable SMACNA details.

C. Copings: Fabricate from the following material:
   1. Aluminum: 0.040 inch thick.
   2. Conform to drawings and applicable SMACNA details.

PART 3 - EXECUTION

3.01 EXAMINATION

A. Examine substrates and conditions under which sheet metal flashing and trim are to be installed and verify that Work may properly commence. Do not proceed with installation until unsatisfactory conditions have been corrected.

3.02 INSTALLATION

A. General: Unless otherwise indicated, install sheet metal flashing and trim to comply with performance requirements, manufacturer's installation instructions, and SMACNA's "Architectural Sheet Metal Manual." Anchor units of Work securely in place by methods indicated, providing for thermal expansion of metal units; conceal fasteners where possible, and set units true to line and level as indicated. Install Work with laps, joints, and seams that will be permanently watertight and weatherproof.

B. Install exposed sheet metal Work that is without excessive oil canning, buckling, and tool marks and that is true to line and levels indicated, with exposed edges folded back to form hems. Install sheet metal flashing and trim to fit substrates and to result in waterproof and weather-resistant performance. Verify shapes and dimensions of surfaces to be covered before fabricating sheet metal.

C. Roof-Edge Flashings: Secure metal flashings at roof edges according to FM Loss Prevention Data Sheet 1-49 for specified wind zone.

D. Expansion Provisions: Provide for thermal expansion of exposed sheet metal Work. Space movement joints at maximum of 10 feet with no joints allowed within 24 inches of corner or intersection. Where lapped or bayonet-type expansion provisions in Work cannot be used or would not be sufficiently weatherproof and waterproof, form expansion joints of intermeshing hooked flanges, not less than 1 inch deep, filled with mastic sealant (concealed within joints).

E. Sealed Joints: Form nonexpansion, but movable, joints in metal to accommodate elastomeric sealant to comply with SMACNA standards. Fill joint with sealant and form metal to completely conceal sealant.

F. Seams: Fabricate nonmoving seams in sheet metal with flat-lock seams.

G. Separations: Separate metal from noncompatible metal or corrosive substrates by coating concealed surfaces, at locations of contact, with asphalt mastic or other permanent separation as recommended by manufacturer.
   1. Underlayment: Where installing stainless steel or aluminum directly on cementitious or wood substrates, install a slip sheet of red-rosin paper and a course of polyethylene underlayment.
   2. Bed flanges of Work in a thick coat of roofing cement where required for waterproof performance.

### 3.03 CLEANING AND PROTECTION

A. Clean exposed metal surfaces, removing substances that might cause corrosion of metal or deterioration of finishes.

B. Provide final protection and maintain conditions that ensure sheet metal flashing and trim Work during construction is without damage or deterioration other than natural weathering at the time of Substantial Completion.

## PART 4 - MEASUREMENT AND PAYMENT:

### 4.01 METHOD OF MEASUREMENT:

Sheet Metal Flashing and Trim will be measured by the lump sum, complete and accepted. The Sheet Metal Flashing and Trim limits shall be as shown or described in the Contract Documents.

### 4.02 BASIS OF PAYMENT:

Sheet Metal Flashing and Trim will be paid for at the contract lump sum price. Payment for Sheet Metal Flashing and Trim will be under:

| Pay Item | | Pay Unit |
|---|---|---|
| DIV. 7 | Thermal and Moisture | Lump Sum |

**END OF SECTION**

# SECTION 07 84 13 - PENETRATION FIRESTOPPING

All work and materials shall conform to the Contract Documents and the provisions of the State of Maine Department of Transportation Standard Specifications, Revision November 2014, with the following additions:

Add the following:

## PART 1 - GENERAL

### 1.01 RELATED DOCUMENTS

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

### 1.02 SUMMARY

A. This Section includes, unless specified elsewhere, through-penetration firestop systems for penetrations through fire-resistance-rated constructions, including both empty openings and openings containing penetrating items.

B. Related Sections include the following:
   1. Division 07 Section "Fire-Resistive Joint Systems."
   2. Division 21 Sections specifying fire-suppression piping penetrations.
   3. Division 22 and 23 Sections specifying duct and piping penetrations.
   4. Division 26, 27, and 28 Sections specifying cable and conduit penetrations.

### 1.03 PERFORMANCE REQUIREMENTS

A. General: For penetrations through fire-resistance-rated constructions, including both empty openings and openings containing penetrating items, provide through-penetration firestop systems that are produced and installed to resist spread of fire according to requirements indicated, resist passage of smoke and other gases, and maintain original fire-resistance rating of construction penetrated.

B. Rated Systems: Provide through-penetration firestop systems with the following ratings determined per ASTM E 814 or UL 1479:
   1. F-Rated Systems: Provide through-penetration firestop systems with F-ratings indicated, but not less than that equaling or exceeding fire-resistance rating of constructions penetrated.
   2. T-Rated Systems: For the following conditions, provide through-penetration firestop systems with T-ratings indicated, as well as F-ratings, where systems protect penetrating items exposed to potential contact with adjacent materials in occupiable floor areas:
      a. Penetrations located outside wall cavities.
      b. Penetrations located outside fire-resistance-rated shaft enclosures.
   3. L-Rated Systems: Provide through-penetration firestop systems with L-ratings of not more than 3.0 cfm/sq. ft at both ambient temperatures and 400 deg F.
   4. For through-penetration firestop systems exposed to view, traffic, moisture, and physical damage, provide products that, after curing, do not deteriorate when exposed to these conditions both during and after construction.
   5. For piping penetrations for plumbing and wet-pipe sprinkler systems, provide moisture-resistant through-penetration firestop systems.
   6. For floor penetrations with annular spaces exceeding 4 inches in width and exposed to possible loading and traffic, provide firestop systems capable of supporting floor loads involved, either by installing floor plates or by other means.
   7. For penetrations involving insulated piping, provide through-penetration firestop systems not requiring removal of insulation.

C. For through-penetration firestop systems exposed to view, provide products with flame-spread and smoke-developed indexes of less than 25 and 450, respectively, as determined per ASTM E 84.

## 1.04 SUBMITTALS

A. Product Data: For each type of product indicated.

B. Shop Drawings: For each through-penetration firestop system, show each type of construction condition penetrated, relationships to adjoining construction, and type of penetrating item. Include firestop design designation of qualified testing and inspecting agency that evidences compliance with requirements for each condition indicated.
   1. Submit documentation, including illustrations, from a qualified testing and inspecting agency that is applicable to each through-penetration firestop system configuration for construction and penetrating items.
   2. Where Project conditions require modification to a qualified testing and inspecting agency's illustration for a particular through-penetration firestop condition, submit illustration, with modifications marked, approved by through-penetration firestop system manufacturer's fire-protection engineer as an engineering judgment or equivalent fire-resistance-rated assembly.

C. Through-Penetration Firestop System Schedule: Indicate locations of each through-penetration firestop system, along with the following information:
   1. Types of penetrating items.
   2. Types of constructions penetrated, including fire-resistance ratings and, where applicable, thicknesses of construction penetrated.
   3. Through-penetration firestop systems for each location identified by firestop design designation of qualified testing and inspecting agency.

D. Qualification Data: For Installer.

E. Product Certificates: For through-penetration firestop system products, signed by product manufacturer.

F. Product Test Reports: From a qualified testing agency indicating through-penetration firestop system complies with requirements, based on comprehensive testing of current products.

## 1.05 QUALITY ASSURANCE

A. Installer Qualifications: A firm experienced in installing through-penetration firestop systems similar in material, design, and extent to that indicated for this Project, whose work has resulted in construction with a record of successful performance. Qualifications include having the necessary experience, staff, and training to install manufacturer's products per specified requirements. Manufacturer's willingness to sell its through-penetration firestop system products to Contractor or to Installer engaged by Contractor does not in itself confer qualification on buyer.

B. Fire-Test-Response Characteristics: Provide through-penetration firestop systems that comply with the following requirements and those specified in Part 1 "Performance Requirements" Article:
   1. Firestopping tests are performed by a qualified testing and inspecting agency. A qualified testing and inspecting agency is UL or another agency performing testing and follow-up inspection services for firestop systems acceptable to authorities having jurisdiction.
   2. Through-penetration firestop systems are identical to those tested per testing standard referenced in "Part 1 Performance Requirements" Article. Provide rated systems complying with the following requirements:
      a. Through-penetration firestop system products bear classification marking of qualified testing and inspecting agency.
      b. Through-penetration firestop systems correspond to those indicated by reference to through-penetration firestop system designations listed by the following:
         1) UL in its "Fire Resistance Directory."

C. Preinstallation Conference: Conduct conference at Project site to comply with requirements in Division 01 Section "Project Management and Coordination."

D. Special Inspections: Allow for 1 of each type of firestopping system to be removed and inspected for conformance with approved submittals. All firestopping shall be inspected prior to the installation of ceilings.

E. Above Ceiling review: Prior to the installation of ceilings, a review of construction completion shall be conducted for firestopping and other items that will not be visible when the ceilings have been installed.

1.06 DELIVERY, STORAGE, AND HANDLING

A. Deliver through-penetration firestop system products to Project site in original, unopened containers or packages with intact and legible manufacturers' labels identifying product and manufacturer, date of manufacture, lot number, shelf life if applicable, qualified testing and inspecting agency's classification marking applicable to Project, curing time, and mixing instructions for multicomponent materials.

B. Store and handle materials for through-penetration firestop systems to prevent their deterioration or damage due to moisture, temperature changes, contaminants, or other causes.

1.07 PROJECT CONDITIONS

A. Environmental Limitations: Do not install through-penetration firestop systems when ambient or substrate temperatures are outside limits permitted by through-penetration firestop system manufacturers or when substrates are wet due to rain, frost, condensation, or other causes.

B. Ventilate through-penetration firestop systems per manufacturer's written instructions by natural means or, where this is inadequate, forced-air circulation.

1.08 COORDINATION

A. Coordinate construction of openings and penetrating items to ensure that through-penetration firestop systems are installed according to specified requirements.

B. Coordinate sizing of sleeves, openings, core-drilled holes, or cut openings to accommodate through-penetration firestop systems.

C. Notify Owner's inspecting agency at least seven days in advance of through-penetration firestop system installations; confirm dates and times on days preceding each series of installations.

D. Do not cover up through-penetration firestop system installations that will become concealed behind other construction until each installation has been examined by building inspector, if required by authorities having jurisdiction.

PART 2 - PRODUCTS

2.01 MANUFACTURERS

A. Available Products: Subject to compliance with requirements, through-penetration firestop systems that may be incorporated into the Work include those systems indicated that are produced by one of the following manufacturers:
1. Grace, W. R. & Co. - Conn.
2. Hilti, Inc.

3. Nelson Firestop Products.
4. RectorSeal Corporation (The).
5. Specified Technologies Inc.
6. 3M; Fire Protection Products Division.
7. Tremco; Sealant/Weatherproofing Division.
8. USG Corporation.

## 2.02 FIRESTOPPING, GENERAL

A. Compatibility: Provide through-penetration firestop systems that are compatible with one another; with the substrates forming openings; and with the items, if any, penetrating through-penetration firestop systems, under conditions of service and application, as demonstrated by through-penetration firestop system manufacturer based on testing and field experience.

B. Accessories: Provide components for each through-penetration firestop system that are needed to install fill materials and to comply with Part 1 "Performance Requirements" Article. Use only components specified by through-penetration firestop system manufacturer and approved by qualified testing and inspecting agency for firestop systems indicated. Accessories include, but are not limited to, the following items:
   1. Permanent forming/damming/backing materials, including the following:
      a. Slag-/rock-wool-fiber insulation.
      b. Sealants used in combination with other forming/damming/backing materials to prevent leakage of fill materials in liquid state.
      c. Fire-rated form board.
      d. Fillers for sealants.
   2. Temporary forming materials.
   3. Substrate primers.
   4. Collars.
   5. Steel sleeves.

## 2.03 FILL MATERIALS

A. General: Provide through-penetration firestop systems containing the types of fill materials as required by UL approved Through-Penetration Firestop System. Fill materials are those referred to in directories of the referenced testing and inspecting agencies as fill, void, or cavity materials.

B. Cast-in-Place Firestop Devices: Factory-assembled devices for use in cast-in-place concrete floors and consisting of an outer metallic sleeve lined with an intumescent strip, a radial extended flange attached to one end of the sleeve for fastening to concrete formwork, and a neoprene gasket.

C. Latex Sealants: Single-component latex formulations that after cure do not re-emulsify during exposure to moisture.

D. Elastomeric Spray: Single component, water-based elastomeric compound.

E. Firestop Devices: Factory-assembled collars formed from galvanized steel and lined with intumescent material sized to fit specific diameter of penetrant.

F. Intumescent Composite Sheets: Rigid panels consisting of aluminum-foil-faced elastomeric sheet bonded to galvanized steel sheet.

G. Intumescent Putties: Nonhardening dielectric, water-resistant putties containing no solvents, inorganic fibers, or silicone compounds.

H. Intumescent Wrap Strips: Single-component intumescent elastomeric sheets with aluminum foil on one side.

I. Mortars: Prepackaged dry mixes consisting of a blend of inorganic binders, hydraulic cement, fillers, and lightweight aggregate formulated for mixing with water at Project site to form a nonshrinking, homogeneous mortar.

J. Pillows/Bags: Reusable heat-expanding pillows/bags consisting of glass-fiber cloth cases filled with a combination of mineral-fiber, water-insoluble expansion agents, and fire-retardant additives.

K. Silicone Foams: Multicomponent, silicone-based liquid elastomers that, when mixed, expand and cure in place to produce a flexible, nonshrinking foam.

L. Silicone Sealants: Single-component, silicone-based, neutral-curing elastomeric sealants of grade indicated below:
1. Grade: Pourable (self-leveling) formulation for openings in floors and other horizontal surfaces, and nonsag formulation for openings in vertical and other surfaces requiring a nonslumping, gunnable sealant, unless indicated firestop system limits use to nonsag grade for both opening conditions.
2. Grade for Horizontal Surfaces: Pourable (self-leveling) formulation for openings in floors and other horizontal surfaces.
3. Grade for Vertical Surfaces: Nonsag formulation for openings in vertical and other surfaces.

M. Unfaced, Slag-Wool-/Rock-Wool-Fiber Board Insulation: ASTM C 612, maximum flame-spread and smoke-developed indices of 15 and 0, respectively; passing ASTM E 136 for combustion characteristics; and of the following density, type, thermal resistivity, and fiber color:
1. Nominal density of 4 lb/cu. ft., Types IA and IB, thermal resistivity of 4 deg F x h x sq. ft./Btu x in. at 75 deg F.
2. Color: Natural.
3. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
a. Fibrex Insulations Inc.
b. Owens Corning.
c. Thermafiber.

## 2.04 MIXING

A. For those products requiring mixing before application, comply with through-penetration firestop system manufacturer's written instructions for accurate proportioning of materials, water (if required), type of mixing equipment, selection of mixer speeds, mixing containers, mixing time, and other items or procedures needed to produce products of uniform quality with optimum performance characteristics for application indicated.

# PART 3 - EXECUTION

## 3.01 EXAMINATION

A. Examine substrates and conditions, with Installer present, for compliance with requirements for opening configurations, penetrating items, substrates, and other conditions affecting performance of work.
1. Proceed with installation only after unsatisfactory conditions have been corrected.

## 3.02 PREPARATION

A. Surface Cleaning: Clean out openings immediately before installing through-penetration firestop systems to comply with firestop system manufacturer's written instructions and with the following requirements:
1. Remove from surfaces of opening substrates and from penetrating items foreign materials that could interfere with adhesion of through-penetration firestop systems.

2. Clean opening substrates and penetrating items to produce clean, sound surfaces capable of developing optimum bond with through-penetration firestop systems. Remove loose particles remaining from cleaning operation.
3. Remove laitance and form-release agents from concrete.

B. Priming: Prime substrates where recommended in writing by through-penetration firestop system manufacturer using that manufacturer's recommended products and methods. Confine primers to areas of bond; do not allow spillage and migration onto exposed surfaces.

C. Masking Tape: Use masking tape to prevent through-penetration firestop systems from contacting adjoining surfaces that will remain exposed on completion of Work and that would otherwise be permanently stained or damaged by such contact or by cleaning methods used to remove smears from firestop system materials. Remove tape as soon as possible without disturbing firestop system's seal with substrates.

## 3.03 THROUGH-PENETRATION FIRESTOP SYSTEM INSTALLATION

A. General: Install through-penetration firestop systems to comply with Part 1 "Performance Requirements" Article and with firestop system manufacturer's written installation instructions and published drawings for products and applications indicated.

B. Install forming/damming/backing materials and other accessories of types required to support fill materials during their application and in the position needed to produce cross-sectional shapes and depths required to achieve fire ratings indicated.
1. After installing fill materials and allowing them to fully cure, remove combustible forming materials and other accessories not indicated as permanent components of firestop systems.

C. Install fill materials for firestop systems by proven techniques to produce the following results:
1. Fill voids and cavities formed by openings, forming materials, accessories, and penetrating items as required to achieve fire-resistance ratings indicated.
2. Apply materials so they contact and adhere to substrates formed by openings and penetrating items.
3. For fill materials that will remain exposed after completing Work, finish to produce smooth, uniform surfaces that are flush with adjoining finishes.

## 3.04 IDENTIFICATION

A. Identify through-penetration firestop systems with preprinted metal or plastic labels. Attach labels permanently to surfaces adjacent to and within 6 inches of edge of the firestop systems so that labels will be visible to anyone seeking to remove penetrating items or firestop systems. Use mechanical fasteners for metal labels. For plastic labels, use self-adhering type with adhesives capable of permanently bonding labels to surfaces on which labels are placed and, in combination with label material, will result in partial destruction of label if removal is attempted. 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.

## 3.05 FIELD QUALITY CONTROL

A. Owner will engage a qualified testing agency to perform tests and inspections.

B. Where deficiencies are found, repair or replace through-penetration firestop systems so they comply with requirements.

C. Proceed with enclosing through-penetration firestop systems with other construction only after inspection reports are issued and firestop installations comply with requirements.

D. Reinstall firestopping materials that have been removed for inspection.

3.06 CLEANING AND PROTECTING

A. Clean off excess fill materials adjacent to openings as Work progresses by methods and with cleaning materials that are approved in writing by through-penetration firestop system manufacturers and that do not damage materials in which openings occur.

B. Provide final protection and maintain conditions during and after installation that ensure that through-penetration firestop systems are without damage or deterioration at time of Substantial Completion. If, despite such protection, damage or deterioration occurs, cut out and remove damaged or deteriorated through-penetration firestop systems immediately and install new materials to produce systems complying with specified requirements.

PART 4 - MEASUREMENT AND PAYMENT:

4.01 METHOD OF MEASUREMENT:

Penetration Firestopping will be measured by the lump sum, complete and accepted. The Penetration Firestopping limits shall be as shown or described in the Contract Documents.

4.02 BASIS OF PAYMENT:

Penetration Firestopping will be paid for at the contract lump sum price. Payment for Penetration Firestopping will be under:

| Pay Item | | Pay Unit |
|---|---|---|
| DIV. 7 | Thermal and Moisture | Lump Sum |

**END OF SECTION**

# SECTION 07 92 00 - JOINT SEALANTS

All work and materials shall conform to the Contract Documents and the provisions of the State of Maine Department of Transportation Standard Specifications, Revision November 2014, with the following additions:

Add the following:

## PART 1 - GENERAL

### 1.01 RELATED DOCUMENTS

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

### 1.02 SUMMARY

A. Section Includes:
1. Silicone joint sealants.
2. Latex joint sealants.

B. Related Sections:
1. Division 04 Section "Exterior Stone Cladding" for control and expansion joint fillers and gaskets.
2. Division 08 Section "Glazing" for glazing sealants.
3. Division 09 Section "Gypsum Board" for sealing perimeter joints.
4. Division 09 Section "Tiling" for sealing tile joints.

### 1.03 SUBMITTALS

A. Product Data: For each joint-sealant product indicated.

B. Samples for Selection: Manufacturer's color charts consisting of strips of cured sealants showing the full range of colors available for each product exposed to view.

C. Joint-Sealant Schedule: Include the following information:
1. Joint-sealant application, joint location, and designation.
2. Joint-sealant manufacturer and product name.
3. Joint-sealant formulation.
4. Joint-sealant color.

D. Product Certificates: For each kind of joint sealant and accessory, from manufacturer.

E. Product Test Reports: Based on evaluation of comprehensive tests performed by a qualified testing agency, indicating that sealants comply with requirements.

F. Warranties: Sample of special warranties.

### 1.04 QUALITY ASSURANCE

A. Installer Qualifications: An experienced installer who has specialized in installing joint sealants similar in material, design, and extent to those indicated for this Project and whose work has resulted in joint-sealant installations with a record of successful in-service performance.

B. Product Testing: Test joint sealants using a qualified testing agency.
1. Testing Agency Qualifications: An independent testing agency qualified according to ASTM C 1021 to conduct the testing indicated.

C. Mockups: Install sealant in mockups of assemblies specified in other Sections that are indicated to receive joint sealants specified in this Section. Use materials and installation methods specified in this Section.

D. Preinstallation Conference: Conduct conference at Project site.

1.05 PROJECT CONDITIONS

A. Do not proceed with installation of joint sealants under the following conditions:
1. When ambient and substrate temperature conditions are outside limits permitted by joint-sealant manufacturer or are below 40 deg F.
2. When joint substrates are wet.
3. Where joint widths are less than those allowed by joint-sealant manufacturer for applications indicated.
4. Where contaminants capable of interfering with adhesion have not yet been removed from joint substrates.

1.06 WARRANTY

A. Special Installer's Warranty: Manufacturer's standard form in which Installer agrees to repair or replace joint sealants that do not comply with performance and other requirements specified in this Section within specified warranty period.
1. Warranty Period: Two years from date of Substantial Completion.

B. Special Manufacturer's Warranty: Manufacturer's standard form in which joint-sealant manufacturer agrees to furnish joint sealants to repair or replace those that do not comply with performance and other requirements specified in this Section within specified warranty period.
1. Warranty Period: Five years from date of Substantial Completion.

C. Special warranties specified in this article exclude deterioration or failure of joint sealants from the following:
1. Movement of the structure caused by structural settlement or errors attributable to design or construction resulting in stresses on the sealant exceeding sealant manufacturer's written specifications for sealant elongation and compression.
2. Disintegration of joint substrates from natural causes exceeding design specifications.
3. Mechanical damage caused by individuals, tools, or other outside agents.
4. Changes in sealant appearance caused by accumulation of dirt or other atmospheric contaminants.

PART 2 - PRODUCTS

2.01 MATERIALS, GENERAL

A. Compatibility: Provide joint sealants, backings, and other related materials that are compatible with one another and with joint substrates under conditions of service and application, as demonstrated by joint-sealant manufacturer, based on testing and field experience.

B. VOC Content of Interior Sealants: Provide sealants and sealant primers for use inside the weatherproofing system that comply with the following limits for VOC content when calculated according to 40 CFR 59, Part 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.

C. Stain-Test-Response Characteristics: Where sealants are specified to be nonstaining to porous substrates, provide products that have undergone testing according to ASTM C 1248 and have not stained porous joint substrates indicated for Project.

D. Colors of Exposed Joint Sealants: As selected by Architect from manufacturer's full range.

## 2.02 SILICONE JOINT SEALANTS

A. Sealant Type 1: Single-Component, Nonsag, Neutral-Curing Silicone Joint Sealant; ASTM C 920, Type S, Grade NS, Class 100/50, for Use NT.
   1. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:
      a. Dow Corning Corporation; 790 (VOC 43); 756 SMS (VOC 87) for cold applications.
      b. GE Advanced Materials - Silicones; SilPruf LM SCS2700.
      c. Pecora Corporation; 890 (VOC na).
      d. Sika Corporation, Construction Products Division; SikaSil-C990.
      e. Tremco Incorporated; Spectrem 1 (VOC 1).

B. Sealant Type 2: Single-Component, Nonsag, Neutral-Curing Silicone Joint Sealant; ASTM C 920, Type S, Grade NS, Class 50, for Use NT.
   1. Stain-Test-Response Characteristics: Nonstaining to porous substrates per ASTM C 1248.
   2. Products: Subject to compliance with requirements, provide one of the following:
      a. Dow Corning Corporation; 756 SMS (VOC 87).
      b. GE Advanced Materials - Silicones; SilPruf LM SCS2700 (VOC 27).
      c. Pecora Corporation; 890NST (VOC 98).

C. Sealant Type 3: Single-Component, Nonsag, Traffic-Grade, Neutral-Curing Silicone Joint Sealant; ASTM C 920, Type S, Grade NS, Class 100/50, for Use T.
   1. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:
      a. Dow Corning Corporation; 790 (VOC 43).
      b. Pecora Corporation; 301 NS (VOC 50).
      c. Tremco Incorporated; Spectrem 800 (VOC 1).

D. Sealant Type 4: Mildew-Resistant, Single-Component, Acid-Curing Silicone Joint Sealant: ASTM C 920, Type S, Grade NS, Class 25, for Use NT.
   1. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:
      a. Dow Corning Corporation; 786(VOC 33) (Food)
      b. GE Advanced Materials - Silicones; Sanitary SCS1700.
      c. Tremco Incorporated; Tremsil 200 Sanitary (VOC 1).

## 2.03 LATEX JOINT SEALANTS

A. Sealant Type 5: Latex Joint Sealant: Acrylic latex or siliconized acrylic latex, ASTM C 834, Type OP, Grade NF.
   1. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:

      a. BASF Building Systems; Sonolac (VOC 41).
      b. Bostik, Inc.; Chem-Calk 600.
      c. Pecora Corporation; AC-20 (VOC 31).
      d. Tremco Incorporated; Tremflex 834.

## 2.04 JOINT SEALANT BACKING

A. General: Provide sealant backings of material that are nonstaining; are compatible with joint substrates, sealants, primers, and other joint fillers; and are approved for applications indicated by sealant manufacturer based on field experience and laboratory testing.

B. Cylindrical Sealant Backings: ASTM C 1330, Type C (closed-cell material with a surface skin), and of size and density to control sealant depth and otherwise contribute to producing optimum sealant performance.

C. Bond-Breaker Tape: Polyethylene tape or other plastic tape recommended by sealant manufacturer for preventing sealant from adhering to rigid, inflexible joint-filler materials or joint surfaces at back of joint. Provide self-adhesive tape where applicable.

2.05 MISCELLANEOUS MATERIALS

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

B. Cleaners for Nonporous Surfaces: Chemical cleaners acceptable to manufacturers of sealants and sealant backing materials, free of oily residues or other substances capable of staining or harming joint substrates and adjacent nonporous surfaces in any way, and formulated to promote optimum adhesion of sealants to joint substrates.

C. Masking Tape: Nonstaining, nonabsorbent material compatible with joint sealants and surfaces adjacent to joints.

PART 3 - EXECUTION

3.01 EXAMINATION

A. Examine joints indicated to receive joint sealants, with Installer present, for compliance with requirements for joint configuration, installation tolerances, and other conditions affecting joint-sealant performance.

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

3.02 PREPARATION

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

B. Joint Priming: Prime joint substrates where recommended by joint-sealant manufacturer or as indicated by preconstruction joint-sealant-substrate tests or prior experience. Apply primer to comply with joint-sealant manufacturer's written instructions. Confine primers to areas of joint-sealant bond; do not allow spillage or migration onto adjoining surfaces.

C. Masking Tape: Use masking tape where required to prevent contact of sealant or primer with adjoining surfaces that otherwise would be permanently stained or damaged by such contact or by cleaning methods required to remove sealant smears. Remove tape immediately after tooling without disturbing joint seal.

## 3.03 INSTALLATION OF JOINT SEALANTS

A. General: Comply with joint-sealant manufacturer's written installation instructions for products and applications indicated, unless more stringent requirements apply.

B. Sealant Installation Standard: Comply with recommendations in ASTM C 1193 for use of joint sealants as applicable to materials, applications, and conditions indicated.

C. Install sealant backings of kind indicated to support sealants during application and at position required to produce cross-sectional shapes and depths of installed sealants relative to joint widths that allow optimum sealant movement capability.
   1. Do not leave gaps between ends of sealant backings.
   2. Do not stretch, twist, puncture, or tear sealant backings.
   3. Remove absorbent sealant backings that have become wet before sealant application and replace them with dry materials.

D. Install bond-breaker tape behind sealants where sealant backings are not used between sealants and backs of joints.

E. Install sealants using proven techniques that comply with the following and at the same time backings are installed:
   1. Place sealants so they directly contact and fully wet joint substrates.
   2. Completely fill recesses in each joint configuration.
   3. Produce uniform, cross-sectional shapes and depths relative to joint widths that allow optimum sealant movement capability.

F. Tooling of Nonsag Sealants: Immediately after sealant application and before skinning or curing begins, tool sealants according to requirements specified in subparagraphs below to form smooth, uniform beads of configuration indicated; to eliminate air pockets; and to ensure contact and adhesion of sealant with sides of joint.
   1. Remove excess sealant from surfaces adjacent to joints.
   2. Use tooling agents that are approved in writing by sealant manufacturer and that do not discolor sealants or adjacent surfaces.
   3. Provide concave joint profile per Figure 8A in ASTM C 1193, unless otherwise indicated.
      a. Use masking tape to protect surfaces adjacent to recessed tooled joints.

G. Installation of Preformed Silicone-Sealant System: Comply with the following requirements:
   1. Apply masking tape to each side of joint, outside of area to be covered by sealant system.
   2. Apply silicone sealant to each side of joint to produce a bead of size complying with preformed silicone-sealant system manufacturer's written instructions and covering a bonding area of not less than 3/8 inch. Hold edge of sealant bead 1/4 inch inside masking tape.
   3. Within 10 minutes of sealant application, press silicone extrusion into sealant to wet extrusion and substrate. Use a roller to apply consistent pressure and ensure uniform contact between sealant and both extrusion and substrate.
   4. Complete installation of sealant system in horizontal joints before installing in vertical joints. Lap vertical joints over horizontal joints. At ends of joints, cut silicone extrusion with a razor knife.

## 3.04 CLEANING

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

## 3.05 PROTECTION

A. Protect joint sealants during and after curing period from contact with contaminating substances and from damage resulting from construction operations or other causes so sealants are without deterioration or damage at time of Substantial Completion. If, despite such protection, damage or deterioration occurs, cut out and remove damaged or deteriorated joint sealants immediately so installations with repaired areas are indistinguishable from original work.

## 3.06 JOINT-SEALANT SCHEDULE

A. Exterior Isolation and Contraction Joints in Cast-in-place Concrete Slabs.
   1. Silicone Joint Sealant: Sealant Type 3.
   2. Joint-Sealant Color: As selected by Architect from manufacturer's full range of colors.

B. Exterior Control, Expansion, and Soft Joints in Masonry and Between Masonry and Adjacent Work.
   1. Silicone Joint Sealant: Sealant Type 1.
   2. Joint-Sealant Color: As selected by Architect from manufacturer's full range of colors.

C. Exterior Control, Expansion, and Soft Joints Between Masonry and Metal Door Frames, Windows, Storefronts and Curtain Walls.
   1. Silicone Joint Sealant: Sealant Type 1.
   2. Joint-Sealant Color: As selected by Architect from manufacturer's full range of colors.

D. Exterior Control, Expansion, and Soft Joints in Stone Work and Between Stone and Adjacent Work.
   1. Silicone Joint Sealant: Sealant Type 2.
   2. Joint-Sealant Color: As selected by Architect from manufacturer's full range of colors.

E. Under Exterior Door Thresholds.
   1. Silicone Joint Sealant: Sealant Type 1.
   2. Joint-Sealant Color: As selected by Architect from manufacturer's full range of colors.

F. Exterior Joints for Which No Other Sealant Type is Indicated.
   1. Silicone Joint Sealant: Sealant Type 1.
   2. Joint-Sealant Color: As selected by Architect from manufacturer's full range of colors.

G. Interior Isolation and Contraction Joints in Cast-In-Place Concrete Slabs.
   1. Silicone Joint Sealant: Sealant Type 3.
   2. Joint-Sealant Color: As selected by Architect from manufacturer's full range of colors.

H. Concealed Interior Perimeter Joints of Exterior Openings.
   1. Silicone Joint Sealant: Sealant Type 1.
   2. Joint-Sealant Color: As selected by Architect from manufacturer's full range of colors.

I. Exposed Interior Perimeter Joints of Exterior Openings.
   1. Silicone Joint Sealant: Sealant Type 1.
   2. Joint-Sealant Color: As selected by Architect from manufacturer's full range of colors.

J. Perimeter Joints Between Interior Wall Surfaces and Frames of Interior Doors Windows and Elevator Entrances.
   1. Latex Joint Sealant: Sealant Type 5.
   2. Joint-Sealant Color: As selected by Architect from manufacturer's full range of colors.

K. Vertical Joints on Exposed Surfaces of Walls and Partitions.
   1. Latex Joint Sealant: Sealant Type 5.
   2. Joint-Sealant Color: As selected by Architect from manufacturer's full range of colors.

L. Joints between Plumbing Fixtures and Walls and Floors and Between Countertops and Walls.
   1. Silicone Joint Sealant: Sealant Type 4.

2. Joint-Sealant Color: As selected by Architect from manufacturer's full range of colors.

M. Interior Joints for Which No Other Sealant is Indicated.
1. Latex Joint Sealant: Sealant Type 5.
2. Joint-Sealant Color: As selected by Architect from manufacturer's full range of colors.

## PART 4 - MEASUREMENT AND PAYMENT:

### 4.01 METHOD OF MEASUREMENT:

Joint Sealants will be measured by the lump sum, complete and accepted. The Joint Sealants limits shall be as shown or described in the Contract Documents.

### 4.02 BASIS OF PAYMENT:

Joint Sealants will be paid for at the contract lump sum price. Payment for Joint Sealants will be under:

| Pay Item | | Pay Unit |
|---|---|---|
| DIV. 7 | Thermal and Moisture | Lump Sum |

**END OF SECTION**

# SECTION 08 11 13 - HOLLOW METAL DOORS AND FRAMES

All work and materials shall conform to the Contract Documents and the provisions of the State of Maine Department of Transportation Standard Specifications, Revision November 2014, with the following additions:

Add the following:

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

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

1.02 SUMMARY

A. Section Includes:
   1. Standard hollow metal frames.

B. Related Sections:
   1. Division 08 Section "Door Hardware" for door hardware for hollow metal frames.
   2. Division 09 Sections "Exterior Painting" and "Interior Painting" for field painting hollow metal frames.

1.03 DEFINITIONS

A. Minimum Thickness: Minimum thickness of base metal without coatings.

B. Standard Hollow Metal Work: Hollow metal work fabricated according to ANSI/SDI A250.8.

1.04 SUBMITTALS

A. General: Submittals for Sections 081113, 081416 and 087100 shall be made concurrently.

B. Product Data: For each type of product indicated. Include construction details, material descriptions, core descriptions, fire-resistance rating, and finishes.

C. Shop Drawings: Include the following:
   1. Elevations of each door frame design.
   2. Frame details for each frame type, including dimensioned profiles and metal thicknesses.
   3. Locations of reinforcement and preparations for hardware.
   4. Details of each different wall opening condition.
   5. Details of anchorages, joints, field splices, and connections.
   6. Details of accessories.

D. Other Action Submittals:
   1. Schedule: Provide a schedule of hollow metal work prepared by or under the supervision of supplier, using same reference numbers for details and openings as those on Drawings. Coordinate with door hardware schedule.

E. Product Test Reports: Based on evaluation of comprehensive tests performed by a qualified testing agency, for each type of hollow metal door and frame assembly.

1.05 QUALITY ASSURANCE

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

B. Fire-Rated Door Assemblies: Assemblies complying with NFPA 80 that are listed and labeled by a qualified testing agency, for fire-protection ratings indicated, based on testing at positive pressure according to NFPA 252 or UL 10C.

C. Fire-Rated, Borrowed-Light Frame Assemblies: Assemblies complying with NFPA 80 that are listed and labeled, by a testing and inspecting agency acceptable to authorities having jurisdiction, for fire-protection ratings indicated, based on testing according to NFPA 257 or UL 9. Label each individual glazed lite.

D. Smoke-Control Door Assemblies: Comply with NFPA 105 or UL 1784.

E. Regulatory Requirements: Comply with the Americans with Disabilities Act (ADA) and with code provisions as adopted by authorities having jurisdiction.
   1. Notify Architect of details or specifications not conforming to code.

F. Preinstallation Conference: Conduct conference at Project site.
   1. Inspect and discuss condition of substrate and other preparatory work performed by other trades.
   2. Review tie-in to air barrier system.

1.06 DELIVERY, STORAGE, AND HANDLING

A. Deliver hollow metal work palletized, wrapped, or crated to provide protection during transit and Project-site storage. Do not use nonvented plastic.
   1. Provide additional protection to prevent damage to finish of factory-finished units.

B. Deliver welded frames with two removable spreader bars across bottom of frames, tack welded to jambs and mullions.

C. Store hollow metal work under cover at Project site. Place in stacks of five units maximum in a vertical position with heads up, spaced by blocking, on minimum 4-inch- high wood blocking. Do not store in a manner that traps excess humidity.

1.07 PROJECT CONDITIONS

A. Field Measurements: Verify actual dimensions of openings by field measurements before fabrication.

1.08 COORDINATION

A. Coordinate installation of anchorages for hollow metal frames. Furnish setting drawings, templates, and directions for installing anchorages, including sleeves, concrete inserts, anchor bolts, and items with integral anchors. Deliver such items to Project site in time for installation.

PART 2 - PRODUCTS

2.01 MANUFACTURERS

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
   1. Standard Steel Frames:
      a. Ceco Door Products; a United Dominion Company.
      b. Curries Company.
      c. Steelcraft; a division of Ingersoll-Rand.

## 2.02 MATERIALS

A. Recycled Content of Steel Products: Provide products with average recycled content of steel products so postconsumer recycled content plus one-half of preconsumer recycled content is not less than 25 percent.

B. Cold-Rolled Steel Sheet: ASTM A 1008/A 1008M, Commercial Steel (CS), Type B; suitable for exposed applications.

C. Hot-Rolled Steel Sheet: ASTM A 1011/A 1011M, Commercial Steel (CS), Type B; free of scale, pitting, or surface defects; pickled and oiled.

D. Metallic-Coated Steel Sheet: ASTM A 653/A 653M, Commercial Steel (CS), Type B; with minimum G60 or A60 metallic coating.
   1. Wipe Coat Galvanneal materials will not be considered acceptable.

E. Frame Anchors: ASTM A 591/A 591M, Commercial Steel (CS), 40Z coating designation; mill phosphatized.
   1. For anchors built into exterior walls, steel sheet complying with ASTM A 1008/A 1008M or ASTM A 1011/A 1011M, hot-dip galvanized according to ASTM A 153/A 153M, Class B.

F. Inserts, Bolts, and Fasteners: Hot-dip galvanized according to ASTM A 153/A 153M.

G. Powder-Actuated Fasteners in Concrete: Fastener system of type suitable for application indicated, fabricated from corrosion-resistant materials, with clips or other accessory devices for attaching hollow metal frames of type indicated.

H. Grout: ASTM C 476, except with a maximum slump of 4 inches, as measured according to ASTM C 143/C 143M.

I. Bituminous Coating: Cold-applied asphalt mastic, SSPC-Paint 12, compounded for 15-mil dry film thickness per coat. Provide inert-type noncorrosive compound free of asbestos fibers, sulfur components, and other deleterious impurities.

## 2.03 STANDARD HOLLOW METAL FRAMES

A. General: Comply with ANSI/SDI A250.8 and with details indicated for type and profile.

B. Exterior Frames: Fabricated from metallic-coated steel sheet.
   1. Fabricate frames with mitered or coped corners.
   2. Fabricate frames as face welded unless otherwise indicated.
   3. Frames for Level 2 Steel Doors: 0.053-inch- thick steel sheet.

C. Interior Frames: Fabricated from cold-rolled steel sheet, unless metallic-coated sheet is indicated.
   1. Fabricate frames with mitered or coped corners.
   2. Fabricate frames as knocked down unless otherwise indicated.
   3. Frames for Wood Doors: 0.053-inch- thick steel sheet.
   4. Frames for Borrowed Lights: 0.053-inch- thick steel sheet.

D. Hardware Reinforcement: Fabricate according to ANSI/SDI A250.6 with reinforcement plates from same material as frames.

## 2.04 FRAME ANCHORS

A. Jamb Anchors:

1. Masonry Type: Adjustable strap-and-stirrup or T-shaped anchors to suit frame size, not less than 0.042 inch thick, with corrugated or perforated straps not less than 2 inches wide by 10 inches long; or wire anchors not less than 0.177 inch thick.
2. Stud-Wall Type: Designed to engage stud, welded to back of frames; not less than 0.042 inch thick.
3. Postinstalled Expansion Type for In-Place Concrete or Masonry: Minimum 3/8-inch- diameter bolts with expansion shields or inserts. Provide pipe spacer from frame to wall, with throat reinforcement plate, welded to frame at each anchor location.

B. Floor Anchors: Formed from same material as frames, not less than 0.042 inch thick, and as follows:
1. Monolithic Concrete Slabs: Clip-type anchors, with two holes to receive fasteners.
2. Separate Topping Concrete Slabs: Adjustable-type anchors with extension clips, allowing not less than 2-inch height adjustment. Terminate bottom of frames at finish floor surface.

## 2.05 STOPS AND MOLDINGS

A. Fixed Frame Moldings: Formed integral with hollow metal frames, a minimum of 5/8 inch high unless otherwise indicated.

B. Loose Stops for Glazed Lites in Frames: Minimum 0.032 inch thick, fabricated from same material as frames in which they are installed.

## 2.06 ACCESSORIES

A. Mullions and Transom Bars: Join to adjacent members by welding or rigid mechanical anchors.

B. Ceiling Struts: Minimum 1/4-inch-thick by 1-inch- wide steel.

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

## 2.07 FABRICATION

A. Fabricate hollow metal work to be rigid and free of defects, warp, or buckle. Accurately form metal to required sizes and profiles, with minimum radius for thickness of metal. Where practical, fit and assemble units in manufacturer's plant. To ensure proper assembly at Project site, clearly identify work that cannot be permanently factory assembled before shipment.

B. Tolerances: Fabricate hollow metal work to tolerances indicated in SDI 117.

C. Hollow Metal Frames: Where frames are fabricated in sections due to shipping or handling limitations, provide alignment plates or angles at each joint, fabricated of same thickness metal as frames.
1. Welded Frames: Weld flush face joints continuously; grind, fill, dress, and make smooth, flush, and invisible.
2. Sidelight and Transom Bar Frames: Provide closed tubular members with no visible face seams or joints, fabricated from same material as door frame. Fasten members at crossings and to jambs by butt welding.
3. Provide countersunk, flat- or oval-head exposed screws and bolts for exposed fasteners unless otherwise indicated.
4. Grout Guards: Weld guards to frame at back of hardware mortises in frames to be grouted.
5. Floor Anchors: Weld anchors to bottom of jambs and mullions with at least four spot welds per anchor.
6. Jamb Anchors: Provide number and spacing of anchors as follows:
   a. Masonry Type: Locate anchors not more than 18 inches from top and bottom of frame. Space anchors not more than 32 inches o.c. and as follows:
      1) Two anchors per jamb up to 60 inches high.
      2) Three anchors per jamb from 60 to 90 inches high.
      3) Four anchors per jamb from 90 to 120 inches high.

4) Four anchors per jamb plus 1 additional anchor per jamb for each 24 inches or fraction thereof above 120 inches high.

b. Stud-Wall Type: Locate anchors not more than 18 inches from top and bottom of frame. Space anchors not more than 32 inches o.c. and as follows:
1) Three anchors per jamb up to 60 inches high.
2) Four anchors per jamb from 60 to 90 inches high.
3) Five anchors per jamb from 90 to 96 inches high.
4) Five anchors per jamb plus 1 additional anchor per jamb for each 24 inches or fraction thereof above 96 inches high.
5) Two anchors per head for frames above 42 inches wide and mounted in metal-stud partitions.

c. Compression Type: Not allowed.

d. Postinstalled Expansion Type: Locate anchors not more than 6 inches from top and bottom of frame. Space anchors not more than 26 inches o.c.

7. Door Silencers: Except on weather-stripped doors, drill stops to receive door silencers as follows. Keep holes clear during construction.
a. Single-Door Frames: Drill stop in strike jamb to receive three door silencers.
b. Double-Door Frames: Drill stop in head jamb to receive two door silencers.

D. Fabricate concealed stiffeners, edge channels, and hardware reinforcement from either cold- or hot-rolled steel sheet.

E. Hardware Preparation: Factory prepare hollow metal work to receive templated mortised hardware; include cutouts, reinforcement, mortising, drilling, and tapping according to the Door Hardware Schedule and templates furnished as specified in Division 08 Section "Door Hardware."
1. Locate hardware as indicated, or if not indicated, according to ANSI/SDI A250.8.
2. Reinforce frames to receive nontemplated, mortised and surface-mounted door hardware.
3. Comply with applicable requirements in ANSI/SDI A250.6 and ANSI/DHI A115 Series specifications for preparation of hollow metal work for hardware.
4. Coordinate locations of conduit and wiring boxes for electrical connections with Division 26 Sections.

F. Stops and Moldings: Provide stops and moldings around glazed lites where indicated. Form corners of stops and moldings with butted or mitered hairline joints.
1. Single Glazed Lites: Provide fixed stops and moldings welded on secure side of hollow metal work.
2. Multiple Glazed Lites: Provide fixed and removable stops and moldings so that each glazed lite is capable of being removed independently.
3. Provide fixed frame moldings on outside of exterior and on secure side of interior doors and frames.
4. Provide loose stops and moldings on inside of hollow metal work.
5. Coordinate rabbet width between fixed and removable stops with type of glazing and type of installation indicated.

## 2.08 STEEL FINISHES

A. Prime Finish: Apply manufacturer's standard primer immediately after cleaning and pretreating.
1. Shop Primer: Manufacturer's standard, fast-curing, lead- and chromate-free primer complying with ANSI/SDI A250.10 acceptance criteria; recommended by primer manufacturer for substrate; compatible with substrate and field-applied coatings despite prolonged exposure.

# PART 3 - EXECUTION

## 3.01 EXAMINATION

A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of the Work.

B. Examine roughing-in for embedded and built-in anchors to verify actual locations before frame installation.

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

3.02 PREPARATION

A. Remove welded-in shipping spreaders installed at factory. Restore exposed finish by grinding, filling, and dressing, as required to make repaired area smooth, flush, and invisible on exposed faces.

B. Prior to installation, adjust and securely brace welded hollow metal frames for squareness, alignment, twist, and plumbness to the following tolerances:
1. Squareness: Plus or minus 1/16 inch, measured at door rabbet on a line 90 degrees from jamb perpendicular to frame head.
2. Alignment: Plus or minus 1/16 inch, measured at jambs on a horizontal line parallel to plane of wall.
3. Twist: Plus or minus 1/16 inch, measured at opposite face corners of jambs on parallel lines, and perpendicular to plane of wall.
4. Plumbness: Plus or minus 1/16 inch, measured at jambs on a perpendicular line from head to floor.

C. Drill and tap doors and frames to receive nontemplated, mortised, and surface-mounted door hardware.

D. At exterior walls and masonry walls, coat inside of frame profile with bituminous coating to a thickness of 1/16 inch.

3.03 INSTALLATION

A. General: Install hollow metal work plumb, rigid, properly aligned, and securely fastened in place; comply with Drawings and manufacturer's written instructions.

B. Hollow Metal Frames: Install hollow metal frames of size and profile indicated. Comply with ANSI/SDI A250.11.
1. Set frames accurately in position, plumbed, aligned, and braced securely until permanent anchors are set. After wall construction is complete, remove temporary braces, leaving surfaces smooth and undamaged.
   a. At fire-protection-rated openings, install frames according to NFPA 80.
   b. Where frames are fabricated in sections because of shipping or handling limitations, field splice at approved locations by welding face joint continuously; grind, fill, dress, and make splice smooth, flush, and invisible on exposed faces.
   c. Install frames with removable glazing stops located on secure side of opening.
   d. Install door silencers in frames before grouting.
   e. Remove temporary braces only after frames have been properly set and secured.
   f. Check plumbness, squareness, and twist of frames as walls are constructed. Shim as necessary to comply with installation tolerances.
2. Floor Anchors: Provide floor anchors for each jamb and mullion that extends to floor, and secure with postinstalled expansion anchors.
   a. Floor anchors may be set with powder-actuated fasteners instead of postinstalled expansion anchors if so indicated and approved on Shop Drawings.
3. Metal-Stud Partitions: Solidly pack mineral-fiber insulation behind frames.
4. Masonry Walls: Coordinate installation of frames to allow for solidly filling space between frames and masonry with grout.
5. Concrete Walls: Solidly fill space between frames and concrete with grout. Take precautions, including bracing frames, to ensure that frames are not deformed or damaged by grout forces.
6. In-Place Concrete or Masonry Construction: Secure frames in place with postinstalled expansion anchors. Countersink anchors, and fill and make smooth, flush, and invisible on exposed faces.
7. Ceiling Struts: Extend struts vertically from top of frame at each jamb to overhead structural supports or substrates above frame unless frame is anchored to masonry or to other structural support at each jamb. Bend top of struts to provide flush contact for securing to supporting construction. Provide adjustable wedged or bolted anchorage to frame jamb members.

8. Installation Tolerances: Adjust hollow metal door frames for squareness, alignment, twist, and plumb to the following tolerances:
   a. Squareness: Plus or minus 1/16 inch, measured at door rabbet on a line 90 degrees from jamb perpendicular to frame head.
   b. Alignment: Plus or minus 1/16 inch, measured at jambs on a horizontal line parallel to plane of wall.
   c. Twist: Plus or minus 1/16 inch, measured at opposite face corners of jambs on parallel lines, and perpendicular to plane of wall.
   d. Plumbness: Plus or minus 1/16 inch, measured at jambs at floor.

C. Glazing: Comply with installation requirements in Division 08 Section "Glazing" and with hollow metal manufacturer's written instructions.
   1. Secure stops with countersunk flat- or oval-head machine screws spaced uniformly not more than 9 inches o.c. and not more than 2 inches o.c. from each corner.

3.04 ADJUSTING AND CLEANING

A. Final Adjustments: Check and readjust operating hardware items immediately before final inspection. Leave work in complete and proper operating condition. Remove and replace defective work, including hollow metal work that is warped, bowed, or otherwise unacceptable.

B. Remove grout and other bonding material from hollow metal work immediately after installation.

C. Prime-Coat Touchup: Immediately after erection, sand smooth rusted or damaged areas of prime coat and apply touchup of compatible air-drying, rust-inhibitive primer.

D. Metallic-Coated Surfaces: Clean abraded areas and repair with galvanizing repair paint according to manufacturer's written instructions.

PART 4 - MEASUREMENT AND PAYMENT:

4.01 METHOD OF MEASUREMENT:

Hollow Metal Doors and Frames will be measured by the lump sum, complete and accepted. The Hollow Metal Doors and Frames limits shall be as shown or described in the Contract Documents.

4.02 BASIS OF PAYMENT:

Hollow Metal Doors and Frames will be paid for at the contract lump sum price. Payment for Hollow Metal Doors and Frames will be under:

| Pay Item | | Pay Unit |
|---|---|---|
| DIV. 8 | Openings | Lump Sum |

**END OF SECTION**

# SECTION 08 14 16 - FLUSH WOOD DOORS

All work and materials shall conform to the Contract Documents and the provisions of the State of Maine Department of Transportation Standard Specifications, Revision November 2014, with the following additions:

Add the following:

## PART 1 - GENERAL

### 1.01 RELATED DOCUMENTS

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

### 1.02 SUMMARY

A. Section Includes:
   1. Solid-core doors with wood-veneer faces.
   2. Factory finishing flush wood doors.
   3. Factory fitting flush wood doors to frames and factory machining for hardware.
   4. Factory glazing of wood doors.

B. Related Sections:
   1. Division 08 Section "Glazing" for glass view panels in flush wood doors.

### 1.03 SUBMITTALS

A. General: Submittals for Sections 08 11 13, 08 14 16 and 08 71 00 shall be made concurrently.

B. Product Data: For each type of door indicated. Include details of core and edge construction, louvers, and trim for openings. Include factory-finishing specifications.

C. Shop Drawings: Indicate location, size, and hand of each door; elevation of each kind of door; construction details not covered in Product Data; location and extent of hardware blocking; and other pertinent data.
   1. Indicate dimensions and locations of mortises and holes for hardware.
   2. Indicate dimensions and locations of cutouts.
   3. Indicate requirements for veneer matching.
   4. Indicate doors to be factory finished and finish requirements.
   5. Indicate fire-protection ratings for fire-rated doors.

D. Samples for Verification:
   1. Factory finishes applied to actual door face materials, approximately 8 by 10 inches, for each material and finish.

E. Warranty: Sample of special warranty.

### 1.04 QUALITY ASSURANCE

A. Source Limitations: Obtain flush wood doors from single manufacturer.

B. Quality Standard: In addition to requirements specified, comply with WDMA I.S.1-A, "Architectural Wood Flush Doors."

C. Fire-Rated Wood Doors: Doors complying with NFPA 80 that are listed and labeled by a qualified testing agency, for fire-protection ratings indicated, based on testing at positve pressure according to NFPA 252 and UL 10C.
   1. Include all requirements as part of the door construction per Category "A" guidelines."

D. Preinstallation Conference: Conduct conference at Project site.
   1. Inspect and discuss condition of substrate and other preparatory work performed by other trades.

1.05 DELIVERY, STORAGE, AND HANDLING

A. Comply with requirements of referenced standard and manufacturer's written instructions.

B. Package doors individually in plastic bags or cardboard cartons.

C. Mark each door on bottom rail with opening number used on Shop Drawings.

1.06 PROJECT CONDITIONS

A. Environmental Limitations: Do not deliver or install doors until spaces are enclosed and weathertight, wet work in spaces is complete and dry, and HVAC system is operating and maintaining ambient temperature and humidity conditions at occupancy levels during the remainder of the construction period.

1.07 WARRANTY

A. Special Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace doors that fail in materials or workmanship within specified warranty period.
   1. Failures include, but are not limited to, the following:
      a. Warping (bow, cup, or twist) more than 1/4 inch in a 42-by-84-inch section.
      b. Telegraphing of core construction in face veneers exceeding 0.01 inch in a 3-inch span.
   2. Warranty Period for Solid-Core Interior Doors: Life of installation.

PART 2 - PRODUCTS

2.01 MANUFACTURERS

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
   1. Flush Wood Doors:
      a. Algoma Hardwoods Inc.
      b. Eggers Industries; Architectural Door Division.
      c. Marshfield Door Systems, Inc.: Signature Series.
      d. Mohawk Flush Doors, Inc.
      e. VT Industries Inc.

2.02 DOOR CONSTRUCTION, GENERAL

A. Low-Emitting Materials: Provide doors made with adhesives and composite wood products that do not contain urea formaldehyde.

B. WDMA I.S.1-A Performance Grade: Extra Heavy Duty.

C. Particleboard-Core Doors:

   1. Particleboard: ANSI A208.1, Grade LD-2.
   2. Blocking: Provide wood blocking in particleboard-core doors as needed to eliminate through-bolting hardware.

D. Structural-Composite-Lumber-Core Doors:
   1. Structural Composite Lumber: WDMA I.S.10.
      a. Screw Withdrawal, Face: 700 lbf.
      b. Screw Withdrawal, Edge: 400 lbf.
   2. Provide doors with structural-composite-lumber cores instead of particleboard cores for the following doors:
      a. Doors indicated to receive exit devices.
      b. Doors where oversized glass lites exceed more than 40 percent of the door surface area.
      c. Doors where louvers exceed more than 40 percent of the door surface area.

E. Fire-Protection-Rated Doors: Provide core specified or mineral core as needed to provide fire-protection rating indicated.
   1. Edge Construction: Provide edge construction with intumescent seals concealed by outer stile. Comply with specified requirements for exposed edges.

F. Mineral-Core Doors:
   1. Core: Noncombustible mineral product complying with requirements of referenced quality standard and testing and inspecting agency for fire-protection rating indicated.
   2. Blocking: Provide composite blocking with improved screw-holding capability approved for use in doors of fire-protection ratings indicated as needed to eliminate through-bolting hardware.
   3. Edge Construction: At hinge stiles, provide laminated-edge construction with improved screw-holding capability and split resistance. Comply with specified requirements for exposed edges.

## 2.03 VENEERED-FACED DOORS FOR TRANSPARENT FINISH

A. Interior Solid-Core Doors:
   1. Grade: Premium, with Grade A faces.
   2. Species: White Maple
   3. Cut: Plain sliced.
   4. Match between Veneer Leaves: Book match.
   5. Assembly of Veneer Leaves on Door Faces: Running match.
   6. Pair and Set Match: Provide for doors hung in same opening.
   7. Exposed Vertical Edges: Same species as faces.
   8. Core: Particleboard except where structural composite lumber is required.
   9. Construction: Five plies. Stiles and rails are bonded to core, then entire unit abrasive planed before veneering.
   10. Adhesives: Type I per WDMA TM-6.

## 2.04 LOUVERS AND LIGHT FRAMES

A. Wood Louvers: Door manufacturer's standard solid-wood louvers unless otherwise indicated.
   1. Wood Species: Same species as door faces.

B. Metal Louvers:
   1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
      a. Air Louvers Inc.
      b. Anemostat; a Mestek company.
      c. Hiawatha Incorporated.
      d. L & L Louvers, Inc.
      e. LL Building Products, Inc.; a division of GAF Materials Corporation.
      f. Louvers & Dampers, Inc.; a Mestek company.
      g. McGill Architectural Products.
   2. Blade Type: Vision-proof, inverted V.
   3. Metal and Finish: Hot-dip galvanized steel, 0.040 inch thick, with baked-enamel- or powder-coated finish.

C. Louvers for Fire-Rated Doors: Metal louvers with fusible link and closing device, listed and labeled for use in doors with fire-protection rating of 1-1/2 hours and less.
   1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
      a. Air Louvers Inc.
      b. Anemostat; a Mestek company.
      c. Hiawatha Incorporated.
      d. L & L Louvers, Inc.
      e. LL Building Products, Inc.; a division of GAF Materials Corporation.
      f. Louvers & Dampers, Inc.; a Mestek company.
      g. McGill Architectural Products.
   2. Metal and Finish: Hot-dip galvanized steel, 0.040 inch thick, with baked-enamel- or powder-coated finish.

D. Wood Beads for Light Openings in Wood Doors: Provide manufacturer's standard wood beads as follows unless otherwise indicated.
   1. Wood Species: Same species as door faces.
   2. Profile: Flush, square shape.
   3. At wood-core doors with 20-minute fire-protection ratings, provide wood beads and metal glazing clips approved for such use.

E. Metal Frames for Light Openings in Fire-Rated Doors: Manufacturer's standard frame formed of 0.048-inch-thick, cold-rolled steel sheet; with baked-enamel- or powder-coated finish; and approved for use in doors of fire-protection rating indicated.

## 2.05 FABRICATION

A. Factory fit doors to suit frame-opening sizes indicated. Comply with clearance requirements of referenced quality standard for fitting unless otherwise indicated.
   1. Comply with requirements in NFPA 80 for fire-rated doors.

B. Factory machine doors for hardware that is not surface applied. Locate hardware to comply with DHI-WDHS-3. Comply with final hardware schedules, door frame Shop Drawings, DHI A115-W series standards, and hardware templates.
   1. Coordinate with hardware mortises in metal frames to verify dimensions and alignment before factory machining.

C. Openings: Cut and trim openings through doors in factory.
   1. Light Openings: Trim openings with moldings of material and profile indicated.
   2. Louvers: Factory install louvers in prepared openings.

D. Factory Glazing: Provide glazing for all doors. Provide glass as specified in Division 08 Section “Glazing.” Install fire-rated glass as required by the glazing manufacturer.

## 2.06 FACTORY FINISHING

A. General: Comply with referenced quality standard for factory finishing. Complete fabrication, including fitting doors for openings and machining for hardware that is not surface applied, before finishing.
   1. Finish faces, all four edges, edges of cutouts, and mortises. Stains and fillers may be omitted on bottom edges, edges of cutouts, and mortises.

B. Finish doors at factory.

C. Transparent Finish:
   1. Grade: Premium.
   2. Finish: WDMA TR-4 conversion varnish or TR-6 catalyzed polyurethane.
   3. Staining: None required.

4. Effect: Open-grain finish.
5. Sheen: Satin.

PART 3 - EXECUTION

3.01 EXAMINATION

A. Examine doors and installed door frames before hanging doors.
1. Verify that frames comply with indicated requirements for type, size, location, and swing characteristics and have been installed with level heads and plumb jambs.
2. Reject doors with defects.

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

3.02 INSTALLATION

A. Hardware: For installation, see Division 08 Section "Door Hardware."

B. Installation Instructions: Install doors to comply with manufacturer's written instructions and the referenced quality standard, and as indicated.
1. Install fire-rated doors in corresponding fire-rated frames according to NFPA 80.

C. Factory-Fitted Doors: Align in frames for uniform clearance at each edge.

D. Factory-Finished Doors: Restore finish before installation if fitting or machining is required at Project site.

3.03 ADJUSTING

A. Operation: Rehang or replace doors that do not swing or operate freely.

B. Finished Doors: Replace doors that are damaged or that do not comply with requirements. Doors may be repaired or refinished if work complies with requirements and shows no evidence of repair or refinishing.

PART 4 - MEASUREMENT AND PAYMENT:

4.01 METHOD OF MEASUREMENT:

Flush Wood Doors will be measured by the lump sum, complete and accepted. The Flush Wood Doors limits shall be as shown or described in the Contract Documents.

4.02 BASIS OF PAYMENT:

Flush Wood Doors will be paid for at the contract lump sum price. Payment for Flush Wood Doors will be under:

| Pay Item | | Pay Unit |
|---|---|---|
| DIV. 8 | Openings | Lump Sum |

**END OF SECTION**

# SECTION 08 30 00 - COILING OVERHEAD DOORS

All work and materials shall conform to the Contract Documents and the provisions of the State of Maine Department of Transportation Standard Specifications, Revision November 2014, with the following additions:

Add the following:

## PART 1 GENERAL

### 1.1 SECTION INCLUDES

A. Overhead Coiling Service Doors.

### 1.2 RELATED SECTIONS

A. Section 05 10 00 - Structural Metal Framing.

B. Section 06 10 00 - Rough Carpentry.

C. Section 26 05 00 - Common Work Results for Electrical.

### 1.3 REFERENCES

A. ASTM A480/A480M-04; 2004 - Standard Specification for Flat-Rolled Stainless and Heat-Resisting Steel Plate, Sheet, and Strip.

B. ASTM A653/A653M-03; 2003 - Standard Specification for Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process.

C. ASTM B209-04; 2004 - Standard Specification for Aluminum - Alloy Sheet and Plate.

D. ASTM B221-02; 2002 - Standard Specification for Aluminum - Alloy Extruded Bars, Rods, Wires, Shapes and Tubes.

### 1.4 SUBMITTALS

A. Submit under provisions of Section 01 30 00.

B. Shop Drawings: Indicate opening dimensions and required tolerances, jamb connection details, anchorage spacing, hardware locations, installation details, and special conditions.

C. Provide product data information on components, application, hardware and accessories.

D. Closeout Submittals:
1. Operation and maintenance data.

### 1.5 QUALITY ASSURANCE

A. Manufacturer Qualifications: Manufacturer shall provide a coiling door system capable of withstanding positive and negative design loads as required by local building code for 20,000 cycles.

B. Installer Qualifications: Installer shall be authorized and qualified to install overhead door systems on the type and scope of project specified.

### 1.6 PERFORMANCE REQUIREMENTS

A. Design doors to withstand positive and negative wind loads as calculated in accordance with applicable building code.
   1. Design Wind Load: ____35____lb/sf. For exterior doors
   2. Test Wind Load: 1.5 times design wind load.

1.7 DELIVERY, STORAGE, AND HANDLING

A. Store products in manufacturer's unopened packaging until ready for installation.

B. Store and dispose of all materials in accordance with federal, state and local laws.

1.8 PROJECT CONDITIONS

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

1.9 WARRANTY

A. Provide an original of the manufacturer's limited warranty against manufacturing defects and product workmanship.
   1. Rolling Steel Door Warranty: 5 Years.

PART 2 PRODUCTS

2.1 MANUFACTURERS

A. Basis of Design: Overhead Doors, or alternate manufacturer subject to meeting design standards of this section.
   1. C.H.I.
   2. Raynor

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

2.2 MATERIALS

A. Galvanized Steel Sheet:
   1. Galvanized commercial steel, (CS type) per ASTM A653/A653M, G90 and G60 coating class.

B. Aluminum:
   1. Extrusions: ASTM B221, alloy and temper best suited to application.
   2. Sheet: ASTM B209, alloy and temper best suited to application.

2.3 OVERHEAD COILING SERVICE DOORS

A. Basis of Design Unit: “Rolling Steel Service Door Heavy Duty Stormtite 625” by Overhead Door

B. Construction:
   1. Material: Galvanized steel.
      a. Gauge: 18 gauge.
   2. Profile: Flat, insulated, 2 1/2 inches high by 13/16 inch deep, with urethane insulation and 24 gauge steel backer.
   3. Bottom bar: Two galvanized steel angles bolted back-to-back, with adjustable tubular compression weather seal.
   4. Guides: Three steel angles bolted together to form guide and mounting surface.
      a. Include weather seal on both sides of door.
   5. End locks: Galvanized malleable iron, attached to every other slat to act as wearing surface and prevent lateral movement.
   6. Wind locks: Per design and wind load requirements.

7. Head Plate: Rectangular steel plate, with precision sealed ball bearings supporting drive side axle.
8. Barrel Assembly: Steel pipe, sized for maximum deflection, with threaded rings or lugs welded to barrel assembly for curtain attachment.
9. Springs: Counterbalanced torsion springs, grease packed and mounted on steel torsion shafts, designed for minimum 20,000 cycles.
10. Weatherstripping: Rubber hood baffle with exterior vinyl guide seal.
11. Insulation Value: R 7.7.
12. Hood: Prefinished galvanized steel color as selected by Architect from manufacturer's standard colors.

C. Locking Mechanism: Plated steel slide bolt locks with padlock provisions.
1. Extruded aluminum tube type bottom bar with throw handle and cylinder locking.
2. Keyed cylinder both sides.
3. Access from Coil Side.

D. Electric Operator:
1. Type: Externally mounted on drive side of coil.
2. Power Supply: 220 Volts AC.
3. Manually operable in case of power failure.
4. Control Station: 24 Volt three button (Open / Close/Stop) station.

E. Safety Reversing Edge Detection Device:
1. Electric Edge, Two Wire: Detect obstruction and reverse door upon contact with electric strips in vinyl housing.

F. Finish:
1. Galvanized Steel: Powder Coat. Color to be selected from manufacturer's range of +/- 200 colors.

PART 3 EXECUTION

3.1 INSTALLATION

A. Install assembly in accordance with manufacturer's instructions.

B. Anchor to adjacent construction without distortion or stress.

C. Fit and align assembly including hardware, plumb, level and square to ensure smooth operation.

D. Position head and jamb weatherstripping to contact door when closed; secure in position.

E. Make wiring connections between power supply and operator and between operator and controls.

3.2 ADJUSTING

A. Adjust closures to operate smoothly throughout full operating range.

3.3 DEMONSTRATION

A. Demonstrate proper operation to Owner.

PART 4 - MEASUREMENT AND PAYMENT:

4.01 METHOD OF MEASUREMENT:

Coiling Overhead Doors will be measured by the lump sum, complete and accepted. The Coiling Overhead Doors limits shall be as shown or described in the Contract Documents.

4.02 BASIS OF PAYMENT:

Coiling Overhead Doors will be paid for at the contract lump sum price. Payment for Coiling Overhead Doors will be under:

| Pay Item | | Pay Unit |
|---|---|---|
| DIV. 8 | Openings | Lump Sum |

**END OF SECTION**

# SECTION 08 31 13 - ACCESS DOORS AND FRAMES

All work and materials shall conform to the Contract Documents and the provisions of the State of Maine Department of Transportation Standard Specifications, Revision November 2014, with the following additions:

Add the following:

## PART 1 - GENERAL

### 1.01 RELATED DOCUMENTS

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

### 1.02 SUMMARY

A. This Section includes the following:
   1. Access doors and frames for walls and ceilings.

### 1.03 SUBMITTALS

A. Product Data: For each type of access door and frame indicated. Include construction details, fire ratings, materials, individual components and profiles, and finishes.

B. Shop Drawings: Show fabrication and installation details of access doors and frames for each type of substrate. Include plans, elevations, sections, details, and attachments to other work.

C. Access Door and Frame Schedule: Provide complete access door and frame schedule, including types, locations, sizes, latching or locking provisions, and other data pertinent to installation.

### 1.04 QUALITY ASSURANCE

A. Source Limitations: Obtain access doors and frames through one source from a single manufacturer.

B. Fire-Rated Access Doors and Frames: Units complying with NFPA 80 that are identical to access door and frame assemblies tested for fire-test-response characteristics per the following test method and that are listed and labeled by UL or another testing and inspecting agency acceptable to authorities having jurisdiction:
   1. NFPA 252 or UL 10B for vertical access doors and frames.
   2. ASTM E 119 or UL 263 for horizontal access doors and frames.

C. Size Variations: Obtain Architect's acceptance of manufacturer's standard-size units, which may vary slightly from sizes indicated.

### 1.05 COORDINATION

A. Verification: Determine specific locations and sizes for access doors needed to gain access to concealed plumbing, mechanical, or other concealed work, and indicate in the schedule specified in "Submittals" Article.

## PART 2 - PRODUCTS

### 2.01 STEEL MATERIALS

A. Steel Plates, Shapes, and Bars: ASTM A 36/A 36M.
   1. ASTM A 123/A 123M, for galvanizing steel and iron products.
   2. ASTM A 153/A 153M, for galvanizing steel and iron hardware.

B. Steel Sheet: Uncoated cold-rolled steel sheet substrate complying with ASTM A 1008/A 1008M, Commercial Steel (CS), exposed.

C. Steel Finishes: Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for recommendations for applying and designating finishes.
   1. Surface Preparation for Steel Sheet: Clean surfaces to comply with SSPC-SP 1, "Solvent Cleaning," to remove dirt, oil, grease, or other contaminants that could impair paint bond. Remove mill scale and rust, if present, from uncoated steel, complying with SSPC-SP 5/NACE No. 1, "White Metal Blast Cleaning," or SSPC-SP 8, "Pickling."
   2. Factory-Primed Finish: Apply shop primer immediately after cleaning and pretreating.

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

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:
   1. Acudor Products, Inc.
   2. Babcock-Davis; A Cierra Products Co.
   3. J. L. Industries, Inc.
   4. Karp Associates, Inc.
   5. Larsen's Manufacturing Company.
   6. Milcor Inc.

B. Flush Access Doors and Frames with Exposed Trim: Fabricated from steel sheet.
   1. Locations: Wall and ceiling surfaces.
   2. Door: Minimum 0.060-inch- thick sheet metal, set flush with exposed face flange of frame.
   3. Frame: Minimum 0.060-inch- thick sheet metal with 1-inch- wide, surface-mounted trim.
   4. Hinges: Continuous piano.
   5. Latch: Cam latch operated by screwdriver with interior release.

C. Fire-Rated, Insulated, Flush Access Doors and Frames with Exposed Trim: Fabricated from steel [**stainless-steel**] sheet.
   1. Locations: Wall and ceiling surfaces.
   2. Fire-Resistance Rating: Not less than that of adjacent construction.
   3. Temperature Rise Rating: 250 deg F at the end of 30 minutes.
   4. Door: Flush panel with a core of mineral-fiber insulation enclosed in sheet metal with a minimum thickness of 0.036 inch.
   5. Frame: Minimum 0.060-inch- thick sheet metal with 1-inch- wide, surface-mounted trim.
   6. Hinges: Continuous piano.
   7. Automatic Closer: Spring type.
   8. Latch: Self-latching device operated by flush key with interior release.

### 2.03 FABRICATION

A. General: Provide access door and frame assemblies manufactured as integral units ready for installation.

B. Metal Surfaces: For metal surfaces exposed to view in the completed Work, provide materials with smooth, flat surfaces without blemishes. Do not use materials with exposed pitting, seam marks, roller marks, rolled trade names, or roughness.

C. Doors and Frames: Grind exposed welds smooth and flush with adjacent surfaces. Furnish attachment devices and fasteners of type required to secure access panels to types of supports indicated.
   1. Exposed Flanges: Nominal 1 to 1-1/2 inches wide around perimeter of frame.
   2. Provide mounting holes in frames for attachment of units to metal or wood framing.
   3. Provide mounting holes in frame for attachment of masonry anchors. Furnish adjustable metal masonry anchors.

D. Latching Mechanisms: Furnish number required to hold doors in flush, smooth plane when closed.

## PART 3 - EXECUTION

### 3.01 INSTALLATION

A. Comply with manufacturer's written instructions for installing access doors and frames.

B. Set frames accurately in position and attach securely to supports with plane of face panels aligned with adjacent finish surfaces.

C. Install doors flush with adjacent finish surfaces or recessed to receive finish material.

### 3.02 ADJUSTING AND CLEANING

A. Adjust doors and hardware after installation for proper operation.

B. Remove and replace doors and frames that are warped, bowed, or otherwise damaged.

### 3.03 SCHEDULE

A. Ceilings: 24 by 24 inch door, unless noted otherwise.

B. Walls: 12 by 12 inch door, unless noted otherwise.

## PART 4 - MEASUREMENT AND PAYMENT:

### 4.01 METHOD OF MEASUREMENT:

Access Doors and Frames will be measured by the lump sum, complete and accepted. The Access Doors and Frames limits shall be as shown or described in the Contract Documents.

### 4.02 BASIS OF PAYMENT:

Access Doors and Frames will be paid for at the contract lump sum price. Payment for Access Doors and Frames will be under:

| Pay Item | | Pay Unit |
|---|---|---|
| DIV. 8 | Openings | Lump Sum |

**END OF SECTION**

# SECTION 08 41 13 - ALUMINUM-FRAMED ENTRANCES AND STOREFRONTS

All work and materials shall conform to the Contract Documents and the provisions of the State of Maine Department of Transportation Standard Specifications, Revision November 2014, with the following additions:

Add the following:

## PART 1 - GENERAL

### 1.01 RELATED DOCUMENTS

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

### 1.02 SUMMARY

A. Section Includes:
   1. Exterior storefront framing.
   2. Exterior manual-swing entrance doors and door-frame units.

### 1.03 DEFINITIONS

A. ADA/ABA Accessibility Guidelines: U.S. Architectural & Transportation Barriers Compliance Board's "Americans with Disability Act (ADA) and Architectural Barriers Act (ABA) Accessibility Guidelines for Buildings and Facilities."

### 1.04 PERFORMANCE REQUIREMENTS

A. General Performance: Aluminum-framed systems shall withstand the effects of the following performance requirements without exceeding performance criteria or failure due to defective manufacture, fabrication, installation, or other defects in construction:
   1. Movements of supporting structure indicated on Drawings including, but not limited to, story drift and deflection from uniformly distributed and concentrated live loads.
   2. Dimensional tolerances of building frame and other adjacent construction.
   3. Failure includes the following:
      a. Deflection exceeding specified limits.
      b. Thermal stresses transferring to building structure.
      c. Framing members transferring stresses, including those caused by thermal and structural movements to glazing.
      d. Noise or vibration created by wind and by thermal and structural movements.
      e. Loosening or weakening of fasteners, attachments, and other components.
      f. Sealant failure.
      g. Failure of operating units.

B. Delegated Design: Design aluminum-framed systems, including comprehensive engineering analysis by a qualified professional engineer, using performance requirements and design criteria indicated.

C. Structural Loads:
   1. Wind Loads: As indicated on Drawings..
   2. Seismic Performance: Glazed aluminum curtain walls shall withstand the effects of earthquake motions determined according to SEI/ASCE 7.
      a. Component Importance Factor is 1.5.

D. Deflection of Framing Members:

1. Deflection Normal to Wall Plane: Limited to edge of glass in a direction perpendicular to glass plane shall not exceed L/175 of the glass edge length for each individual glazing lite or an amount that restricts edge deflection of individual glazing lites to 3/4 inch, whichever is less.
2. Deflection Parallel to Glazing Plane: Limited to L/360 of clear span or 1/8 inch, whichever is smaller.

E. Structural-Test Performance: Provide aluminum-framed systems tested according to ASTM E 330 as follows:
1. When tested at positive and negative wind-load design pressures, systems do not evidence deflection exceeding specified limits.
2. When tested at 150 percent of positive and negative wind-load design pressures, systems, including anchorage, do not evidence material failures, structural distress, and permanent deformation of main framing members exceeding 0.2 percent of span.
3. Test Durations: As required by design wind velocity, but not fewer than 10 seconds.

F. Air Infiltration: Provide aluminum-framed systems with maximum air leakage through fixed glazing and framing areas of 0.06 cfm/sq. ft. of fixed wall area when tested according to ASTM E 283 at a minimum static-air-pressure difference of 6.24 lbf/sq. ft..

G. Water Penetration under Static Pressure: Provide aluminum-framed systems that do not evidence water penetration through fixed glazing and framing areas when tested according to ASTM E 331 at a minimum static-air-pressure difference of 20 percent of positive wind-load design pressure, but not less than 6.24 lbf/sq. ft..
1. Maximum Water Leakage: No uncontrolled water penetrating aluminum-framed systems or water appearing on systems' normally exposed interior surfaces from sources other than condensation. Water leakage does not include water controlled by flashing and gutters that is drained to exterior and water that cannot damage adjacent materials or finishes.

H. Thermal Movements: Provide aluminum-framed systems that allow for thermal movements resulting from the following maximum change (range) in ambient and surface temperatures. Base engineering calculation on surface temperatures of materials due to both solar heat gain and nighttime-sky heat loss.
1. Temperature Change (Range): 120 deg F, ambient; 180 deg F, material surfaces.
a. High Exterior Ambient-Air Temperature: That which produces an exterior metal-surface temperature of 180 deg F.
b. Low Exterior Ambient-Air Temperature: 0 deg F.
2. Interior Ambient-Air Temperature: 75 deg F.

I. Condensation Resistance: Provide aluminum-framed systems with fixed glazing and framing areas having condensation-resistance factor (CRF) of not less than 53 when tested according to AAMA 1503.

J. Thermal Conductance: Provide aluminum-framed systems with fixed glazing and framing areas having an average U-factor of not more than 0.40 Btu/sq. ft. x h x deg F when tested according to AAMA 1503.

## 1.05 SUBMITTALS

A. Product Data: For each type of product indicated. Include construction details, material descriptions, dimensions of individual components and profiles, and finishes for aluminum-framed systems.

B. Shop Drawings: For aluminum-framed systems. Include plans, elevations, sections, details, and attachments to other work.
1. Include details of provisions for system expansion and contraction and for drainage of moisture in the system to the exterior.
2. For entrance doors, include hardware schedule and indicate operating hardware types, functions, quantities, and locations.

C. Samples for Verification: For each type of exposed finish required, in manufacturer's standard sizes.

D. Other Action Submittals:

1. Entrance Door Hardware Schedule: Prepared by or under the supervision of supplier, detailing fabrication and assembly of entrance door hardware, as well as procedures and diagrams. Coordinate final entrance door hardware schedule with doors, frames, and related work to ensure proper size, thickness, hand, function, and finish of entrance door hardware.

E. Delegated-Design Submittal: For aluminum-framed systems indicated to comply with performance requirements and design criteria, including analysis data signed and sealed by the qualified professional engineer responsible for their preparation.
1. Detail fabrication and assembly of aluminum-framed systems.
2. Include design calculations.

F. Seismic Qualification Certificates: For aluminum-framed systems**,** accessories, and components, from manufacturer.
1. Basis for Certification: Indicate whether withstand certification is based on actual test of assembled components or on calculation.

G. Product Test Reports: Based on evaluation of comprehensive tests performed by a qualified testing agency, for aluminum-framed systems, indicating compliance with performance requirements.

H. Maintenance Data: For aluminum-framed systems to include in maintenance manuals.

I. Warranties: Sample of special warranties.

## 1.06 QUALITY ASSURANCE

A. Installer Qualifications: Manufacturer's authorized representative who is trained and approved for installation of units required for this Project.

B. Engineering Responsibility: Prepare data for aluminum-framed systems, including Shop Drawings, based on testing and engineering analysis of manufacturer's standard units in systems similar to those indicated for this Project.

C. Product Options: Information on Drawings and in Specifications establishes requirements for systems' aesthetic effects and performance characteristics. Aesthetic effects are indicated by dimensions, arrangements, alignment, and profiles of components and assemblies as they relate to sightlines, to one another, and to adjoining construction. Performance characteristics are indicated by criteria subject to verification by one or more methods including preconstruction testing, field testing, and in-service performance.
1. Do not revise intended aesthetic effects, as judged solely by Architect, except with Architect's approval. If revisions are proposed, submit comprehensive explanatory data to Architect for review.

D. Accessible Entrances: Comply with applicable provisions in the U.S. Architectural & Transportation Barriers Compliance Board's ADA-ABA Accessibility Guidelines.

E. Source Limitations for Aluminum-Framed Systems: Obtain from single source from single manufacturer.

F. Regulatory Requirements: Comply with the Americans with Disabilities Act (ADA) and with code provisions as adopted by authorities having jurisdiction.
1. Doors: Provide doors as required by accessibility regulations and requirements of authorities having jurisdiction. These include, but are not limited to, the following:
a. Clear Width: 32 inches (815 mm) with door 90 degrees open.
b. Maneuvering Clearances: Refer to Code for various side and approach clearances.
c. Double-Leaf Doorways: Provide at least one leaf that meets the clear width and maneuvering clearances.
d. Two Doors in Series: Provide a distance of four feet plus the width of any door swinging into the space between hinged or pivoted doors.
2. Notify Architect of details or specifications not conforming to code.

G. Preinstallation Conference: Conduct conference at Project site.
1. Inspect and discuss condition of substrate and other preparatory work performed by other trades.
2. Review structural loading limitations.
3. Review and finalize construction schedule and verify availability of materials, Installer's personnel, equipment, and facilities needed to make progress and avoid delays.
4. Review use of Rivnuts for hardware.
5. Review sill flashing details and components.

1.07 PROJECT CONDITIONS

A. Field Measurements: Verify actual locations of structural supports for aluminum-framed systems by field measurements before fabrication and indicate measurements on Shop Drawings.

1.08 WARRANTY

A. Special Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace components of aluminum-framed systems that do not comply with requirements or that fail in materials or workmanship within specified warranty period.
1. Failures include, but are not limited to, the following:
a. Structural failures including, but not limited to, excessive deflection.
b. Noise or vibration caused by thermal movements.
c. Deterioration of metals, metal finishes, and other materials beyond normal weathering.
d. Water leakage through fixed glazing and framing areas.
e. Failure of operating components.
2. Warranty Period: Two years from date of Substantial Completion.

B. Special Finish Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace components on which finishes do not comply with requirements or that fail in materials or workmanship within specified warranty period. Warranty does not include normal weathering.
1. Warranty Period: 10 years from date of Substantial Completion.

PART 2 - PRODUCTS

2.01 MANUFACTURERS

A. Manufacturers: Subject to compliance with requirements, provide indicated products by one of the following:
1. EFCO Corporation.
2. Kawneer North America; an Alcoa company.
3. United States Aluminum.
4. Vistawall Architectural Products; The Vistawall Group; a Bluescope Steel company.
5. YKK AP America Inc.

B. Products:
1. Exterior Aluminum-Framed Storefronts Standard of Design:
a. Kawneer: FA-SET S.S.G (Thermal).
2. Doors and Entrances:
a. Kawneer: 350 Heavy Wall.

2.02 MATERIALS

A. Recycled Content of Aluminum Products: Provide products with average recycled content of aluminum products so postconsumer recycled content plus one-half of preconsumer recycled content is not less than 25 percent.

B. Aluminum: Alloy and temper recommended by manufacturer for type of use and finish indicated.

1. Sheet and Plate: ASTM B 209.
2. Extruded Bars, Rods, Profiles, and Tubes: ASTM B 221.
3. Extruded Structural Pipe and Tubes: ASTM B 429.
4. Structural Profiles: ASTM B 308/B 308M.
5. Welding Rods and Bare Electrodes: AWS A5.10/A5.10M.

C. Steel Reinforcement: Manufacturer's standard zinc-rich, corrosion-resistant primer, complying with SSPC-PS Guide No. 12.00; applied immediately after surface preparation and pretreatment. Select surface preparation methods according to recommendations in SSPC-SP COM and prepare surfaces according to applicable SSPC standard.
1. Structural Shapes, Plates, and Bars: ASTM A 36/A 36M.
2. Cold-Rolled Sheet and Strip: ASTM A 1008/A 1008M.
3. Hot-Rolled Sheet and Strip: ASTM A 1011/A 1011M.

## 2.03 FRAMING SYSTEMS

A. Framing Members: Manufacturer's standard extruded-aluminum framing members of thickness required and reinforced as required to support imposed loads.
1. Construction: Thermally broken.
2. Glazing System: Retained mechanically with gaskets on four sides.
3. Glazing Plane: Front.
4. Exterior Jambs and Head Framing: Provide manufacturer’s standard extruded aluminum continuous flat filler for use at jambs and head framing. This extrusion provides the necessary profile for sealing with the building air barrier system. Channel type jamb components will not be acceptable.

B. Brackets and Reinforcements: Manufacturer's standard high-strength aluminum with nonstaining, nonferrous shims for aligning system components.

C. Fasteners and Accessories: Manufacturer's standard corrosion-resistant, nonstaining, nonbleeding fasteners and accessories compatible with adjacent materials.
1. Use self-locking devices where fasteners are subject to loosening or turning out from thermal and structural movements, wind loads, or vibration.
2. Reinforce members as required to receive fastener threads.
3. Use exposed fasteners with countersunk Phillips screw heads, finished to match framing system, fabricated from stainless steel.

D. Concrete and Masonry Inserts: Hot-dip galvanized cast-iron, malleable-iron, or steel inserts, complying with ASTM A 123/A 123M or ASTM A 153/A 153M.

E. Concealed Flashing: Manufacturer's standard corrosion-resistant, nonstaining, nonbleeding flashing compatible with adjacent materials.

F. Framing System Gaskets and Sealants: Manufacturer's standard, recommended by manufacturer for joint type.
1. Provide sealants for use inside of the weatherproofing system that have a VOC content of 250 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).

G. Subsills for Exterior Storefronts: Manufacturer’s standard thermally broken extruded aluminum sill flashing, color to match framing.

## 2.04 GLAZING SYSTEMS

A. Glazing: As specified in Division 08 Section "Glazing."

B. Glazing Gaskets: Manufacturer's standard compression types; replaceable, molded or extruded, of profile and hardness required to maintain watertight seal.

C. Spacers and Setting Blocks: Manufacturer's standard elastomeric type.

## 2.05 ENTRANCE DOOR SYSTEMS

A. Heavy-Duty Entrance Doors: Manufacturer's standard glazed entrance doors for manual-swing operation.
   1. Door Construction: 1-7/8 to 2-inch overall thickness, with minimum 0.188-inch- thick, extruded-aluminum tubular rail and stile members. Mechanically fasten corners with reinforcing brackets that are deeply penetrated and fillet welded or that incorporate concealed tie rods.
   2. Door Design: Medium stile; 3-1/2-inch nominal width.
      a. Accessible Doors: Smooth surfaced for width of door in area within 10 inches above floor or ground plane.
   3. Glazing Stops and Gaskets: Square, snap-on, extruded-aluminum stops and preformed gaskets.

B. Entrance Door Hardware: As specified in Division 08 Section "Door Hardware."

## 2.06 ENTRANCE DOOR HARDWARE

A. General: Provide entrance door hardware and entrance door hardware sets indicated in "Entrance Door Hardware Sets" Article for each entrance door to comply with requirements in this Section.
   1. Entrance Door Hardware Sets: Provide quantity, item, size, finish or color indicated, and named manufacturers' products or products equivalent in function and comparable in quality to named products.
   2. Sequence of Operation: Provide electrified door hardware function, sequence of operation, and interface with other building control systems indicated.
   3. Opening-Force Requirements:
      a. Egress Doors: Not more than 15 lbf to release the latch and not more than 30 lbfto set the door in motion and not more than 15 lbf to open the door to its minimum required width.
      b. Accessible Interior Doors: Not more than 5 lbf to fully open door.

B. Butt Hinges: BHMA A156.1, Grade 1, radius corner.
   1. Nonremovable Pins: Provide set screw in hinge barrel that, when tightened into a groove in hinge pin, prevents removal of pin while entrance door is closed.
   2. Exterior Hinges: Stainless steel, with stainless-steel pin.
   3. Quantities:
      a. For doors up to 87 inches high, provide 3 hinges per leaf.
      b. For doors more than 87 and up to 120 inches high, provide 4 hinges per leaf.

C. Strikes: Provide strike with black-plastic dust box for each latch or lock bolt; fabricated for aluminum framing.

D. Weather Stripping: Manufacturer's standard replaceable components.
   1. Compression Type: Made of ASTM D 2000, molded neoprene, or ASTM D 2287, molded PVC.

E. Thresholds: BHMA A156.21, raised thresholds beveled with a slope of not more than 1:2, with maximum height of 1/2 inch.

F. Additional Hardware: As specified in Division 8 Section "Door Hardware."

## 2.07 ACCESSORY MATERIALS

A. Joint Sealants: For installation at perimeter of aluminum-framed systems, as specified in Division 07 Section "Joint Sealants."
   1. Provide interior sealants for use inside of the weatherproofing system that have a VOC content of 250 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).

B. Bituminous Paint: Cold-applied, asphalt-mastic paint complying with SSPC-Paint 12 requirements except containing no asbestos; formulated for 30-mil thickness per coat.

## 2.08 FABRICATION

A. Form or extrude aluminum shapes before finishing.

B. Weld in concealed locations to greatest extent possible to minimize distortion or discoloration of finish. Remove weld spatter and welding oxides from exposed surfaces by descaling or grinding.

C. Framing Members, General: Fabricate components that, when assembled, have the following characteristics:
1. Profiles that are sharp, straight, and free of defects or deformations.
2. Accurately fitted joints with ends coped or mitered.
3. Means to drain water passing joints, condensation within framing members, and moisture migrating within the system to exterior.
4. Physical and thermal isolation of glazing from framing members.
5. Accommodations for thermal and mechanical movements of glazing and framing to maintain required glazing edge clearances.
6. Provisions for field replacement of glazing from exterior.
7. Fasteners, anchors, and connection devices that are concealed from view to greatest extent possible.

D. Mechanically Glazed Framing Members: Fabricate for flush glazing without projecting stops.

E. Storefront Framing: Fabricate framing in profiles indicated for flush glazing (without projecting stops). Provide subframes and reinforcing of types indicated or, if not indicated, as required for a complete system. Factory assemble components to greatest extent possible. Disassemble components only as necessary for shipment and installation.

F. Entrance Door Frames: Reinforce as required to support loads imposed by door operation and for installing entrance door hardware.
1. At exterior doors, provide compression weather stripping at fixed stops.
2. At interior doors, provide silencers at stops to prevent metal-to-metal contact. Install three silencers on strike jamb of single-door frames and two silencers on head of frames for pairs of doors.

G. Entrance Doors: Reinforce doors as required for installing entrance door hardware.
1. At pairs of exterior doors, provide sliding-type weather stripping retained in adjustable strip and mortised into door edge.
2. At exterior doors, provide weather sweeps applied to door bottoms.

H. Entrance Door Hardware Installation: Factory install entrance door hardware to the greatest extent possible. Cut, drill, and tap for factory-installed entrance door hardware before applying finishes.

I. After fabrication, clearly mark components to identify their locations in Project according to Shop Drawings.

## 2.09 ALUMINUM FINISHES

A. Clear Anodic Finish: AAMA 611, AA-M12C22A31, Class II, 10 microns or thicker.

## 2.10 HARDWARE FINISHES

A. Standard: BHMA A156.18, as indicated in door hardware sets.

B. Protect mechanical finishes on exposed surfaces from damage by applying a strippable, temporary protective covering before shipping.

C. Appearance of Finished Work: Variations in appearance of abutting or adjacent pieces are acceptable if they are within one-half of the range of approved Samples. Noticeable variations in the same piece are not acceptable. Variations in appearance of other components are acceptable if they are within the range of approved Samples and are assembled or installed to minimize contrast.

D. Provide the following finishes:

| | | |
|---|---|---|
| 1. | Butts and Hinges: | 26D |
| 2. | Weatherstripping | Aluminum |
| 3. | Threshold | Aluminum |

## PART 3 - EXECUTION

### 3.01 EXAMINATION

A. Examine areas and conditions, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of the Work.

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

### 3.02 INSTALLATION

A. General:
1. Comply with manufacturer's written instructions.
2. Do not install damaged components.
3. Fit joints to produce hairline joints free of burrs and distortion.
4. Rigidly secure nonmovement joints.
5. Install anchors with separators and isolators to prevent metal corrosion and electrolytic deterioration.
6. Seal joints watertight unless otherwise indicated.

B. Metal Protection:
1. Where aluminum will contact dissimilar metals, protect against galvanic action by painting contact surfaces with primer or applying sealant or tape, or by installing nonconductive spacers as recommended by manufacturer for this purpose.
2. Where aluminum will contact concrete or masonry, protect against corrosion by painting contact surfaces with bituminous paint.

C. Install components to drain water passing joints, condensation occurring within framing members, and moisture migrating within the system to exterior.

D. Set continuous sill members and flashing in full sealant bed as specified in Division 07 Section "Joint Sealants" to produce weathertight installation.

E. Install components plumb and true in alignment with established lines and grades, and without warp or rack.

F. Install glazing as specified in Division 08 Section "Glazing."

G. Entrance Doors: Install doors to produce smooth operation and tight fit at contact points.
1. Exterior Doors: Install to produce weathertight enclosure and tight fit at weather stripping.
2. Field-Installed Entrance Door Hardware: Install surface-mounted entrance door hardware according to entrance door hardware manufacturers' written instructions using concealed fasteners to greatest extent possible.

H. Install perimeter joint sealants as specified in Division 07 Section "Joint Sealants" to produce weathertight installation.

### 3.03 ERECTION TOLERANCES

A. Install aluminum-framed systems to comply with the following maximum erection tolerances:
1. Location and Plane: Limit variation from true location and plane to 1/8 inch in 12 feet; 1/4 inch over total length.
2. Alignment:

a. Where surfaces abut in line, limit offset from true alignment to 1/16 inch.
b. Where surfaces meet at corners, limit offset from true alignment to 1/32 inch.

B. Diagonal Measurements: Limit difference between diagonal measurements to 1/8 inch.

3.04 ADJUSTING

A. Adjust operating entrance door hardware to function smoothly as recommended by manufacturer.
1. For entrance doors accessible to people with disabilities, adjust closers to provide a 3-second closer sweep period for doors to move from a 70-degree open position to 3 inches from the latch, measured to the leading door edge.

PART 4 - MEASUREMENT AND PAYMENT:

4.01 METHOD OF MEASUREMENT:

Aluminum-Framed Entrances and Storefronts will be measured by the lump sum, complete and accepted. The Aluminum-Framed Entrances and Storefronts limits shall be as shown or described in the Contract Documents.

4.02 BASIS OF PAYMENT:

Aluminum-Framed Entrances and Storefronts will be paid for at the contract lump sum price. Payment for Aluminum-Framed Entrances and Storefronts will be under:

| Pay Item | | Pay Unit |
|---|---|---|
| DIV. 8 | Openings | Lump Sum |

**END OF SECTION**

# SECTION 08 51 13 - ALUMINUM WINDOWS

All work and materials shall conform to the Contract Documents and the provisions of the State of Maine Department of Transportation Standard Specifications, Revision November 2014, with the following additions:

Add the following:

PART 1 - GENERAL

1.01 GENERAL CONDITIONS: The General Conditions and Supplementary General Conditions shall apply to each and every contract and contractor, person or persons supplying material, labor or entering into the work, directly or indirectly.

1.02 SCOPE: This Section includes all labor, materials, equipment and related services necessary for the fabrication and delivery to the job site of the items shown on the drawings and/or specified herein, including but not limited to the following:

A. Aluminum windows.
   1. Include factory glazing of window units.
   2. Screens at operable units.

1.03 RELATED WORK SPECIFIED ELSEWHERE

A. Glass and Glazing 08 80 00

1.04 LABORATORY TESTING AND PERFORMANCE REQUIREMENTS

A. Test Units
   1. Air, water, and structural test unit shall conform to requirements set forth in AAMA/NWWDA 101/I.S.2 – 97 and manufacturer's standard locking/operating hardware and insulated glazing configuration.
   2. Thermal test unit sizes shall be 48" (1219 mm) x 72" (1828 mm). Unit shall consist of a fixed over project-out window.

B. Test Procedures and Performances
   1. The air, water, and structural tests shall conform to AAMA/NWWDA 101/I.S.2 - 97 requirements for the window type referenced in 1.01.B. In addition, the following specific performance requirements shall be met.
   2. Air Infiltration Test
      a. With ventilators closed and locked, test unit in accordance with ASTM E 283 at a static air pressure difference of 6.24 psf (299 Pa).
      b. Air infiltration shall not exceed .10 cfm/SF (.50 l/s•$m^2$) of unit.
   3. Water Resistance Test
      a. With ventilators closed and locked, test unit in accordance with ASTM E 331/ASTM E 547 at a static air pressure difference of 10.0 psf (479 Pa).
      b. There shall be no uncontrolled water leakage.
   4. Uniform Load Structural Test
      a. With ventilators closed and locked, test unit in accordance with ASTM E 330 at a static air pressure difference of 97.5 psf (4668 Pa), both positive and negative.
      b. At conclusion of test there shall be no glass breakage, permanent damage to fasteners, hardware parts, support arms or actuating mechanisms, nor any other damage that would cause the window to be inoperable.
   5. Forced Entry Resistance
      a. Windows shall be tested in accordance to ASTM F 588 or AAMA 1302.5 and meet the requirements of performance level 10.
   6. Condensation Resistance Test (CRF)
      a. With ventilators closed and locked, test unit in accordance with AAMA 1503.1.
      b. Condensation Resistance Factor (CRF) shall not be less than 46 (frame) and 42 (glass) when glazed

with 1" (25 mm) insulated – 1/4" (6 mm) clear, 1/2" (12 mm) air, 1/4" (6 mm) clear glass.

7. Thermal Transmittance Test (Conductive U-Value)
   a. With ventilators closed and locked, test unit in accordance with AAMA 1503.1.
   b. Conductive thermal transmittance (U-Value) shall not be more than 0.59 BTU/hr•ft$^2$•°F (3.35 W/m$^2$•k) when glazed with 1" (25 mm) insulated – 1/4" (6 mm) clear, 1/2" (12 mm) air, 1/4" (6 mm) clear glass.

C. Project Wind Loads
   1. The system shall be designed to withstand the following loads normal to the plane of the wall:
      a. Positive pressure of +24 psf at non-corner zones.
      b. Negative pressure of -26 psf at non-corner zones.
      c. Negative pressure of +31 psf at corner zones.

1.05 QUALITY ASSSURANCE

A. Provide test reports from AAMA accredited laboratories certifying the performance as specified in 1.4.

B. Test reports shall be accompanied by the window manufacturer's letter of certification, stating the tested window meets or exceeds the air, water, and structural testing criteria for the appropriate AAMA/NWWDA 101/I.S.2 – 97 window type.

1.06 SUBMITTALS

A. Contractor shall submit shop drawings; finish samples, test reports, and warranties.
   1. Samples of materials as may be requested without cost to owner, i.e., metal, glass, fasteners, anchors, frame sections, mullion section, corner section, etc.

1.07 WARRANTIES

A. Total Window System
   1. The responsible contractor shall assume full responsibility and warrant for one year the satisfactory performance of the total window installation which includes that of the windows, hardware, glass (including insulated units), glazing, anchorage and setting system, sealing, flashing, etc., as it relates to air, water, and structural adequacy as called for in the specifications and approved shop drawings.
   2. Any deficiencies due to such elements not meeting the specifications shall be corrected by the responsible contractor at his expense during the warranty period.

PART 2 - PRODUCTS

2.01 WINDOWS:

A. Basis of design is Kawneer 8225 TL projected window w/ 2 ¼" frame depth. Provide or units from one of the following manufacturers:
   1. Kawneer
   2. Efco
   3. Peerless

2.02 MATERIALS

A. Aluminum
   1. Extruded aluminum shall be 6063-T6 alloy and tempered.

B. Hardware
   1. Locking handles shall be cam type and manufactured from a white bronze alloy with a US25D brushed finish.
   2. Operating hardware shall be 4-bar stainless steel arms or equal.

C. Weather-Strip

1. All weather-strip shall be Santoprene® or equal.

D. Thermal Barrier
1. All exterior aluminum shall be separated from interior aluminum by a rigid, structural thermal barrier. For purposes of this specification, a structural thermal barrier is defined as a system that shall transfer shear during bending and, therefore, promote composite action between the exterior and interior extrusions.
2. No thermal short circuits shall occur between the exterior and interior.
3. Barrier material shall be poured-in-place, two-part polyurethane. A nonstructural thermal barrier is unacceptable.

E. Glass
1. Insulated glass shall be 1" (25 mm) as manufactured by EFCO consisting of ¼" exterior, ½" air spacer, and ¼" interior.

## 2.03 FABRICATION

A. General
1. All aluminum frame and vent extrusions shall have a minimum wall thickness of .125" (3 mm).
2. Mechanical fasteners, welded components, and hardware items shall not bridge thermal barriers. Thermal barriers shall align at all frame and vent corners.
3. Depth of frame shall not be less than 2 7/16" (61 mm).

B. Frame
1. Frame components shall be mortise and tenon. Other means of mechanically fastening, i.e., screws shall not be permitted.
2. Appearance of frame shall replicate a putty-glazed steel frame.

C. Ventilator
1. All vent extrusions shall be tubular.
2. Each corner shall be mitered, reinforced with an extruded corner key, hydraulically crimped, and "cold welded" with epoxy adhesive.
3. Each vent shall have one exterior row of weather stripping installed in specifically designed dovetail grooves in the extrusion and one interior row of drive-in glazing gasket that also forms the interior seals. The exterior gasket will be omitted at the vent bottom rail for project-out vents allowing pressure air to pressure equalize the void between the vent and frame.
4. Appearance of vent frame shall replicate putty-glazed steel vents.

D. Screens
1. Screen frames shall be extruded.
2. Screen mounting holes in the window frame shall be factory drilled.
3. Screen mesh shall be aluminum or fiberglass.

E. Glazing
1. Vents
a. Units shall be inside glazed with a snap-in aluminum glazing bead and Santoprene drive-in wedge against the interior of the glass. The exterior face of the glass shall be set against preshimmed butyl tape.
2. Fixed Lites
a. The exterior face of the glass shall be set against preshimmed butyl tape. The interior face of the glass shall be set against a dense neoprene drive-in wedge.

F. Aluminum Finishes

1. Clear Anodic Finish: AAMA 611, AA-M12X22A31, Class II, 10 microns or thicker.

# PART 3 - EXECUTION

## 3.01 INSPECTION

A. Job Conditions
   1. Verify that openings are dimensionally within allowable tolerances, plumb, level, clean, provide a solid anchoring surface, and are in accordance with approved shop drawings.

3.02 INSTALLATION

A. Use only skilled tradesmen with work done in accordance with approved shop drawings and specifications.

B. Plumb and align window faces in a single plane for each wall plane, and erect windows and materials square and true. Adequately anchor to maintain positions permanently when subjected to normal thermal movement, specified building movement, and specified wind loads.

C. Adjust windows for proper operation after installation.

D. Furnish and apply sealants to provide a weather tight installation at all joints and intersections and at opening perimeters. Wipe off excess material and leave all exposed surfaces and joints clean and smooth.

3.03 ANCHORAGE

A. Adequately anchor to maintain positions permanently when subjected to normal thermal movement, specified building movement, and specified wind loads.

3.04 PROTECTION AND CLEANING

A. After completion of window installation, windows shall be inspected, adjusted, put into working order and left clean, free of labels, dirt, etc. Protection from this point shall be the responsibility of the general contractor.

PART 4 - MEASUREMENT AND PAYMENT:

4.01 METHOD OF MEASUREMENT:

A. Aluminum Windows will be measured by the lump sum, complete and accepted. The Aluminum Windows limits shall be as shown or described in the Contract Documents.

4.02 BASIS OF PAYMENT:

A. Aluminum Windows will be paid for at the contract lump sum price. Payment for Aluminum Windows will be under:

| Pay Item | | Pay Unit |
|---|---|---|
| DIV. 8 | Openings | Lump Sum |

**END OF SECTION**

# SECTION 08 71 00 - DOOR HARDWARE

All work and materials shall conform to the Contract Documents and the provisions of the State of Maine Department of Transportation Standard Specifications, Revision November 2014, with the following additions:

Add the following:

## PART 1 - GENERAL

### 1.01 RELATED DOCUMENTS

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

### 1.02 SUMMARY

A. This Section includes the following:
   1. Commercial door hardware for the following:
      a. Swinging doors.

B. Related Sections include the following:
   1. Division 08 Section "Hollow Metal Frames" for door silencers provided as part of hollow-metal frames.
   2. Division 08 Section "Flush Wood Doors" for integral intumescent seals provided as part of fire-rated labeled assemblies.
   3. Division 28 Section “Door Entry Access Control System” for electric strikes provided as part of the building security system.

### 1.03 SUBMITTALS

A. General: Submittals for Sections 081113, 081416 and 087100 shall be made concurrently.

B. Product Data: Include construction and installation details, material descriptions, dimensions of individual components and profiles, and finishes.

C. Samples for Verification: Submit minimum 2-by-4-inch plate Samples of each type of finish required, except primed finish.

D. Product Certificates: For electrified door hardware, signed by product manufacturer.
   1. Certify that door hardware approved for use on types and sizes of labeled fire doors complies with listed fire door assemblies.

E. Product Test Reports: Based on evaluation of comprehensive tests performed by manufacturer and witnessed by a qualified testing agency, for locks, latches and closers.

F. Maintenance Data: For each type of door hardware to include in maintenance manuals. Include final hardware and keying schedule.

G. Warranty: Special warranty specified in this Section.

H. Other Action Submittals:
   1. Door Hardware Sets: Prepared by or under the supervision of Architectural Hardware Consultant, detailing fabrication and assembly of door hardware, as well as procedures and diagrams. Coordinate the

final door hardware sets with doors, frames, and related work to ensure proper size, thickness, hand, function, and finish of door hardware.

a. Format: Comply with scheduling sequence and vertical format in DHI's "Sequence and Format for the Hardware Schedule." Double space entries, and number and date each page.
b. Format: Use same scheduling sequence and format and use same door numbers as in the Contract Documents.
c. Content: Include the following information:
    1) Identification number, location, hand, fire rating, and material of each door and frame.
    2) Type, style, function, size, quantity, and finish of each door hardware item. Include description and function of each lockset and exit device.
    3) Complete designations of every item required for each door or opening including name and manufacturer.
    4) Fastenings and other pertinent information.
    5) Location of each door hardware set, cross-referenced to Drawings, both on floor plans and in door and frame schedule.
    6) Explanation of abbreviations, symbols, and codes contained in schedule.
    7) Mounting locations for door hardware.
    8) Door and frame sizes and materials.
    9) Description of each electrified door hardware function, including location, sequence of operation, and interface with other building control systems.
        a) Sequence of Operation: Include description of component functions that occur in the following situations: authorized person wants to enter; authorized person wants to exit; unauthorized person wants to enter; unauthorized person wants to exit.
    10) List of related door devices specified in other Sections for each door and frame.
d. Submittal Sequence: Submit initial draft of final schedule along with essential Product Data to facilitate the fabrication of other work that is critical in Project construction schedule. Submit the final door hardware sets after Samples, Product Data, coordination with Shop Drawings of other work, delivery schedules, and similar information has been completed and accepted.

2. Keying Schedule: Prepared by or under the supervision of Architectural Hardware Consultant, detailing Owner's final keying instructions for locks. Include schematic keying diagram and index each key set to unique door designations.

## 1.04 QUALITY ASSURANCE

A. Installer Qualifications: An experienced installer who has completed door hardware 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. Architectural Hardware Consultant Qualifications: A person who is currently certified by DHI as an Architectural Hardware Consultant and who is experienced in providing consulting services for door hardware installations that are comparable in material, design, and extent to that indicated for this Project.
    1. Electrified Door Hardware Consultant Qualifications: A qualified Architectural Hardware Consultant who is experienced in providing consulting services for electrified door hardware installations.

C. Source Limitations: Obtain each type and variety of door hardware from a single manufacturer, unless otherwise indicated.
    1. Provide electrified door hardware from same manufacturer as mechanical door hardware, unless otherwise indicated. Manufacturers that perform electrical modifications and that are listed by a testing and inspecting agency acceptable to authorities having jurisdiction are acceptable.

D. Regulatory Requirements: Comply with the Americans with Disabilities Act (ADA) and with code provisions as adopted by authorities having jurisdiction.
    1. Door Hardware: Provide hardware as required by accessibility regulations and requirements of authorities having jurisdiction. These include, but are not limited to, the following:
        a. Handles, Pulls, Latches, Locks, and other Operating Devices: Shape that is easy to grasp with one hand and does not require tight grasping, tight pinching, or twisting of the wrist.

b. Door Closers: Comply with the following maximum opening-force requirements indicated:
   1) Interior Hinged Doors: 5 lbf applied perpendicular to door.
   2) Sliding or Folding Doors: 5 lbf applied parallel to door at latch.
   3) Fire Doors: Minimum opening force allowable by authorities having jurisdiction.

c. Thresholds: Not more than 1/2 inch high. Bevel raised thresholds with a slope of not more than 1:2.

2. NFPA 101: Comply with the following for means of egress doors:

   a. Latches, Locks, and Exit Devices: Not more than 15 lbf to release the latch. Locks shall not require the use of a key, tool, or special knowledge for operation.
   b. Delayed-Egress Locks: Lock releases within 15 seconds after applying a force not more than 15 lbf for not more than 3 seconds.
   c. Door Closers: Not more than 30 lbf to set door in motion and not more than 15 lbf to open door to minimum required width.
   d. Thresholds: Not more than 1/2 inch high.

3. Electrified Door Hardware: Listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction.

E. Fire-Rated Door Assemblies: Where fire-rated door assemblies are indicated, provide door hardware rated for use in assemblies complying with NFPA 80 that are listed and labeled by a qualified testing agency, for fire-protection ratings indicated, based on testing at positive pressure according to NFPA 252 or UL 10C, unless otherwise indicated.

F. Smoke- and Draft-Control Door Assemblies: Where smoke- and draft-control door assemblies are required, provide door hardware that meet requirements of assemblies tested according to UL 1784 and installed in compliance with NFPA 105.
   1. Air Leakage Rate: Maximum air leakage of 0.3 cfm/sq. ft. at the tested pressure differential of 0.3-inch wg of water.

G. Electrified Door Hardware: Listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.

H. Keying Conference: Conduct conference at Project site to comply with requirements in Division 01 Section "Project Management and Coordination." In addition to Owner, Construction Manager, Contractor, and Architect, conference participants shall also include Installer's Architectural Hardware Consultant. Incorporate keying conference decisions into final keying schedule after reviewing door hardware keying system including, but not limited to, the following:
   1. Function of building, flow of traffic, purpose of each area, degree of security required, and plans for future expansion.
   2. Preliminary key system schematic diagram.
   3. Requirements for key control system.
   4. Address for delivery of keys.

I. Pre-installation Conference: Conduct conference at Project site to comply with requirements in Division 01 Section "Project Management and Coordination." Review methods and procedures related to electrified door hardware including, but not limited to, the following:
   1. Inspect and discuss electrical roughing-in and other preparatory work performed by other trades.
   2. Review sequence of operation for each type of electrified door hardware.
   3. Review and finalize construction schedule and verify availability of materials, Installer's personnel, equipment, and facilities needed to make progress and avoid delays.
   4. Review required testing, inspecting, and certifying procedures.

1.05 DELIVERY, STORAGE, AND HANDLING

A. Inventory door hardware on receipt and provide secure lock-up for door hardware delivered to Project site.

B. Tag each item or package separately with identification related to the final door hardware sets, and include basic installation instructions, templates, and necessary fasteners with each item or package.

C. Deliver keys to manufacturer of key control system for subsequent delivery to Owner.

1.06 COORDINATION

A. Templates: Distribute door hardware templates for doors, frames, and other work specified to be factory prepared for installing door hardware. Check Shop Drawings of other work to confirm that adequate provisions are made for locating and installing door hardware to comply with indicated requirements.

B. Electrical System Roughing-in: Coordinate layout and installation of electrified door hardware with connections to access control system.

C. Existing Openings: Where new hardware components are scheduled for application to existing construction or where modifications to existing door hardware are required, field verify existing conditions and coordinate installation of door hardware to suit opening conditions and to provide for proper operation.

1.07 WARRANTY

A. Special Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace components of door hardware that fail in materials or workmanship within specified warranty period.
   1. Failures include, but are not limited to, the following:
      a. Structural failures including excessive deflection, cracking, or breakage.
      b. Faulty operation of operators and door hardware.
      c. Deterioration of metals, metal finishes, and other materials beyond normal weathering and use.
   2. Warranty Period: One year from date of Substantial Completion, except as follows:
      a. Exit Devices: Two years from date of Substantial Completion.
      b. Manual Closers: 10 years from date of Substantial Completion.

1.08 MAINTENANCE SERVICE

A. Maintenance Tools and Instructions: Furnish a complete set of specialized tools and maintenance instructions as needed for Owner's continued adjustment, maintenance, and removal and replacement of door hardware.

PART 2 - PRODUCTS

2.01 SCHEDULED DOOR HARDWARE

A. General: Provide door hardware for each door to comply with requirements in this Section and door hardware sets indicated in Part 3 "Door Hardware Sets" Article.
   1. Door Hardware Sets: Provide quantity, item, size, finish or color indicated, and named manufacturers' products.
   2. Sequence of Operation: Provide electrified door hardware function, sequence of operation, and interface with other building control systems indicated.

B. Designations: Requirements for design, grade, function, finish, size, and other distinctive qualities of each type of door hardware are indicated in Part 3 "Door Hardware Sets" Article. Products are identified by using door hardware designations, as follows:

1. Named Manufacturers' Products: Manufacturer and product designation are listed for each door hardware type required for the purpose of establishing minimum requirements.

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

## 2.02 HINGES, GENERAL

A. Quantity: Provide the following, unless otherwise indicated:
1. Two Hinges: For doors with heights up to 60 inches.
2. Three Hinges: For doors with heights 61 to 90 inches.
3. Four Hinges: For doors with heights 91 to 120 inches.
4. For doors with heights more than 120 inches, provide 4 hinges, plus 1 hinge for every 30 inches of door height greater than 120 inches.

B. Template Requirements: Except for hinges and pivots to be installed entirely (both leaves) into wood doors and frames, provide only template-produced units.

C. Hinge Weight: Unless otherwise indicated, provide the following:
1. Entrance Doors: Heavy-weight hinges.
2. Doors with Closers: Antifriction-bearing hinges.
3. Interior Doors: Antifriction-bearing hinges and standard-weight hinges as indicated.

D. Hinge Base Metal: Unless otherwise indicated, provide the following:
1. Exterior Hinges: Stainless steel, with stainless-steel pin.
2. Interior Hinges: Steel, with steel pin.
3. Hinges for Fire-Rated Assemblies: Steel, with steel pin.

E. Hinge Options: Where indicated in door hardware sets or on Drawings:
1. Nonremovable Pins: Provide set screw in hinge barrel that, when tightened into a groove in hinge pin, prevents removal of pin while door is closed; for outswinging exterior doors and outswinging corridor doors with locks.
2. Corners: Square.

F. Electrified Functions for Hinges: Comply with the following:
1. Power Transfer: Concealed PTFE-jacketed wires, secured at each leaf and continuous through hinge knuckle.
2. Available Products:
a. Hagar: ETW 4-1/2 x 4-1/2.
b. McKinney: TA2714-CC4.
c. Stanley: CEFBB-179.

G. Fasteners: Comply with the following:
1. Machine Screws: For metal doors and frames. Install into drilled and tapped holes.
2. Wood Screws: For wood doors and frames.
3. Threaded-to-the-Head Wood Screws: For fire-rated wood doors.
4. Screws: Phillips flat-head; machine screws (drilled and tapped holes) for metal doors and wood screws for wood doors and frames. Finish screw heads to match surface of hinges.

## 2.03 HINGES

A. Butts and Hinges: BHMA A156.1.

B. Template Hinge Dimensions: BHMA A156.7.

C. Available Manufacturers:
1. Hager Companies (HAG).
2. McKinney Products Company; an ASSA ABLOY Group company (MCK).
3. Stanley Commercial Hardware; Div. of The Stanley Works (STH).

D. The following is a guide for hinge size and type required for this project.

| | Manufacturer | Interior: | Exterior |
|---|---|---|---|
| 1-3/8” Doors up to 3’-0” wide | Stanley | F179-3 1/2" | |
| | Hager | 1279-3 1/2" | |
| | McKinney | T2714-3 1/2" | |
| 1-3/4” Doors up to 3’-0” wide | Stanley | FBB179-4 1/2" | FBB191-4 1/2” |
| | Hager | BB1279-4 1/2" | BB1191-4 1/2" |
| | McKinney | TA-TB2714-4 1/2" | TA-TB2314-4 1/2" |
| 1-3/4” Doors over 3’-0” wide | Stanley | FBB168-4 1/2" | FBB199-4 1/2” |
| | Hager | BB1168-4 1/2" | BB1199-4 1/2" |
| | McKinney | T4A-T4B3786-4 1/2" | T4A-T4B3386-4 1/2" |
| 2-1/4” Doors | Stanley | | FBB199-5” |
| | Hager | | BB1199-5" |
| | McKinney | | T4A-T4B3386-5" |

## 2.04 LOCKS AND LATCHES, GENERAL

A. Accessibility Requirements: Where indicated to comply with accessibility requirements, comply with the U.S. Architectural & Transportation Barriers Compliance Board's "Americans with Disabilities Act (ADA), Accessibility Guidelines for Buildings and Facilities (ADAAG)."
1. Provide operating devices that do not require tight grasping, pinching, or twisting of the wrist and that operate with a force of not more than 5 lbf.

B. Latches and Locks for Means of Egress Doors: Comply with NFPA 101. Latches shall not require more than 15 lbf to release the latch. Locks shall not require use of a key, tool, or special knowledge for operation.

C. Electrified Locking Devices: BHMA A156.25.

D. Lock Trim:
1. Levers: Cast.
2. Escutcheons (Roses): Forged.
3. Dummy Trim: Match lever lock trim and escutcheons.

E. Lock Throw: Comply with testing requirements for length of bolts required for labeled fire doors, and as follows:
1. Bored Locks: Minimum 1/2-inch latchbolt throw.
2. Mortise Locks: Minimum 3/4-inch latchbolt throw.
3. Deadbolts: Minimum 1-inch bolt throw.

F. Rabbeted Meeting Doors: Provide special rabbeted front and strike on locksets for rabbeted meeting stiles.

G. Backset: 2-3/4 inches, unless otherwise indicated.

H. Strikes: Manufacturer's standard strike with strike box for each latchbolt or lock bolt, with curved lip extended to protect frame, finished to match door hardware set, and as follows:

1. Strikes for Bored Locks and Latches: BHMA A156.2.
2. Strikes for Mortise Locks and Latches: BHMA A156.13.
3. Strikes for Interconnected Locks and Latches: BHMA A156.12.
4. Strikes for Auxiliary Deadlocks: BHMA A156.5.
5. Flat-Lip Strikes: For locks with three-piece antifriction latchbolts, as recommended by manufacturer.
6. Extra-Long-Lip Strikes: For locks used on frames with applied wood casing trim.
7. Aluminum-Frame Strike Box: Manufacturer's special strike box fabricated for aluminum framing.

## 2.05 MORTISED LOCKS AND LATCHES

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
   1. Mechanical Locks and Latches:
      a. Best Lock Corporation (BLC).
      b. Corbin Russwin Architectural Hardware; Div. of Yale Security Inc. (CR).
      c. Sargent Manufacturing Company; Div. of ESSEX Industries, Inc. (SGT).
      d. Schlage Lock Company; an Ingersoll-Rand Company (SCH).

B. Mortise Locks: Stamped steel case with steel or brass parts; BHMA Grade 1; Series 1000.
   1. Provide one of the following manufacturers and designs:
      a. Best H Series
      b. Corbin/Russwin ML2000 Series
      c. Sargent 8200 Series
      d. Schlage L9000 Series

C. Lock Trim: Comply with the following:
   1. Lockset Designs: Provide the lockset design designated below or, if sets are provided by another manufacturer, provide designs that match those designated:
      a. Best, 14 design
      b. Corbin/Russwin, Newport design
      c. Sargent, LNL design
      d. Schlage, 06A design

D. Lock Functions: Lock functions as indicated in the hardware schedule shall be as follows:

| FUNCTION | SARGENT | SCHLAGE | CORBIN/RUSSWIN | BEST |
|---|---|---|---|---|
| A (utility) | 04 | 80 | 57 | EW |
| B (office) | 05 | 50 | 51 | E |
| C (passage) | 15 | 10 | 10 | N |
| D (classroom) | 37 | 70 | 55 | J |
| E (entrance) | 16 | 60 | 42 | F |
| F (privacy) | 65 | 40 | 30 | LF |

## 2.06 DOOR BOLTS

A. Bolt Throw: Comply with testing requirements for length of bolts required for labeled fire doors, and as follows:
   1. Half-Round Surface Bolts: Minimum 7/8-inch throw.
   2. Interlocking Surface Bolts: Minimum 15/16-inch throw.
   3. Fire-Rated Surface Bolts: Minimum 1-inch throw; listed and labeled for fire-rated doors.
   4. Dutch-Door Bolts: Minimum 3/4-inch throw.
   5. Mortise Flush Bolts: Minimum 3/4-inch throw.

B. Dustproof Strikes: BHMA A156.16, Grade 1.

C. Manual Flush Bolts: BHMA A156.16, Grade 1; designed for mortising into door edge.
   1. Available Manufacturers:
      a. Door Controls International (DCI).
      b. Glynn-Johnson; an Ingersoll-Rand Company (GJ).
      c. Rockwood.
   2. Available Products for Wood Doors:
      a. Door Controls: 790.
      b. Glynn-Johnson: FB6W.
      c. Rockwood: 557.

## 2.07 EXIT DEVICES

A. Note: NEC requires exit devices on electrical room doors where gear is rated over 1200 amps. City of Portland requires exit devices on all electrical room doors regardless of rating.

B. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
   1. Precision Hardware, Inc. (PH).
   2. Sargent Manufacturing Company; Div. of ESSEX Industries, Inc. (SGT).
   3. Von Duprin; an Ingersoll-Rand Company (VD).

C. Products: All exit devices for this project shall be one of the following:
   1. Precision Olympian Series
   2. The 80 Series exit device by Sargent & Co.
   3. 98 Series by Von Duprin Division

D. Exit Devices: BHMA A156.3, Grade 1.

E. Accessibility Requirements: Where handles, pulls, latches, locks, and other operating devices are indicated to comply with accessibility requirements, comply with the U.S. Architectural & Transportation Barriers Compliance Board's "Americans with Disabilities Act (ADA), Accessibility Guidelines for Buildings and Facilities (ADAAG)."
   1. Provide operating devices that do not require tight grasping, pinching, or twisting of the wrist and that operate with a force of not more than 5 lbf.

F. Exit Devices for Means of Egress Doors: Comply with NFPA 101. Exit devices shall not require more than 15 lbf to release the latch. Locks shall not require use of a key, tool, or special knowledge for operation.

G. Panic Exit Devices: Listed and labeled by a testing and inspecting agency acceptable to authorities having jurisdiction, for panic protection, based on testing according to UL 305.

H. Fire Exit Devices: Devices complying with NFPA 80 that are listed and labeled by a testing and inspecting agency acceptable to authorities having jurisdiction, for fire and panic protection, based on testing according to UL 305 and NFPA 252.

I. Removable Mullions: BHMA A156.3.

J. Outside Trim: Pull with cylinder; material and finish to match locksets, unless otherwise indicated.

K. Top and Bottom Strikes: Where vertical rod exit devices are indicated for interior doors, provide standard surface-mounted top strike and flush or recessed bottom strike.

L. The following functions shall be required where specified:

M. FUNCTION VON DUPRIN SARGENT PRECISION

| | | | |
|---|---|---|---|
| A | CD99NL-OP | 16-8804 | 1103CD x 1123-38 |
| B | CD99EO | 16-8810 | 1101CD x 1123-38 |
| C | 99L | 8813ET | 1108 x 39L x 1123-38 |
| D | 99L-BE | 8815ET | 1108A x 39L x 1123-38 |
| E | 99EO-F | 12-8810 | FL-1101 x 1123-38 |
| F | 99L-F | 12-8813ET | FL-1108 x 39L x 1123-38 |
| G | 99L-F-BE | 12-8815ET | FL-1108A x 39L x 1123-38 |
| H | CD9927EO | 16-8710 | 1201CD x 1123-38 |
| I | 9927L | 8713ET | 1208 x 39L x 1123-38 |
| J | 9927L-BE | 8715ET | 1208A x 39L x 1123-38 |
| K | CD9927EO x LBR | 16-PP/PR8710 | 1201CD x 1123-38 x LBR |
| L | 9927L x LBR | PP/PR8713ET | 1208 x 39L x 1123-38 x LBR |
| M | 9927L-BE x LBR | PP/PR8715ET | 1208A x 39L x 1123-38 xLBR |
| N | 9927EO-F | 12-8710 | FL-1201 x 1123-38 |
| O | 9927L-F | 12-8713ET | FL-1208 x 39L x 1123-38 |
| P | 9927L-F-BE | 12-8715ET | FL-1208A x 39L x 1123-38 |
| Q | 9927EO-F x LBR | 12-PP/PR8710 | FL-1201 x 1123-38 x LBR |
| R | 9927L-F x LBR | 12-PP/PR8713ET | FL-1208x39L x 1123-38xLBR |
| S | 9927-L-F-BE x LBR | 12-PP/PR8715ET | FL-1208Ax39Lx1123-38 x LBR |

## 2.08 LOCK CYLINDERS

A. Standard Lock Cylinders: BHMA A156.5, Grade 1.

B. Cylinders: Manufacturer's standard tumbler type, constructed from brass or bronze, stainless steel, or nickel silver, and complying with the following:
   1. Number of Pins: Six.
   2. Rim Type: Cylinders with back plate, flat-type vertical or horizontal tailpiece, and raised trim ring.
   3. Bored-Lock Type: Cylinders with tailpieces to suit locks.

C. Construction Keying: Comply with the following:
   1. Construction Master Keys: Provide cylinders with feature that permits voiding of construction keys without cylinder removal. Provide 10 construction master keys.

D. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
   1. Cylinders: Sargent to match City of Portland Standard System

## 2.09 KEYING

A. Keying System: Factory registered, complying with guidelines in BHMA A156.28, Appendix A. Incorporate decisions made in keying conference, and as follows:
   1. Master Key System: Cylinders are operated by a change key and a master key.
   2. Keyed Alike: Key all cylinders to same change key.

B. Keys: Nickel silver.
   1. Stamping: Permanently inscribe each key with a visual key control number and include the following notation:

      a. Notation: Information to be furnished by Owner.
   2. Quantity: In addition to one extra key blank for each lock, provide the following:
      a. Cylinder Change Keys: Three.
      b. Master Keys: Eight.

## 2.10 KEY CONTROL SYSTEM

A. Key Control Cabinet: BHMA A156.5, Grade 1; metal cabinet with baked-enamel finish; containing key-holding hooks, labels, 2 sets of key tags with self-locking key holders, key-gathering envelopes, and temporary and permanent markers; with key capacity of 150 percent of the number of locks.
   1. Wall-Mounted Cabinet: Cabinet with hinged-panel door equipped with key-holding panels and pin-tumbler cylinder door lock.

B. Cross-Index System: Multiple-index system for recording key information. Include three receipt forms for each key-holding hook. Set up by key control manufacturer.
   1. Available Manufacturers:
      a. Key Control Systems, Inc. (KCS).
      b. Telkee, Inc.; a division of Sunroc Corporation (SUN).

C. Key Lock Boxes (Knox Box): Designed for storage of (4) four keys.
   1. Available Manufacturers:
      a. ABLOY Security, Inc.; an ASSA ABLOY Group company (ABL).
      b. Knox Company (KNX).
      c. Supra Products (SUP).
      d. Provide item approved by the Portland Fire Department.

## 2.11 OPERATING TRIM

A. Standard: BHMA A156.6.

B. Materials: Fabricate from stainless steel, unless otherwise indicated.

C. Available Manufacturers:
   1. Burns Manufacturing Incorporated (BM).
   2. Don-Jo Mfg., Inc. (DJO).
   3. Hager Companies (HAG).
   4. IVES Hardware; an Ingersoll-Rand Company (IVS).
   5. Rockwood Manufacturing Company (RM).

D. Door Pulls, 1 inch diameter.
   1. Size: ADA compliant, unless indicated otherwise, provide 10 inches center to center, with 3 1/2 inch projection and 2 1/2 inch clearance.
   2. Available Products:
      a. Hager Companies, H4J.
      b. IVES Hardware; an Ingersoll-Rand Company; 8103EZ.
      c. Equivalent by Rockwood Manufacturing Co.

E. Push Bars, 1 inch diameter.

## 2.12 CLOSERS

A. Surface Closers: BHMA A156.4; rack-and-pinion hydraulic type with adjustable sweep and latch speeds controlled by key-operated valves and forged-steel main arm. Comply with manufacturer's written recommendations for size of door closers depending on size of door, exposure to weather, and anticipated frequency of use. Provide factory-sized closers, adjustable to meet field conditions and requirements for opening force.

B. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
   1. Surface-Mounted Closers:

a. LCN Closers; an Ingersoll-Rand Company (LCN).
b. Sargent Manufacturing Company; Div. of ESSEX Industries, Inc. (SGT).

C. Accessibility Requirements: Where handles, pulls, latches, locks, and other operating devices are indicated to comply with accessibility requirements, comply with the U.S. Architectural & Transportation Barriers Compliance Board's "Americans with Disabilities Act (ADA), Accessibility Guidelines for Buildings and Facilities (ADAAG)."
1. Comply with the following maximum opening-force requirements:
a. Interior, Non-Fire-Rated Hinged Doors: 5 lbf applied perpendicular to door.
b. Fire Doors: Minimum opening force allowable by authorities having jurisdiction.

D. Door Closers for Means of Egress Doors: Comply with NFPA 101. Door closers shall not require more than 30 lbf to set door in motion and not more than 15 lbf to open door to minimum required width.

E. Size of Units: Unless otherwise indicated, comply with manufacturer's written recommendations for size of door closers depending on size of door, exposure to weather, and anticipated frequency of use. Provide factory-sized closers, adjustable to meet field conditions and requirements for opening force.
1. LCN:
a. Exterior: 4040 Series
b. Interior: 4040 Series
2. Sargent:
a. Exterior: 281
b. Interior: 281

## 2.13 PROTECTIVE TRIM UNITS

A. Size: 1-1/2 inches less than door width on push side and 1/2 inch less than door width on pull side, by height specified in door hardware sets.

B. Fasteners: Manufacturer's standard machine or self-tapping screws.

C. Metal Protective Trim Units: BHMA A156.6; beveled top and 2 sides; fabricated from the following material:
1. Material: 0.050-inch- thick stainless steel.
2. Available Manufacturers:
a. Burns Manufacturing Incorporated (BM).
b. Don-Jo Mfg., Inc. (DJO).
c. Hager Companies (HAG).
d. IVES Hardware; an Ingersoll-Rand Company (IVS).
e. Rockwood Manufacturing Company (RM).

D. Fabricate protection plates as follows:

1. Push Plates: 16" high by 8" wide.
2. Kick Plates: 10" high by 1-1/2" less than door width for single doors and 1" less than door width for pairs of doors. Kick plates shall be applied to push side of all doors where noted.

## 2.14 STOPS AND HOLDERS

A. Stops and Bumpers: BHMA A156.16, Grade 1.

1. Provide wall stops for doors unless floor or other type stops are scheduled or indicated. Do not mount floor stops where they will impede traffic. Where floor or wall stops are not appropriate, provide overhead holders.
2. Provide matching finishes for hardware units at each door or opening, to the greatest extent possible, and except as otherwise indicated. Reduce differences in color and textures as much as commercially possible

where the base metal or metal forming process is different for individual units of hardware exposed at the same door or opening. In general, match items to the manufacturer's standard finish for the latch and lock set (or push-pull units if no latch-lock sets) for color and texture.

B. Wall Stops: Wall type bumpers with concealed type flange shall be used where ever possible.
   1. Available Products:
      a. Ives - 407 1/2
      b. Door Controls - 3211T
      c. Rockwood - 409

C. Floor Stops: Where wall type bumpers cannot be used, provide dome type, floor mounted stops of the proper height as follows:
   1. Available Products:
      a. Ives - 436, 438
      b. Door Controls - 3310X, 3320X
      c. Rockwood - 440, 442

D. Exterior doors striking masonry and doors specified to have door stops and holders, shall have cast bronze wall or floor type door stops with hook or staple type holders to selectively hold doors in open position. The following will be acceptable:
   1. Available Products:
      a. Ives - 445, 446
      b. Door Controls - 3237X, 3347X
      c. Rockwood - 473, 477

E. Door Catches: Provide surface-mounted roller catch where indicated. Ives No. 338 or approved substitute.

F. Roller Bumper: Provide curved roller bumper with 2-3/4 inch projection with brushed chrome finish; No. GJRB3 by Robert Brooke and Associates, Hager 273W, or approved substitute.

G. Silencers for Wood Door Frames: BHMA A156.16, Grade 1; neoprene or rubber, minimum 5/8 by 3/4 inch; fabricated for drilled-in application to frame.

H. Silencers for Metal Door Frames: BHMA A156.16, Grade 1; neoprene or rubber, minimum diameter 1/2 inch; fabricated for drilled-in application to frame.

## 2.15 DOOR GASKETING

A. Standard: BHMA A156.22.

B. Door Gasketing: BHMA A156.22; air leakage not to exceed 0.50 cfm per foot of crack length for gasketing other than for smoke control, as tested according to ASTM E 283; with resilient or flexible seal strips that are easily replaceable and readily available from stocks maintained by manufacturer.

C. Weatherstripping:
   1. Perimeter Gasketing: Apply to head and jamb, forming seal between door and frame. Basis-of-Design Product, No. A626A by National Guard Products or approved substitute.
   2. Meeting Stile Gasketing: Fasten to meeting stiles, forming seal when doors are closed. Basis-of-Design Product, No. 600A by National Guard Products or approved substitute.
   3. Door Bottoms: Apply to bottom of door, forming seal with threshold when door is closed. Basis-of-Design Product, No. 95WH by National Guard Products or approved substitute.

D. Smoke-Labeled Gasketing: Assemblies complying with NFPA 105 that are listed and labeled by a testing and inspecting agency acceptable to authorities having jurisdiction, for smoke-control ratings indicated, based on testing according to UL 1784.

1. Provide smoke-labeled gasketing on fire-rated doors and on smoke-labeled doors. Basis-of-Design Product, No. 5050 by National Guard Products or approved substitute.

E. Replaceable Seal Strips: Provide only those units where resilient or flexible seal strips are easily replaceable and readily available from stocks maintained by manufacturer.

## 2.16 THRESHOLDS

A. Standard: BHMA A156.21.

B. Accessibility Requirements: Where thresholds are indicated to comply with accessibility requirements, comply with the U.S. Architectural & Transportation Barriers Compliance Board's "Americans with Disabilities Act (ADA), Accessibility Guidelines for Buildings and Facilities (ADAAG)."
1. Bevel raised thresholds with a slope of not more than 1:2. Provide thresholds not more than 1/2 inch high.

C. Thresholds for Means of Egress Doors: Comply with NFPA 101. Maximum 1/2 inch high.

D. Manufacturers:
1. Provide No. 896 with door bottom sweep No. 95WH by National Guard Products or approved substitute.

## 2.17 MISCELLANEOUS DOOR HARDWARE

A. One-Way Viewers: Provide No. 698 by Ives or approved substitute.

## 2.18 FABRICATION

A. Manufacturer's Nameplate: Do not provide products that have manufacturer's name or trade name displayed in a visible location except in conjunction with required fire-rated labels and as otherwise approved by Architect.
1. Manufacturer's identification is permitted on rim of lock cylinders only.

B. Base Metals: Produce door hardware units of base metal, fabricated by forming method indicated, using manufacturer's standard metal alloy, composition, temper, and hardness. Furnish metals of a quality equal to or greater than that of specified door hardware units and BHMA A156.18. Do not furnish manufacturer's standard materials or forming methods if different from specified standard.

C. Fasteners: Provide door hardware manufactured to comply with published templates generally prepared for machine, wood, and sheet metal screws. Provide screws according to commercially recognized industry standards for application intended, except aluminum fasteners are not permitted. Provide Phillips flat-head screws with finished heads to match surface of door hardware, unless otherwise indicated.
1. Concealed Fasteners: For door hardware units that are exposed when door is closed, except for units already specified with concealed fasteners. Do not use through bolts for installation where bolt head or nut on opposite face is exposed unless it is the only means of securely attaching the door hardware. Where through bolts are used on hollow door and frame construction, provide sleeves for each through bolt.
2. Steel Machine or Wood Screws: For the following fire-rated applications:
   a. Mortise hinges to doors.
   b. Strike plates to frames.
   c. Closers to doors and frames.
3. Steel Through Bolts: For the following fire-rated applications unless door blocking is provided:
   a. Surface hinges to doors.
   b. Closers to doors and frames.
   c. Surface-mounted exit devices.
4. Spacers or Sex Bolts: For through bolting of hollow-metal doors.

5. Fasteners for Wood Doors: Comply with requirements in DHI WDHS.2, "Recommended Fasteners for Wood Doors."

2.19 FINISHES

A. Standard: BHMA A156.18, as indicated in door hardware sets.

B. Protect mechanical finishes on exposed surfaces from damage by applying a strippable, temporary protective covering before shipping.

C. Appearance of Finished Work: Variations in appearance of abutting or adjacent pieces are acceptable if they are within one-half of the range of approved Samples. Noticeable variations in the same piece are not acceptable. Variations in appearance of other components are acceptable if they are within the range of approved Samples and are assembled or installed to minimize contrast.

D. Provide the following finishes:

| | | |
|---|---|---|
| 1. | Butts and Hinges: | 26D |
| 2. | Locks & Lock Trim: | 26D |
| 3. | Exit Devices: | 26D |
| 4. | Door Controls - Closers: | Sprayed Aluminum |
| 5. | Door Stops | 26D |
| 6. | Weatherstripping | Aluminum |
| 7. | Threshold | Aluminum |
| 8. | Kickplates | 26D |
| 9. | Pulls | 26D |

PART 3 - EXECUTION

3.01 EXAMINATION

A. Examine doors and frames, with Installer present, for compliance with requirements for installation tolerances, labeled fire door assembly construction, wall and floor construction, and other conditions affecting performance.

B. Examine roughing-in for electrical power systems to verify actual locations of wiring connections before electrified door hardware installation.

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

3.02 PREPARATION

A. Steel Doors and Frames: Comply with DHI A115 Series.
1. Surface-Applied Door Hardware: Drill and tap doors and frames according to ANSI A250.6.

B. Wood Doors: Comply with DHI A115-W Series.

3.03 INSTALLATION

A. Mounting Heights: Mount door hardware units at heights indicated as follows unless otherwise indicated or required to comply with governing regulations.
1. Standard Steel Doors and Frames: DHI's "Recommended Locations for Architectural Hardware for Standard Steel Doors and Frames."
2. Wood Doors: DHI WDHS.3, "Recommended Locations for Architectural Hardware for Wood Flush Doors."

B. Install each door hardware item to comply with manufacturer's written instructions. Where cutting and fitting are required to install door hardware onto or into surfaces that are later to be painted or finished in another way, coordinate removal, storage, and reinstallation of surface protective trim units with finishing work specified in Division 09 Sections. Do not install surface-mounted items until finishes have been completed on substrates involved.
   1. Set units level, plumb, and true to line and location. Adjust and reinforce attachment substrates as necessary for proper installation and operation.
   2. Drill and countersink units that are not factory prepared for anchorage fasteners. Space fasteners and anchors according to industry standards.

C. Key Control System: Tag keys and place them on markers and hooks in key control system cabinet, as determined by final keying schedule.

D. Thresholds: Set thresholds for exterior and acoustical doors in full bed of sealant complying with requirements specified in Division 07 Section "Joint Sealants."

E. Strikes for Vertical Rod Exit Devices: Where vertical rod exit devices are used at interior doors, bottom strikes at floor are to be installed so that the top of the strike is flush with the adjacent flooring material.

## 3.04 ADJUSTING

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

   1. Spring Hinges: Adjust to achieve positive latching when door is allowed to close freely from an open position of 30 degrees.
   2. Door Closers: Unless otherwise required by authorities having jurisdiction, adjust sweep period so that, from an open position of 70 degrees, the door will take at least 3 seconds to move to a point 3 inches from the latch, measured to the leading edge of the door.

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

## 3.05 CLEANING AND PROTECTION

A. Clean adjacent surfaces soiled by door hardware installation.

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

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

## 3.06 DEMONSTRATION

A. Engage a factory-authorized service representative to train Owner's maintenance personnel to adjust, operate, and maintain door hardware and door hardware finishes. Refer to Division 01 Section "Demonstration and Training."

## 3.07 DOOR HARDWARE SETS

A. The hardware sets listed below indicate the items of hardware required for each opening. It is the bidder’s responsibility to accurately furnish the proper quantities, items, sizes, weights and functions as required by the

plans and specifications. If an opening has, through error, been omitted from the following hardware sets, it shall be the bidder's responsibility to supply hardware of equivalent quality and quantity, as that which is specified for a comparable opening.

**HW1 ALUMINUM VESTIBULE DOORS**

Doors 101.2, 110.2

Each leaf to have:
- Closer
- Push / Push Plate
- Hinges
- Kickplate

**HW2A EXTERIOR ALUMINUM SECURE ENTRANCE**

Doors 101.1, 110.1, 119

Each to have:
- Hinges
- Mortise Lockset
- Heavy Duty Electric Strike (Folger Adams)
- Closer
- Kickplate
- Weatherstripping and brush sweep door bottom
- Threshold
- Silencers

Card reader, presence sensor, request to exit sensor, door position switch by Security System Subcontractor.

**HW2B EXTERIOR SECURE ENTRANCE / EXIT**

Doors 127.1, 127.2, 127.3

Each to have:
- Hinges
- Rim Type Exit Device with Locking Function, Cast Lever Trim, Exterior Cylinder
- Heavy Duty Electric Strike (Folger Adams)
- Closer
- Kickplate
- Weatherstripping and brush sweep door bottom
- Threshold
- Silencers

At Door 127.1 provide jamb and head sound stripping and automatic door bottom.

At Door 127.2 provide special function: Cast lever exterior dummy trim with interior push bar inoperable at all times.

Card reader, presence sensor, request to exit sensor, door position switch by Security System Subcontractor.

**HW3 INTERIOR SECURE OFFICE DOORS**

Doors 102, 105, 109, 115, 116, 117, 118, 126

Each to have:
Hinges
Mortise Lockset
Heavy Duty Electric Strike (Folger Adams)
Closer
Kickplate
Silencers

Card reader, presence sensor, request to exit sensor, door position switch by Security System Subcontractor.

At Door 126 omit Electric Strike and Security System devices.

**HW4A CONTROLLED ACCESS STORAGE / UTILITY DOORS**

Door 108, 113

Each to have:
Hinges
Mortise Lockset
Heavy Duty Electric Strike (Folger Adams)
Closer
Kickplate
Silencers

Card reader, presence sensor, request to exit sensor, door position switch by Security System Subcontractor.

**HW4B SECURE STORAGE / UTILITY DOORS**

Door 103, 114, 128

Each to have:
Hinges
Closer
Mortise Lockset
Silencers

At Door 128 provide rim type exit device with locking function and cast lever outside trim.

**HW5 INTERIOR PRIVACY DOORS**

Doors 120. 121, 124

Each to have:
- Hinges
- Mortise Lockset (Privacy Function)
- Stop
- Silencers

**HW6 INTERIOR CLASSROOM LOCK DOORS**

Doors 112.1, 112.2, 123

Each to have:
- Hinges
- Closer
- Mortise Lockset (Passage Function)
- Stop
- Silencers

**HW7 INTERIOR PUSH/PULL DOORS**

Doors 106, 107

Each to have:
- Hinges
- Closer
- Push Plate
- Kick Plate
- Heavy Duty Cast Pull
- Stop
- Silencers

PART 4 - MEASUREMENT AND PAYMENT:

4.01 METHOD OF MEASUREMENT:

Door Hardware will be measured by the lump sum, complete and accepted. The Door Hardware limits shall be as shown or described in the Contract Documents.

4.02 BASIS OF PAYMENT:

Door Hardware will be paid for at the contract lump sum price. Payment for Door Hardware will be under:

| Pay Item | | Pay Unit |
|---|---|---|
| DIV. 8 | Openings | Lump Sum |

**END OF SECTION**

# SECTION 08 80 00 - GLAZING

All work and materials shall conform to the Contract Documents and the provisions of the State of Maine Department of Transportation Standard Specifications, Revision November 2014, with the following additions:

Add the following:

## PART 1 - GENERAL

### 1.01 RELATED DOCUMENTS

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

### 1.02 SUMMARY

A. Section includes glazing for the following products and applications, including those specified in other Sections where glazing requirements are specified by reference to this Section:
   1. Doors.
   2. Aluminum Storefronts.
   3. Silvered Mirror Glass and Metal Trim.

B. Related Sections:
   1. Division 08 Section "Aluminum Windows" for windows to be factory glazed.

### 1.03 DEFINITIONS

A. Glass Manufacturers: Firms that produce primary glass, fabricated glass, or both, as defined in referenced glazing publications.

B. Glass Thicknesses: Indicated by thickness designations in millimeters according to ASTM C 1036.

C. Interspace: Space between lites of an insulating-glass unit.

### 1.04 PERFORMANCE REQUIREMENTS

A. General: Installed glazing systems shall withstand normal thermal movement and wind and impact loads (where applicable) without failure, including loss or glass breakage attributable to the following: defective manufacture, fabrication, or installation; failure of sealants or gaskets to remain watertight and airtight; deterioration of glazing materials; or other defects in construction.

### 1.05 SUBMITTALS

A. Product Data: For each glass product and glazing material indicated.

B. Glazing Schedule: List glass types and thicknesses for each size opening and location. Use same designations indicated on Drawings.

C. Delegated-Design Submittal: For glass indicated to comply with performance requirements and design criteria, including analysis data signed and sealed by the qualified professional engineer responsible for their preparation.

D. Product Certificates: For glass and glazing products, from manufacturer.

1.06 QUALITY ASSURANCE

A. Glass Testing Agency Qualifications: A qualified independent testing agency accredited according to the NFRC CAP 1 Certification Agency Program.

B. Source Limitations for Glazing Accessories: Obtain from single source from single manufacturer for each product and installation method.

C. Glazing Publications: Comply with published recommendations of glass product manufacturers and organizations below, unless more stringent requirements are indicated. Refer to these publications for glazing terms not otherwise defined in this Section or in referenced standards.

1. GANA Publications: GANA's "Glazing Manual."

D. Safety Glazing Labeling: Where safety glazing labeling is indicated, permanently mark glazing with certification label of the SGCC or another certification agency acceptable to authorities having jurisdiction or the manufacturer. Label shall indicate manufacturer's name, type of glass, thickness, and safety glazing standard with which glass complies.

E. Fire-Protection-Rated Glazing Labeling: Permanently mark fire-protection-rated glazing with certification label of a testing agency acceptable to authorities having jurisdiction. Label shall indicate manufacturer's name, test standard, whether glazing is for use in fire doors or other openings, whether or not glazing passes hose-stream test, whether or not glazing has a temperature rise rating of 450 deg F, and the fire-resistance rating in minutes.

1.07 DELIVERY, STORAGE, AND HANDLING

A. Protect glazing materials according to manufacturer's written instructions. Prevent damage to glass and glazing materials from condensation, temperature changes, direct exposure to sun, or other causes.

B. Comply with insulating-glass manufacturer's written recommendations for venting and sealing units to avoid hermetic seal ruptures due to altitude change.

1.08 PROJECT CONDITIONS

A. Environmental Limitations: Do not proceed with glazing when ambient and substrate temperature conditions are outside limits permitted by glazing material manufacturers and when glazing channel substrates are wet from rain, frost, condensation, or other causes.
1. Do not install glazing sealants when ambient and substrate temperature conditions are outside limits permitted by sealant manufacturer or below 40 deg F.

PART 2 - PRODUCTS

2.01 GLASS PRODUCTS, GENERAL

A. Thickness: Where glass thickness is indicated, it is a minimum. Provide glass lites in thicknesses as needed to comply with requirements indicated.
1. Minimum Glass Thickness for Exterior Lites: Not less than 6.0 mm.
2. Thickness of Tinted Glass: Provide same thickness for each tint color indicated throughout Project.

B. Strength: Where float glass is indicated, provide annealed float glass, Kind HS heat-treated float glass, or Kind FT heat-treated float glass. Where heat-strengthened glass is indicated, provide Kind HS heat-treated float glass or Kind FT heat-treated float glass. Where fully tempered glass is indicated, provide Kind FT heat-treated float glass.

## 2.02 GLASS PRODUCTS

A. Heat-Treated Float Glass: ASTM C 1048; Type I; Quality-Q3; Class I (clear) unless otherwise indicated; of kind and condition indicated.
   1. Fabrication Process: By horizontal (roller-hearth) process with roll-wave distortion parallel to bottom edge of glass as installed unless otherwise indicated.
   2. For uncoated glass, comply with requirements for Condition A.

## 2.03 MIRRORED GLASS

A. Silvered Mirrored Glass: Tempered float glass with successive layers of chemically deposited silver, electrically or chemically deposited copper, and manufacturer's standard organic protective coating applied to second glass surface to produce a coating system complying with ASTM C1036 and CPSC 16 CFR 1201, 1/4 inch (6mm) thick.
   1. Perimeter trim (4) sides:
      a. Material: Satin anodized aluminum.
      b. Corners: Mitered.
      c. Product: CRL D636A or approved equivalent.

## 2.04 GLAZING GASKETS

A. Dense Compression Gaskets: Molded or extruded gaskets of profile and hardness required to maintain watertight seal, made from one of the following:
   1. EPDM complying with ASTM C 864.
   2. Silicone complying with ASTM C 1115.
   3. Thermoplastic polyolefin rubber complying with ASTM C 1115.

B. Soft Compression Gaskets: Extruded or molded, closed-cell, integral-skinned EPDM, silicone, or thermoplastic polyolefin rubber gaskets complying with ASTM C 509, Type II, black; of profile and hardness required to maintain watertight seal.
   1. Application: Use where soft compression gaskets will be compressed by inserting dense compression gaskets on opposite side of glazing or pressure applied by means of pressure-glazing stops on opposite side of glazing.

## 2.05 GLAZING SEALANTS

A. General:
   1. Compatibility: Provide glazing sealants that are compatible with one another and with other materials they will contact, including glass products, seals of insulating-glass units, and glazing channel substrates, under conditions of service and application, as demonstrated by sealant manufacturer based on testing and field experience.
   2. Suitability: Comply with sealant and glass manufacturers' written instructions for selecting glazing sealants suitable for applications indicated and for conditions existing at time of installation.
   3. VOC Content: For sealants used inside of the weatherproofing system, not more than 250 g/L when calculated according to 40 CFR 59, Subpart D.
   4. Colors of Exposed Glazing Sealants: As selected by Architect from manufacturer's full range.

B. Glazing Sealant: Neutral-curing silicone glazing sealant complying with ASTM C 920, Type S, Grade NS, Class 100/50, Use NT.
   1. Products: Subject to compliance with requirements, provide one of the following:
      a. Dow Corning Corporation; 790.
      b. GE Advanced Materials - Silicones; SilPruf LM SCS2700.
      c. May National Associates, Inc.; Bondaflex Sil 290.
      d. Pecora Corporation; 890.
      e. Sika Corporation, Construction Products Division; SikaSil-C990.

f. Tremco Incorporated; Spectrem 1.

C. Glazing Sealants for Fire-Rated Glazing Products: Products that are approved by testing agencies that listed and labeled fire-resistant glazing products with which they are used for applications and fire-protection ratings indicated.

## 2.06 GLAZING TAPES

A. Expanded Cellular Glazing Tapes: Closed-cell, PVC foam tapes; factory coated with adhesive on both surfaces; and complying with AAMA 800 for the following types:
1. AAMA 810.1, Type 1, for glazing applications in which tape acts as the primary sealant.
2. AAMA 810.1, Type 2, for glazing applications in which tape is used in combination with a full bead of liquid sealant.

## 2.07 MISCELLANEOUS GLAZING MATERIALS

A. General: Provide products of material, size, and shape complying with referenced glazing standard, requirements of manufacturers of glass and other glazing materials for application indicated, and with a proven record of compatibility with surfaces contacted in installation.

B. Cleaners, Primers, and Sealers: Types recommended by sealant or gasket manufacturer.

C. Setting Blocks: Elastomeric material with a Shore, Type A durometer hardness of 85, plus or minus 5.

D. Spacers: Elastomeric blocks or continuous extrusions of hardness required by glass manufacturer to maintain glass lites in place for installation indicated.

E. Edge Blocks: Elastomeric material of hardness needed to limit glass lateral movement (side walking).

F. Cylindrical Glazing Sealant Backing: ASTM C 1330, Type O (open-cell material), of size and density to control glazing sealant depth and otherwise produce optimum glazing sealant performance.

G. Perimeter Insulation for Fire-Resistive Glazing: Product that is approved by testing agency that listed and labeled fire-resistant glazing product with which it is used for application and fire-protection rating indicated.

## 2.08 FABRICATION OF GLAZING UNITS

A. Fabricate glazing units in sizes required to fit openings indicated for Project, with edge and face clearances, edge and surface conditions, and bite complying with written instructions of product manufacturer and referenced glazing publications, to comply with system performance requirements.

## 2.09 MONOLITHIC-GLASS TYPES

A. Tempered Glass: Clear fully tempered float glass.
1. Thickness: 6.0 mm.
2. Provide safety glazing labeling.

# PART 3 - EXECUTION

## 3.01 EXAMINATION

A. Examine framing, glazing channels, and stops, with Installer present, for compliance with the following:
1. Manufacturing and installation tolerances, including those for size, squareness, and offsets at corners.
2. Presence and functioning of weep systems.
3. Minimum required face and edge clearances.

4. Effective sealing between joints of glass-framing members.

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

3.02 PREPARATION

A. Clean glazing channels and other framing members receiving glass immediately before glazing. Remove coatings not firmly bonded to substrates.

B. Examine glazing units to locate exterior and interior surfaces. Label or mark units as needed so that exterior and interior surfaces are readily identifiable. Do not use materials that will leave visible marks in the completed work.

3.03 GLAZING, GENERAL

A. Comply with combined written instructions of manufacturers of glass, sealants, gaskets, and other glazing materials, unless more stringent requirements are indicated, including those in referenced glazing publications.

B. Adjust glazing channel dimensions as required by Project conditions during installation to provide necessary bite on glass, minimum edge and face clearances, and adequate sealant thicknesses, with reasonable tolerances.

C. Protect glass edges from damage during handling and installation. Remove damaged glass from Project site and legally dispose of off Project site. Damaged glass is glass with edge damage or other imperfections that, when installed, could weaken glass and impair performance and appearance.

D. Apply primers to joint surfaces where required for adhesion of sealants, as determined by preconstruction testing.

E. Install setting blocks in sill rabbets, sized and located to comply with referenced glazing publications, unless otherwise required by glass manufacturer. Set blocks in thin course of compatible sealant suitable for heel bead.

F. Do not exceed edge pressures stipulated by glass manufacturers for installing glass lites.

G. Provide spacers for glass lites where length plus width is larger than 50 inches.
1. Locate spacers directly opposite each other on both inside and outside faces of glass. Install correct size and spacing to preserve required face clearances, unless gaskets and glazing tapes are used that have demonstrated ability to maintain required face clearances and to comply with system performance requirements.
2. Provide 1/8-inch minimum bite of spacers on glass and use thickness equal to sealant width. With glazing tape, use thickness slightly less than final compressed thickness of tape.

H. Provide edge blocking where indicated or needed to prevent glass lites from moving sideways in glazing channel, as recommended in writing by glass manufacturer and according to requirements in referenced glazing publications.

I. Set glass lites in each series with uniform pattern, draw, bow, and similar characteristics.

J. Set glass lites with proper orientation so that coatings face exterior or interior as specified.

## 3.04 TAPE GLAZING

A. Position tapes on fixed stops so that, when compressed by glass, their exposed edges are flush with or protrude slightly above sightline of stops.

B. Install tapes continuously, but not necessarily in one continuous length. Do not stretch tapes to make them fit opening.

C. Cover vertical framing joints by applying tapes to heads and sills first and then to jambs. Cover horizontal framing joints by applying tapes to jambs and then to heads and sills.

D. Place joints in tapes at corners of opening with adjoining lengths butted together, not lapped. Seal joints in tapes with compatible sealant approved by tape manufacturer.

E. Do not remove release paper from tape until right before each glazing unit is installed.

F. Apply heel bead of elastomeric sealant.

G. Center glass lites in openings on setting blocks and press firmly against tape by inserting dense compression gaskets formed and installed to lock in place against faces of removable stops. Start gasket applications at corners and work toward centers of openings.

H. Apply cap bead of elastomeric sealant over exposed edge of tape.

## 3.05 MIRRORS

A. Mastic Spot Installation System: Install mirrored glass units with mastic as follows:

1. Apply barrier coat to mirrored glass backing where approved in writing by manufacturers of mirrored glass and backing material.
2. Apply mastic in spots to comply with mastic manufacturer's written instructions for coverage and to allow air circulation between back of mirrored glass units and face of mounting surface.
3. After mastic is applied, align mirrored glass units and press into place while maintaining a minimum air space of 1/8 inch (3 mm) between back of mirrored glass and mounting surface.

## 3.06 CLEANING AND PROTECTION

A. Protect exterior glass from damage immediately after installation by attaching crossed streamers to framing held away from glass. Do not apply markers to glass surface. Remove nonpermanent labels and clean surfaces.

B. Protect glass from contact with contaminating substances resulting from construction operations. If, despite such protection, contaminating substances do come into contact with glass, remove substances immediately as recommended in writing by glass manufacturer.

C. Examine glass surfaces adjacent to or below exterior concrete and other masonry surfaces at frequent intervals during construction, but not less than once a month, for buildup of dirt, scum, alkaline deposits, or stains; remove as recommended in writing by glass manufacturer.

D. Remove and replace glass that is broken, chipped, cracked, or abraded or that is damaged from natural causes, accidents, and vandalism, during construction period.

E. Wash glass on both exposed surfaces in each area of Project not more than four days before date scheduled for inspections that establish date of Substantial Completion. Wash glass as recommended in writing by glass manufacturer.

## PART 4 - MEASUREMENT AND PAYMENT:

### 4.01 METHOD OF MEASUREMENT:

Glazing will be measured by the lump sum, complete and accepted. The Glazing limits shall be as shown or described in the Contract Documents.

### 4.02 BASIS OF PAYMENT:

Glazing will be paid for at the contract lump sum price. Payment for Glazing will be under:

| Pay Item | | Pay Unit |
|---|---|---|
| DIV. 8 | Openings | Lump Sum |

**END OF SECTION**

# SECTION 09 29 00 - GYPSUM BOARD

All work and materials shall conform to the Contract Documents and the provisions of the State of Maine Department of Transportation Standard Specifications, Revision November 2014, with the following additions:

Add the following:

## PART 1 - GENERAL

### 1.01 RELATED DOCUMENTS

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

### 1.02 SUMMARY

A. This Section includes the following:

1. High abuse resistant interior gypsum board.
   a. Typical unless shown otherwise on the drawings.
2. Water resistant interior gypsum board.
3. Fire rated water resistant gypsum board.

B. Related Sections include the following:
1. Division 06 Section "Rough Carpentry" for wood framing and furring that supports gypsum board.
2. Division 06 Section "Sheathing" for sheathing.
3. Division 07 Section "Thermal Insulation" for insulation and vapor retarders installed in assemblies that incorporate gypsum board.
4. Division 09 painting Sections for primers applied to gypsum board surfaces.

### 1.03 SUBMITTALS

A. Product Data: For each type of product indicated.

B. Samples: For the following products:
1. Trim Accessories: Full-size Sample in 12-inch- long length for each trim accessory indicated.

### 1.04 PERFORMANCE REQUIREMENTS

A. Fire-Resistance-Rated Assemblies: For fire-resistance-rated assemblies, provide materials and construction identical to those tested in assembly indicated according to ASTM E 119 by an independent testing agency.

B. STC-Rated Assemblies: For STC-rated assemblies, provide materials and construction identical to those tested in assembly indicated according to ASTM E 90 and classified according to ASTM E 413 by an independent testing agency.

### 1.05 STORAGE AND HANDLING

A. Store materials inside under cover and keep them dry and protected against damage from weather, condensation, direct sunlight, construction traffic, and other causes. Stack panels flat to prevent sagging.

1.06 PROJECT CONDITIONS

A. Environmental Limitations: Comply with ASTM C 840 requirements or gypsum board manufacturer's written recommendations, whichever are more stringent.

B. Do not install interior products until installation areas are enclosed and conditioned.

C. Do not install panels that are wet, those that are moisture damaged, and those that are mold damaged.

1. Indications that panels are wet or moisture damaged include, but are not limited to, discoloration, sagging, or irregular shape.
2. Indications that panels are mold damaged include, but are not limited to, fuzzy or splotchy surface contamination and discoloration.

PART 2 - PRODUCTS

2.01 PANELS, GENERAL

A. Size: Provide in maximum lengths and widths available that will minimize joints in each area and that correspond with support system indicated.

B. Regional Materials: Gypsum panel products shall be manufactured within 500 miles of Project site from materials that have been extracted, harvested, or recovered, as well as manufactured, within 500 miles of Project site.

2.02 INTERIOR GYPSUM BOARD

A. General: Complying with ASTM C 36/C 36M or ASTM C 1396/C 1396M, as applicable to type of gypsum board indicated and whichever is more stringent.
1. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
a. G-P Gypsum.
b. Lafarge North America Inc.
c. National Gypsum Company.
d. USG Corporation.
e. Certainteed.

B. Abuse Resistant Type:
1. Thickness: 5/8 inch.
2. Long Edges: Tapered.
3. Product:
a. GP ToughRock Abuse
b. USG FibeRock VHI
c. Certainteed Air Renew Extreme Impact
d. National Gypsum Hi-Impact XP

C. Type X:
1. Thickness: 5/8 inch.
2. Long Edges: Tapered.
3. Provide fire rated version of abuse resistant gypsum board listed above.

## 2.03 SPECIALTY GYPSUM BOARD

A. Glass-Mat Interior Gypsum Board: ASTM C 1658/C 1658M. With fiberglass mat laminated to both sides. Specifically designed for interior use.
   1. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:
      a. Georgia-Pacific Gypsum LLC; DensArmour Plus.
   2. Core: 5/8 inch, Type X.
   3. Long Edges: Tapered.
   4. Mold Resistance: ASTM D 3273, score of 10.
   5. Locations: Provide at locations of ceramic tile.

## 2.04 TRIM ACCESSORIES

A. Interior Trim: ASTM C 1047.
   1. Material:
      a. Galvanized or aluminum-coated steel sheet or rolled zinc.
      b. Plastic where abutting exterior metal doors and windows.
   2. Shapes:
      a. Cornerbead.
      b. LC-Bead: J-shaped; exposed long flange receives joint compound.
      c. L-Bead: L-shaped; exposed long flange receives joint compound.
      d. Expansion (control) joint.

## 2.05 JOINT TREATMENT MATERIALS

A. General: Comply with ASTM C 475/C 475M.

B. Joint Tape:
   1. Interior Gypsum Wallboard: Paper.
   2. Mold-Resistant Gypsum Wallboard: 10-by-10 glass mesh.

C. Joint Compound for Interior Gypsum Wallboard: For each coat use formulation that is compatible with other compounds applied on previous or for successive coats.
   1. Prefilling: At open joints and damaged surface areas, use setting-type taping compound.
   2. Embedding and First Coat: For embedding tape and first coat on joints, fasteners, and trim flanges, use setting-type taping or drying-type, all-purpose compound.
      a. Use setting-type taping with mold-resistant gypsum wallboard.
   3. Fill Coat: For second coat, use setting-type, sandable topping or drying-type, all-purpose compound.
   4. Finish Coat: For third coat, use drying-type, all-purpose compound.
   5. Skim Coat: Not required.

## 2.06 AUXILIARY MATERIALS

A. General: Provide auxiliary materials that comply with referenced installation standards and manufacturer's written recommendations.

B. Steel Drill Screws: ASTM C 1002, unless otherwise indicated.
   1. Use screws complying with ASTM C 954 for fastening panels to steel members from 0.033 to 0.112 inch thick.

C. Sound Attenuation Blankets: ASTM C 665, Type I (blankets without membrane facing) produced by combining thermosetting resins with mineral fibers manufactured from glass, slag wool, or rock wool.

   1. Fire-Resistance-Rated Assemblies: Comply with mineral-fiber requirements of assembly.

D. Acoustical Joint Sealant: Manufacturer's standard nonsag, paintable, nonstaining latex sealant complying with ASTM C 834. Product effectively reduces airborne sound transmission through perimeter joints and openings in building construction as demonstrated by testing representative assemblies according to ASTM E 90.
   1. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:
      a. Pecora Corporation; AC-20 FTR or AIS-919.
      b. USG Corporation; SHEETROCK Acoustical Sealant.
   2. Provide sealants that have a VOC content of 250 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).

E. Thermal Insulation: As specified in Division 07 Section "Thermal Insulation."

F. Vapor Retarder: As specified in Division 07 Section "Thermal Insulation."

G. Firestopping: As specified in Division 07 Section “Penetration Firestopping.”

## PART 3 - EXECUTION

### 3.01 EXAMINATION

A. Examine areas and substrates, with Installer present, and including welded hollow-metal frames and framing, for compliance with requirements and other conditions affecting performance.

B. Examine panels before installation. Reject panels that are wet, moisture damaged, and mold damaged.

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

### 3.02 APPLYING AND FINISHING PANELS, GENERAL

A. Comply with ASTM C 840.

B. Install ceiling panels across framing to minimize the number of abutting end joints and to avoid abutting end joints in central area of each ceiling. Stagger abutting end joints of adjacent panels not less than one framing member.

C. Install panels with face side out. Butt panels together for a light contact at edges and ends with not more than 1/16 inch of open space between panels. Do not force into place.

D. Locate edge and end joints over supports, except in ceiling applications where intermediate supports or gypsum board back-blocking is provided behind end joints. Do not place tapered edges against cut edges or ends. Stagger vertical joints on opposite sides of partitions. Do not make joints other than control joints at corners of framed openings.

E. Form control and expansion joints with space between edges of adjoining gypsum panels.

F. Cover both faces of support framing with gypsum panels in concealed spaces (above ceilings, etc.), except in chases braced internally.
   1. Unless concealed application is indicated or required for sound, fire, air, or smoke ratings, coverage may be accomplished with scraps of not less than 8 sq. ft. in area.
   2. Fit gypsum panels around ducts, pipes, and conduits.
   3. Where partitions intersect structural members projecting below underside of floor/roof slabs and decks, cut gypsum panels to fit profile formed by structural members; allow 1/4- to 3/8-inch- wide joints to install sealant.

G. Isolate perimeter of gypsum board applied to non-load-bearing partitions at structural abutments, except floors. Provide 1/4- to 1/2-inch- wide spaces at these locations, and trim edges with edge trim where edges of panels are exposed. Seal joints between edges and abutting structural surfaces with acoustical sealant.

H. Attachment to Steel Framing: Attach panels so leading edge or end of each panel is attached to open (unsupported) edges of stud flanges first.

I. Wood Framing: Install gypsum panels over wood framing, with floating internal corner construction. Do not attach gypsum panels across the flat grain of wide-dimension lumber, including floor joists and headers. Float gypsum panels over these members, or provide control joints to counteract wood shrinkage.

J. STC-Rated Assemblies: Seal construction at perimeters, behind control joints, and at openings and penetrations with a continuous bead of acoustical sealant. Install acoustical sealant at both faces of partitions at perimeters and through penetrations. Comply with ASTM C 919 and with manufacturer's written recommendations for locating edge trim and closing off sound-flanking paths around or through assemblies, including sealing partitions above acoustical ceilings.

K. Fire-Resistance-Rated Gypsum Board Assemblies: Provide firestop system at the top of fire-resistance-rated gypsum board assemblies. Provide firestop system around any structural penetration of wall assembly.

L. Smoke-Rated Gypsum Board Assemblies: Provide a tight, taped joint at the top of smoke-rated assemblies and around any penetrations to assemblies at both side of the assembly. The use of acoustical sealant will be acceptable to fill gaps up to 3/8 inch wide.

## 3.03 APPLYING INTERIOR GYPSUM BOARD

A. Install interior gypsum board in the following locations:
   1. Regular Type: As indicated on Drawings.
   2. Type X: Where required for fire-resistance-rated assembly.
   3. Moisture- and Mold-Resistant Type: As indicated on Drawings.

B. Single-Layer Application:
   1. On ceilings, apply gypsum panels before wall/partition board application to greatest extent possible and at right angles to framing, unless otherwise indicated.
   2. On partitions/walls, apply gypsum panels as follows:
      a. Vertically (parallel to framing) for metal framing.
      b. Horizontally (perpendicular to framing) for wood framing.
      c. Stagger abutting end joints not less than one framing member in alternate courses of panels.
      d. At stairwells and other high walls, install panels horizontally, unless otherwise indicated or required by fire-resistance-rated assembly.
   3. On Z-furring members, apply gypsum panels vertically (parallel to framing) with no end joints. Locate edge joints over furring members.
   4. Fastening Methods: Apply gypsum panels to supports with steel drill screws.

C. Multilayer Application:

   1. On ceilings, apply gypsum board indicated for base layers before applying base layers on walls/partitions; apply face layers in same sequence. Apply base layers at right angles to framing members and offset face-layer joints 1 framing member, 16 inches minimum, from parallel base-layer joints, unless otherwise indicated or required by fire-resistance-rated assembly.
   2. On partitions/walls, apply gypsum board indicated for base layers and face layers vertically (parallel to framing) with joints of base layers located over stud or furring member and face-layer joints offset at least one stud or furring member with base-layer joints, unless otherwise indicated or required by fire-resistance-rated assembly. Stagger joints on opposite sides of partitions.

3. On Z-furring members, apply base layer vertically (parallel to framing) and face layer either vertically (parallel to framing) or horizontally (perpendicular to framing) with vertical joints offset at least one furring member. Locate edge joints of base layer over furring members.
4. Fastening Methods: Fasten base layers and face layers separately to supports with screws.

## 3.04 INSTALLING TRIM ACCESSORIES

A. General: For trim with back flanges intended for fasteners, attach to framing with same fasteners used for panels. Otherwise, attach trim according to manufacturer's written instructions.

B. Control Joints: Install control joints at locations indicated on Drawings or according to ASTM C 840 and in specific locations approved by Architect for visual effect.

C. Interior Trim: Install in the following locations:
1. Cornerbead: Use at outside corners, unless otherwise indicated.
2. LC-Bead: Use at exposed panel edges.
3. L-Bead: Use where indicated.

## 3.05 FINISHING GYPSUM BOARD

A. General: Treat gypsum board joints, interior angles, edge trim, control joints, penetrations, fastener heads, surface defects, and elsewhere as required to prepare gypsum board surfaces for decoration. Promptly remove residual joint compound from adjacent surfaces.

B. Prefill open joints and damaged surface areas.

C. Apply joint tape over gypsum board joints, except those with trim having flanges not intended for tape.

D. Gypsum Board Finish Levels: Finish panels to levels indicated below and according to ASTM C 840:
1. Level 1: Ceiling plenum areas, concealed areas, and where indicated.
2. Level 2: Where indicated on Drawings.
3. Level 3: Where indicated on Drawings.
4. Level 4: At panel surfaces that will be exposed to view, unless otherwise indicated.
   a. Primer and its application to surfaces are specified in other Division 09 Sections.
5. Level 5: Not required.

## 3.06 FIELD QUALITY CONTROL

A. Above-Ceiling Observation: Before Contractor installs gypsum board ceilings, conduct an above-ceiling observation and report deficiencies in the Work observed. Do not proceed with installation of gypsum board to ceiling support framing until deficiencies have been corrected.
1. Complete the following in areas to receive gypsum board ceilings:
   a. Installation, insulation, and leak and pressure testing of water piping systems.
   b. Installation of air-duct systems.
   c. Installation of air devices.
   d. Installation of mechanical system control-air tubing.
   e. Installation of ceiling support framing.
   f. Installation of Penetration Firestopping.

## 3.07 PROTECTION

A. Protect installed products from damage from weather, condensation, direct sunlight, construction, and other causes during remainder of the construction period.

B. Remove and replace panels that are wet, moisture damaged, and mold damaged.

1. Indications that panels are wet or moisture damaged include, but are not limited to, discoloration, sagging, or irregular shape.
2. Indications that panels are mold damaged include, but are not limited to, fuzzy or splotchy surface contamination and discoloration.

## PART 4 - MEASUREMENT AND PAYMENT:

### 4.01 METHOD OF MEASUREMENT:

Gypsum Board will be measured by the lump sum, complete and accepted. The Gypsum Board limits shall be as shown or described in the Contract Documents.

### 4.02 BASIS OF PAYMENT:

Gypsum Board will be paid for at the contract lump sum price. Payment for Gypsum Board will be under:

| Pay Item | | Pay Unit |
|---|---|---|
| DIV. 9 | Finishes | Lump Sum |

**END OF SECTION**

# SECTION 09 30 00 - TILING

All work and materials shall conform to the Contract Documents and the provisions of the State of Maine Department of Transportation Standard Specifications, Revision November 2014, with the following additions:

Add the following:

## PART 1 - GENERAL

### 1.01 SUMMARY

A. This Section includes the following:
   1. Through body porcelain tile.
   2. Metal edging transition strips for recessed areas.

### 1.02 RELATED WORK

A. See Division 12 Section “Entrance Floor Mats” for walk-off mat to be installed in a recessed area in the tile installation.

### 1.03 DEFINITIONS

A. Module Size: Actual tile size (minor facial dimension as measured per ASTM C 499) plus joint width indicated.

B. Facial Dimension: Nominal tile size as defined in ANSI A137.1.

### 1.04 PERFORMANCE REQUIREMENTS

A. Static Coefficient of Friction: For tile installed on walkway surfaces, provide products with the values indicated as determined by testing identical products per ASTM C 1028.

### 1.05 SUBMITTALS

A. Product Data: For each type of tile, mortar, grout, and other products specified.

B. Shop Drawings: For the following:
   1. Widths, details, and locations of expansion, contraction, control, and isolation joints in tile substrates and finished tile surfaces.

C. Tile Samples for Selection: Manufacturer's color charts consisting of actual tiles or sections of tiles showing the full range of colors, textures, and patterns available for each type and composition of tile indicated. Include Samples of accessories involving color selection.

D. Grout Samples for Selection: Manufacturer's color charts consisting of actual sections of grout showing the full range of colors available for each type of grout indicated.

E. Samples of Accessories: Of each item listed below, prepared on Samples of size and construction indicated. Where products involve normal color and texture variations, include Sample sets showing the full range of variations expected.

### 1.06 QUALITY ASSURANCE

A. Installer Qualifications: Engage an experienced installer who has completed tile installations similar in material, design, and extent to that indicated for this Project and with a record of successful in-service performance.

B. Source Limitations for Tile: Obtain each color, grade, finish, type, composition, and variety of tile from one source with resources to provide products from the same production run for each contiguous area of consistent quality in appearance and physical properties without delaying the Work.

C. Source Limitations for Setting and Grouting Materials: Obtain ingredients of a uniform quality for each mortar, adhesive, and grout component from a single manufacturer and each aggregate from one source or producer.

D. Preinstallation Conference: Conduct conference at Project site to comply with requirements of Division 1 Section "Project Management and Coordination."
   1. Review details and components for thick-set tile, waterproofing, and crack suppression at control joints.

1.07 DELIVERY, STORAGE, AND HANDLING

A. Deliver and store packaged materials in original containers with seals unbroken and labels intact until time of use. Comply with requirement of ANSI A137.1 for labeling sealed tile packages.

B. Store tile and cementitious materials on elevated platforms, under cover, and in a dry location.

C. Store aggregates where grading and other required characteristics can be maintained and contamination avoided.

D. Store liquid latexes and emulsion adhesives in unopened containers and protected from freezing.

1.08 PROJECT CONDITIONS

A. Environmental Limitations: Do not install tile until construction in spaces is completed and ambient temperature and humidity conditions are being maintained to comply with referenced standards and manufacturer's written instructions.

1.09 EXTRA MATERIALS

A. Deliver extra materials to Owner. Furnish extra materials described below that match products installed, are packaged with protective covering for storage, and are identified with labels describing contents.
   1. Tile and Trim Units: Furnish quantity of full-size units equal to 3 percent of amount installed, for each type, composition, color, pattern, and size indicated.

PART 2 - PRODUCTS

2.01 MANUFACTURERS

A. Available Manufacturers and Products: Subject to compliance with requirements, products that may be incorporated into the Work include, but are not limited to, those indicated in the following paragraphs of Part 2.

2.02 PRODUCTS, GENERAL

A. ANSI Ceramic Tile Standard: Provide tile that complies with ANSI A137.1, "Specifications for Ceramic Tile," for types, compositions, and other characteristics indicated.
   1. Provide tile complying with Standard Grade requirements, unless otherwise indicated.

2. For facial dimensions of tile, comply with requirements relating to tile sizes specified in Part 1 "Definitions" Article.

B. ANSI Standards for Tile Installation Materials: Provide materials complying with ANSI standards referenced in "Setting Materials" and "Grouting Materials" articles.

C. Colors, Textures, and Patterns: Where manufacturer's standard products are indicated for tile, grout, and other products requiring selection of colors, surface textures, patterns, and other appearance characteristics, provide specific products or materials complying with the following requirements:

1. As selected by Architect from manufacturer's full range.

D. Factory Blending: For tile exhibiting color variations within the ranges selected during Sample submittals, blend tile in the factory and package so tile units taken from one package show the same range in colors as those taken from other packages and match approved Samples.

E. Mounting: Where factory-mounted tile is required, provide back- or edge-mounted tile assemblies as standard with manufacturer, unless another mounting method is indicated.
1. Where tile is indicated for installation in swimming pools, on exteriors, or in wet areas, do not use back- or edge-mounted tile assemblies unless tile manufacturer specifies in writing that this type of mounting is suitable for these kinds of installations and has a record of successful in-service performance.

## 2.03 TILE PRODUCTS

A. Ceramic Mosaic Tile (CT-1): Provide factory-mounted flat tile complying with the following requirements:
1. Composition: XXX.
2. Field Tile Module Size: 2in. x 2 in.
3. Base Tile Module Size: 2 in. x 2 in.
a. Provide “Build Up Base” #MB-5B with surface bullnose
4. Nominal Thickness: 1/4 inch (7.5 mm).
5. Face: Textured with cushion edges.
6. Static Coefficient of Friction: Level Surfaces, minimum 0.6.
7. Product: Provide the following:
a. Dal Tile Keystones.
b. Color as selected by Architect from Color Group 1 or 2.

## 2.04 WATERPROOFING FOR THIN-SET TILE INSTALLATIONS

A. General: Provide products that comply with ANSI A118.10 and the descriptions in this Article.

B. Latex-Rubber Waterproofing: Manufacturer's standard factory-packaged, job-mixed, proprietary, 2-part formulation consisting of liquid-latex rubber and powder for trowel application and glass-fiber-fabric reinforcing.
1. Product: Laticrete 9235 Waterproof Membrane; Laticrete International, Inc.

C. Urethane Waterproofing and Tile-Setting Adhesive: Manufacturer's standard proprietary product consisting of 1-part liquid-applied urethane in a consistency suitable for trowel application and intended for use as both waterproofing and tile-setting adhesive in a 2-step process.
1. Product: Hydroment Ultra-Set Advanced; Bostik.

## 2.05 SETTING MATERIALS

A. Latex-Portland Cement Mortar: ANSI A118.4, composed as follows:
1. Prepackaged dry-mortar mix combined with acrylic resin liquid-latex additive.
a. For wall applications, provide nonsagging mortar that complies with Paragraph F-4.6.1 in addition to the other requirements in ANSI A118.4.

B. Organic Adhesive: ANSI A136.1, Type I.

2.06 GROUTING MATERIALS

A. Polymer-Modified Tile Grout: ANSI A118.7, color as indicated.
   1. Polymer Type: Acrylic resin in liquid-latex form for addition to prepackaged dry-grout mix.
      a. Unsanded grout mixture for joints 1/8 inch (3.2 mm) and narrower.
      b. Sanded grout mixture for joints 1/8 inch (3.2 mm) and wider.

2.07 ELASTOMERIC SEALANTS

A. General: Provide manufacturer's standard sanded acrylic caulking containing a mildew-cide or antimicrobial protection.
   1. Use sealants that have a VOC content of 250 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).

B. Colors: Provide colors of exposed sealants to match colors of grout in tile adjoining sealed joints, unless otherwise indicated.

C. Products: Available products include the following:
   1. Keracaulk™ S by Mapei
   2. CeramaSeal by Bostik Findley

2.08 MISCELLANEOUS MATERIALS

A. Trowelable Underlayments and Patching Compounds: Latex-modified, portland-cement-based formulation provided or approved by manufacturer of tile-setting materials for installations indicated.

B. Tile Cleaner: A neutral cleaner capable of removing soil and residue without harming tile and grout surfaces, specifically approved for materials and installations indicated by tile and grout manufacturers.

C. Crack Suppression for Thin Set Tile:
   1. Sheet or trowelable membrane designed to bridge small cracks for tile setting applications. Provide one of the following products:
      a. Laticrete 9235 Waterproof & Anti-Fracture Membrane
      b. Nobleseal CIS
      c. Hydroment Ultra-Set
      d. Mapei PRP M19

D. Metal Edging:
   1. Stainless steel edging to be embedded in tile setting bed:
      a. Product: Schluter SCHIENE – E, 3/8 in. (10 mm), #E 100

2.09 MIXING MORTARS AND GROUT

A. Mix mortars and grouts to comply with referenced standards and mortar and grout manufacturers' written instructions.

B. Add materials, water, and additives in accurate proportions.

C. Obtain and use type of mixing equipment, mixer speeds, mixing containers, mixing time, and other procedures to produce mortars and grouts of uniform quality with optimum performance characteristics for installations indicated.

PART 3 - EXECUTION

## 3.01 EXAMINATION

A. Examine substrates, areas, and conditions where tile will be installed, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of installed tile.
   1. Verify that substrates for setting tile are firm; dry; clean; free from oil, waxy films, and curing compounds; and within flatness tolerances required by referenced ANSI A108 series of tile installation standards for installations indicated.
   2. Verify that installation of grounds, anchors, recessed frames, electrical and mechanical units of work, and similar items located in or behind tile has been completed before installing tile.
   3. Verify that joints and cracks in tile substrates are coordinated with tile joint locations; if not coordinated, adjust latter in consultation with Architect.

B. Do not proceed with installation until unsatisfactory conditions have been corrected.

## 3.02 PREPARATION

A. Remove coatings, including curing compounds, and other substances that contain soap, wax, oil, or silicone and are incompatible with tile-setting materials by using a terrazzo or concrete grinder, a drum sander, or a polishing machine equipped with a heavy-duty wire brush.

B. Use trowelable leveling and patching compounds per tile-setting material manufacturer's written instructions to fill minor cracks.

C. Provide concrete substrates for tile floors installed with dry-set or latex-portland cement mortars that comply with flatness tolerances specified in referenced ANSI A108 series of tile installation standards for installations indicated.
   1. Use use self-leveling underlayments or trowelable leveling and patching compounds to fill cracks, holes, and depressions.
   2. Remove protrusions, bumps, and ridges by sanding or grinding.

D. Blending: For tile exhibiting color variations within the ranges selected during Sample submittals, verify that tile has been blended in the factory and packaged so tile units taken from one package show the same range in colors as those taken from other packages and match approved Samples. If not factory blended, either return to manufacturer or blend tiles at Project site before installing.

E. Cracks and Control Joints for Thin-Set Tile:
   1. Install crack suppression materials a minimum of 12 inches wide over construction and control joints. Install in accordance with manufacturer’s instructions.

## 3.03 INSTALLATION, GENERAL

A. ANSI Tile Installation Standards: Comply with parts of ANSI A108 series of tile installation standards in "Specifications for Installation of Ceramic Tile" that apply to types of setting and grouting materials and to methods indicated in ceramic tile installation schedules.

B. TCA Installation Guidelines: TCA's "Handbook for Ceramic Tile Installation." Comply with TCA installation methods indicated in ceramic tile installation schedules.

C. Extend tile work into recesses and under or behind equipment and fixtures to form a complete covering without interruptions, unless otherwise indicated. Terminate work neatly at obstructions, edges, and corners without disrupting pattern or joint alignments.

D. Accurately form intersections and returns. Perform cutting and drilling of tile without marring visible surfaces. Carefully grind cut edges of tile abutting trim, finish, or built-in items for straight aligned joints. Fit tile closely to electrical outlets, piping, fixtures, and other penetrations so plates, collars, or covers overlap tile.

E. Jointing Pattern: Lay tile in grid pattern, unless otherwise indicated. Align joints when adjoining tiles on floor, base, walls, and trim are the same size. Lay out tile work and center tile fields in both directions in each space or on each wall area. Adjust to minimize tile cutting. Provide uniform joint widths, unless otherwise indicated.
   1. For tile mounted in sheets, make joints between tile sheets the same width as joints within tile sheets so joints between sheets are not apparent in finished work.

F. Lay out tile wainscots to next full tile beyond dimensions indicated.

G. Grout tile to comply with the requirements of the following tile installation standards:
   1. For ceramic tile grouts (sand-portland cement, commercial portland cement, and latex-portland cement grouts), comply with ANSI A108.10.

H. Joint Sealants: Install sealant in floor tile joint directly above control joints and crack suppression material. Install sealant in tile joint at perimeter edges of floor tile and tile base or dissimilar base materials.

## 3.04 WATERPROOFING INSTALLATION

A. Install waterproofing to comply with waterproofing manufacturer's written instructions to produce a waterproof membrane of uniform thickness bonded securely to substrate.

B. Do not install tile over waterproofing until waterproofing has cured and been tested to determine that it is watertight.

## 3.05 FLOOR TILE INSTALLATION

A. General: Install tile to comply with requirements in the Ceramic Tile Floor Installation Schedule, including those referencing TCA installation methods and ANSI A108 series of tile installation standards.

B. Joint Widths: Install tile on floors with the following joint widths:
   1. Ceramic Mosaic Tile: 1/16 inch (1.6 mm).
   2. Porcelain Tile: 1/8 inch (3.2 mm).
   3. Paver Tile: 1/4 inch (6.35 mm).

C. Stone Thresholds: Install stone thresholds at locations indicated; set in same type of setting bed as abutting field tile, unless otherwise indicated.
   1. Set thresholds in latex-portland cement mortar for locations where mortar bed would otherwise be exposed above adjacent nontile floor finish.

## 3.06 CLEANING AND PROTECTING

A. Cleaning: On completion of placement and grouting, clean all ceramic tile surfaces so they are free of foreign matter.
   1. Remove epoxy and latex-portland cement grout residue from tile as soon as possible.
   2. Unglazed tile may be cleaned with acid solutions only when permitted by tile and grout manufacturer's written instructions, but no sooner than 10 days after installation. Protect metal surfaces, cast iron, and vitreous plumbing fixtures from effects of acid cleaning. Flush surface with clean water before and after cleaning.

B. Finished Tile Work: Leave finished installation clean and free of cracked, chipped, broken, unbonded, and otherwise defective tile work.

C. Provide final protection and maintain conditions, in a manner acceptable to manufacturer and Installer, that ensure tile is without damage or deterioration at the time of Substantial Completion.

1. When recommended by tile manufacturer, apply a protective coat of neutral protective cleaner to completed tile walls and floors. Protect installed tile work with carpet pad or other heavy covering during construction period to prevent staining, damage, and wear.
2. Prohibit foot and wheel traffic from tiled floors for at least 7 days after grouting is completed.

D. Before final inspection, rinse neutral cleaner from tile surfaces.

3.07 CERAMIC TILE FLOOR INSTALLATION SCHEDULE

A. Ceramic Tile Floor Installation: Where interior floor installations of this designation are indicated, comply with the following:
1. Tile Type: Porcelain paver tile.
2. Installation Method: TCA F113 (thin-set mortar bonded to concrete subfloor).
3. Setting Bed and Grout: ANSI A118.1 with the following mortar and grout:
a. Latex-portland cement mortar bond coat.
b. Sanded polymer-modified tile grout.
c. Grout color: Black

3.08 WASTE MANAGEMENT

A. Separate waste in accordance with the Waste Management Plan and place in designated areas in the following categories for recycling:
1. Half tiles and larger: Set aside for reuse by Owner.
2. Broken tile, cutoffs smaller than 1/2 tile, and excess mortar and grout: Crush for use as mosaic, sub-base, or fill.
3. Separate metal waste and place in designated area for recycling.
4. Separate cardboard waste and place in designated area for recycling.

PART 4 - MEASUREMENT AND PAYMENT:

4.01 METHOD OF MEASUREMENT:

Tiling will be measured by the lump sum, complete and accepted. The Tiling limits shall be as shown or described in the Contract Documents.

4.02 BASIS OF PAYMENT:

Tiling will be paid for at the contract lump sum price. Payment for Tiling will be under:

| Pay Item | | Pay Unit |
|---|---|---|
| DIV. 9 | Finishes | Lump Sum |

**END OF SECTION**

# SECTION 09 51 13 - ACOUSTICAL PANEL CEILINGS

All work and materials shall conform to the Contract Documents and the provisions of the State of Maine Department of Transportation Standard Specifications, Revision November 2014, with the following additions:

Add the following:

## PART 1 - GENERAL

### 1.01 RELATED DOCUMENTS

Drawings and general conditions of Contract, including General and Supplementary Conditions and Divisions-1 Specification sections apply to work of this section.

### 1.02 SUMMARY

A. Section Includes:
1. Acoustical ceiling panels.
2. Exposed grid suspension system.
3. Wire hangers, fasteners, main runners, cross tees, and wall angle moldings.

B. Related Sections:
1. Section 09 20 00 (09250) - Plaster and Gypsum Board
2. Divisions 23 (15) - HVAC
3. Division 26 (16) Sections - Electrical Work

### 1.03 REFERENCES

A. American Society for Testing and Materials (ASTM):
1. ASTM A 1008 Standard Specification for Steel, Sheet, Cold Rolled, Carbon, Structural, High-Strength Low-Alloy and High-Strength Low-Alloy with Improved Formability.
2. ASTM A 641 Standard Specification for Zinc-Coated (Galvanized) Carbon Steel Wire.
3. ASTM A 653 Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) by the Hot-Dip Process.
4. ASTM C 423 Sound Absorption and Sound Absorption Coefficients by the Reverberation Room Method.
5. ASTM C 635 Standard Specification for Metal Suspension Systems for Acoustical Tile and Lay-in Panel Ceilings.
6. ASTM C 636 Recommended Practice for Installation of Metal Ceiling Suspension Systems for Acoustical Tile and Lay-in Panels.
7. ASTM E 84 Standard Test Method for Surface Burning Characteristics of Building Materials.
8. ASTM E 1414 Standard Test Method for Airborne Sound Attenuation Between Rooms Sharing a Common Ceiling Plenum.
9. ASTM E 1111 Standard Test Method for Measuring the Interzone Attenuation of Ceilings Systems.
10. ASTM E 1264 Classification for Acoustical Ceiling Products.
11. ASTM E 1477 Standard Test Method for Luminous Reflectance Factor of Acoustical Materials by Use of Integrating-Sphere Reflectometers.
12. ASTM D 3273 Standard Test Method for Resistance to Growth of Mold on the Surface of Interior Coatings in an Environmental Chamber.
13. ASTM E 119 Standard Test Methods for Fire Tests of Building Construction and Material.

B. ASHRAE Standard 62.1-2004, "Ventilation for Acceptable Indoor Air Quality"

C. International Code Council-Evaluation Services - AC 156 Acceptance Criteria for Seismic Qualification Testing of Non-structural Components

D. International Code Council-Evaluation Services - Evaluation Report, ESR-1308, Fire- and Nonfire-Resistance-Rated Suspended Ceiling Framing Systems

E. ASCE 7 Standard - American Society of Civil Engineers, Minimum Design Loads for Buildings and Other Structures

F. CISCA 0-2 - Ceilings and Interior Systems Construction Association Recommendations for Direct-Hung Acoustical Tile and Lay-In Panel Ceilings, Seismic Zones 0-2

1. 04 SYSTEM DESCRIPTION

A. Seismic Loads: Design and size components to withstand seismic loads in accordance with the International Building Code, Section 1621 for Category C.

1.05 SUBMITTALS

A. Product Data: Submit manufacturer's technical data for each type of acoustical ceiling unit and suspension system required.

B. Samples: Minimum 6 inch x 6 inch samples of specified acoustical panel; 8 inch long samples of exposed wall molding and suspension system, including main runner and 4 foot cross tees.

C. Shop Drawings: Layout and details of acoustical ceilings. Show locations of items which are to be coordinated with, or supported by the ceilings.

D. Certifications: Manufacturer's certifications that products comply with specified requirements, including laboratory reports showing compliance with specified tests and standards. For acoustical performance, each carton of material must carry an approved independent laboratory classification of NRC, CAC, and AC.

E. If the material supplied by the acoustical subcontractor does not have an Underwriter's Laboratory classification of acoustical performance on every carton, subcontractor shall be required to send material from every production run appearing on the job to an independent or NVLAP approved laboratory for testing, at the architect's or owner's discretion. All products not conforming to manufacturer's current published values must be removed, disposed of and replaced with complying product at the expense of the Contractor performing the work.

1.06 QUALITY ASSURANCE

A. Single-Source Responsibility: Provide acoustical panel units and grid components by a single manufacturer.

B. Fire Performance Characteristics: Identify acoustical ceiling components with appropriate markings of applicable testing and inspecting organization.
   1. Surface Burning Characteristics: As follows, tested per ASTM E 84 and complying with ASTM E 1264 for Class A products.
      a. Flame Spread: 25 or less
      b. Smoke Developed: 50 or less
   2. Fire Resistance Ratings: As indicated by reference to design designations in UL Fire Resistance Directory, for types of assemblies in which acoustical ceilings function as a fire protective membrane and tested per ASTM E 119.
      a. Protect lighting fixtures and air ducts to comply with requirements indicated for rated assembly.

C. Seismic Performance: Provide acoustical ceiling system that has been evaluated by an independent party and found to be compliant with the 2003 International Building Code, Seismic Category C.

   1. Tested per International Code Council - Evaluation Services - AC 156 Acceptance Criteria for Seismic Qualification Testing of Non-structural Components as evidenced by International Code Council Evaluation Report, ESR-1308.

D. Handle acoustical ceiling units carefully to avoid chipping edges or damaged units in any way.

1.07 DELIVERY, STORAGE, AND HANDLING

A. Deliver acoustical ceiling units to project site in original, unopened packages and store them in a fully enclosed space where they will be protected against damage from moisture, direct sunlight, surface contamination, and other causes.

B. Before installing acoustical ceiling units, permit them to reach room temperature and a stabilized moisture content.

C. Handle acoustical ceiling units carefully to avoid chipping edges or damaged units in any way.

1.08 PROJECT CONDITIONS

A. Space Enclosure:

All ceiling products and suspension systems must be installed and maintained in accordance with Armstrong written installation instructions for that product in effect at the time of installation and best industry practice. Prior to installation, the ceiling product must be kept clean and dry, in an environment that is between 32oF (0o C) and 120oF (49o C) and not subject to Abnormal Conditions.
Abnormal conditions include exposure to chemical fumes, vibrations, moisture from conditions such as building leaks or condensation, excessive humidity, or excessive dirt or dust buildup.

1.09 WARRANTY

A. Acoustical Panel: Submit a written warranty executed by the manufacturer, agreeing to repair or replace acoustical panels that fail within the warranty period. Failures include, but are not limited to:
   1. Acoustical Panels: Sagging and warping as a result of defects in materials or factory workmanship.
   2. Grid System: Rusting and manufacturer's defects
   3. Acoustical Panels with BioBlock Plus or designated as inherently resistive to the growth of microorganisms installed with Armstrong suspension systems: Visible sag and will resist the growth of mold/mildew and gram positive and gram negative odor and stain causing bacteria.

B. Warranty Period Humiguard:
   4. Acoustical panels: Ten (10) years from date of substantial completion.
   5. Grid: Ten (10) years from date of substantial completion.
   6. Acoustical panels and grid systems with HumiGuard Plus or HumiGuard Max performance supplied by one source manufacturer is thirty (30) years from date of substantial completion.

C. The Warranty shall not deprive the Owner of other rights the Owner may have under other provisions of the Contract Documents and will be in addition to and run concurrent with other warranties made by the Contractor under the requirements of the Contract Documents.

1.10 MAINTENANCE

A. Extra Materials: Deliver extra materials to Owner. Furnish extra materials described below that match products installed. Packaged with protective covering for storage and identified with appropriate labels.
   1. Acoustical Ceiling Units: Furnish quality of full-size units equal to 5.0 percent of amount installed.
   2. Exposed Suspension System Components: Furnish quantity of each exposed suspension component equal to 2.0 percent of amount installed.

PART 2-PRODUCTS

2.01 MANUFACTURERS

A. Ceiling Panels:
   1. Armstrong World Industries, Inc.

2.02 ACOUSTICAL CEILING UNITS

A. Acoustical Panels Type ACT-1: Optima

1. Surface Texture: Fine
2. Composition: Fiberglass
3. Color: White
4. Size: 24in X 24in X 1in
5. Edge Profile: Square Tegular for interface with Interlude XL 9/16" Dimensional Tee.
6. Noise Reduction Coefficient (NRC): ASTM C 423; Classified with UL label on product carton, 0.95.
7. Ceiling Attenuation Class (CAC): ASTM C 1414; Classified with UL label on product carton, Not Applicable
8. Articulation Class (AC): ASTM E 1111; Classified with UL label on product carton 190.
9. Emissions Testing: Section 01350 Protocol, < 13.5 ppb of formaldehyde when used under typical conditions required by ASHRAE Standard 62.1-2004, "Ventilation for Acceptable Indoor Air Quality"
10. Flame Spread: ASTM E 1264; Class A (UL)
11. Light Reflectance (LR): ASTM E 1477; White Panel: Light Reflectance: 0.90.
12. Dimensional Stability: HumiGuard Plus - Temperature is between 32°F (0° C) and 120°F (49° C). It is not necessary for the area to be enclosed or for HVAC systems to be functioning. All wet work (plastering, concrete, etc) must be complete and dry.
13. Antimicrobial Protection: Inherent - Resists the growth of mold/mildew and bacterial growth.
14. Acceptable Product: Optima Open Plan, 3251 as manufactured by Armstrong World Industries.

## 2.03 SUSPENSION SYSTEMS

A. Components: Main beams and cross tees In accordance with the International Building Code, Section 1621 for Category C as described in ESR-1308.
   1. Structural Classification: ASTM C 635, (Intermediate Duty) (Heavy Duty).
   2. Color: Aluminum.
   3. Represented Systems: Interlude XL 9/16" Dimensional Tee System as manufactured by Armstrong World Industries.

B. Attachment Devices: In accordance with the International Building Code, Section 1621 for Category C.

C. Wire for Hangers and Ties: In accordance with the International Building Code, Section 1621.

D. Wall Moldings: In accordance with the International Building Code, Section 1621 for Category C or method as described in ESR-1308.

E. Accessories:

   4. BERC2 - 2 inch Beam End Retaining Clip, 0.034 inch thick, hot-dipped galvanized cold-rolled steel per ASTM A568 - used to join main beam or cross tee to wall molding.

## 2.04 ACOUSTICAL CEILING UNITS

A. Acoustical Panels Type ACT-2:

   1. Surface Texture: Medium
   2. Composition: Mineral Fiber
   3. Color: White
   4. Size: 24in X 24in X 5/8in
   5. Edge Profile: Square Lay-In for interface with AL Prelude Plus XL 15/16" Exposed Tee.
   6. Noise Reduction Coefficient (NRC): ASTM C 423; Classified with UL label on product carton, 0.55.
   7. Ceiling Attenuation Class (CAC): ASTM C 1414; Classified with UL label on product carton, 38
   8. Emissions Testing: Section 01350 Protocol, < 13.5 ppb of formaldehyde when used under typical conditions required by ASHRAE Standard 62.1-2004, "Ventilation for Acceptable Indoor Air Quality"
   9. Flame Spread: ASTM E 1264; Fire Resistive
   10. Light Reflectance (LR): ASTM E 1477; White Panel: Light Reflectance: 0.82.
   11. Dimensional Stability: HumiGuard Max - Temperature is between 32°F (0° C) and 120°F (49° C). It is not necessary for the area to be enclosed or for HVAC systems to be functioning.

12. Antimicrobial Protection: Inherent - Resists the growth of mold/mildew and bacterial growth.
13. Acceptable Product: Fine Fissured Ceramaguard, 607 as manufactured by Armstrong World Industries.

2.05 SUSPENSION SYSTEMS

A. Components: Main beams and cross tees In accordance with the International Building Code, Section 1621 for Category C as described in ESR-1308.

1. Structural Classification: ASTM C 635, (Intermediate Duty) (Heavy Duty).

2. Color: White and match the actual color of the selected ceiling tile, unless noted otherwise.

3. Represented Systems: AL Prelude Plus XL 15/16" Exposed Tee System as manufactured by Armstrong World Industries.

B. Attachment Devices: In accordance with the International Building Code, Section 1621 for Category C.

C. Wire for Hangers and Ties: In accordance with the International Building Code, Section 1621.

D. Wall Moldings: In accordance with the International Building Code, Section 1621 for Category C or method as described in ESR-1308.

E. Accessories:

4. BERC2 - 2 inch Beam End Retaining Clip, 0.034 inch thick, hot-dipped galvanized cold-rolled steel per ASTM A568 - used to join main beam or cross tee to wall molding.

PART 3 - EXECUTION

3.01 EXAMINATION

A. Do not proceed with installation until all wet work such as concrete, terrazzo, plastering and painting has been completed and thoroughly dried out, unless expressly permitted by manufacturer's printed recommendations. (Exception: HumiGuard Max Ceilings)

3.02 PREPARATION

A. Measure each ceiling area and establish layout of acoustical units to balance border widths at opposite edges of each ceiling. Avoid use of less than half width units at borders, and comply with reflected ceiling plans. Coordinate panel layout with mechanical and electrical fixtures.

B. Coordination: Furnish layouts for preset inserts, clips, and other ceiling anchors whose installation is specified in other sections.
1. Furnish concrete inserts and similar devices to other trades for installation well in advance of time needed for coordination of other work.

3.03 INSTALLATION (Category C)

A. Install suspension system and panels in accordance with the International Building Code, Section 1621, except as noted in Section 4.4.3.2 of ESR-1308, and with the authorities having jurisdiction.

B. ESR-1308, Section 4.4.3.2, Seismic Design Category C Installation:

Terminal ends of the runners are secured by attaching the BERC-2 clip to the wall molding and attaching the runners to the BERC-2 clip. The runners have zero clearance at the perimeter on two adjacent walls and with 3/8-inch (9.5 mm) clearance on the opposite walls. The clip is attached to the wall molding by sliding the locking lances over the hem of the vertical leg of the wall molding. BERC-2 clips installed in this manner are an acceptable means of preventing runners from spreading, in lieu of spacer bars required in CISCA 0-2, which is referenced in ASCE 7, Sec-

tion 9.6.2.6.2.1, which is referenced in IBC Section 1621. Except for the use of the BERC-2 clip as noted above, installation of the ceiling system must be as prescribed by the applicable code. Maximum ceiling weight permitted is 1.20 pounds per square foot (5.86 kg/m2). This construction is equivalent to that required by CISCA 0-2, which is referenced in ASCE-7, Section 9.2.6.2.1, and which is referenced in IBC Section 1621.

C. The presence of a hanger wire within 3 inches of an expansion relief joint as called for in ASTM C 636 shall be required in addition to the requirements of the International Building Code, Section 1621.2.5 and with the authorities having jurisdiction.
   1. Only applies when using (Prelude XL Fire Guard 15/16") (Prelude Plus XL Fire Guard 15/16") (Suprafine XL Fire Guard 9/16") Exposed Tee Systems.

D. For reveal edge panels: Cut and reveal or rabbet edges of ceiling panels at border areas and vertical surfaces.

E. Install acoustical panels in coordination with suspended system, with edges resting on flanges of main runner and cross tees. Cut and fit panels neatly against abutting surfaces. Support edges by wall moldings.

3.04 ADJUSTING AND CLEANING

A. Replace damaged and broken panels.

B. Clean exposed surfaces of acoustical ceilings, including trim, edge moldings, and suspension members. Comply with manufacturer's instructions for cleaning and touch up of minor finish damage. Remove and replace work that cannot be successfully cleaned and repaired to permanently eliminate evidence of damage.

PART 4 - MEASUREMENT AND PAYMENT:

4.01 METHOD OF MEASUREMENT:

Acoustical Panel Ceilings will be measured by the lump sum, complete and accepted. The Acoustical Panel Ceilings limits shall be as shown or described in the Contract Documents.

4.02 BASIS OF PAYMENT:

Acoustical Panel Ceilings will be paid for at the contract lump sum price. Payment for Acoustical Panel Ceilings will be under:

| Pay Item | | Pay Unit |
|---|---|---|
| DIV. 9 | Finishes | Lump Sum |

**END OF SECTION**

# SECTION 09 54 26 - WOOD PANEL CEILINGS

All work and materials shall conform to the Contract Documents and the provisions of the State of Maine Department of Transportation Standard Specifications, Revision November 2014, with the following additions:

Add the following:

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

Drawings and general conditions of Contract, including General and Supplementary Conditions and Divisions-1 Specification sections apply to work of this section.

1.02 SUMMARY

A. Section Includes:
1. Wood veneer ceiling planks.
2. Concealed grid suspension system.
3. Wire hangers, fasteners, main runners, wall angle moldings and accessories.
4. Acoustical backing

B. Related Sections:
1. Section 09 51 13 - Acoustical Ceilings
2. Section 09 29 00 - Gypsum Board
3. Divisions 23 - HVAC
4. Division 26 Sections - Electrical Work

1.03 REFERENCES

A. American Society for Testing and Materials (ASTM):
1. ASTM A 641 Standard Specification for Zinc-Coated (Galvanized) Carbon Steel Wire.
2. ASTM A 653 Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) by the Hot- Dip Process.
3. ASTM A 1008 Standard Specification for Steel, Sheet, Cold Rolled, Carbon, Structural, High-Strength Low-Alloy and High-Strength Low-Alloy with Improved Formability.
4. ASTM C 635 Standard Specification for Metal Suspension Systems for Acoustical Tile and Lay-in Panel Ceilings.
5. ASTM C 636 Recommended Practice for Installation of Metal Ceiling Suspension Systems for Acoustical Tile and Lay-in Panels.
6. ASTM E 84 Standard Test Method for Surface Burning Characteristics of Building Materials.
7. ASTM E 1264 Classification for Acoustical Ceiling Products.

B. CISCA Seismic Zones (0-2) (3-4) Ceilings and Interior Systems Construction Association Guidelines for Seismic Restraint for Direct Hung Suspended Ceiling Assemblies

1.04 SUBMITTALS

A. Product Data: Submit manufacturer's technical data for each type of ceiling unit and suspension system required.

B. Installation Instructions: Submit manufacturer's installation instructions as referenced in Part 3, Installation.

C. Samples: Minimum 3-1/2 inch or 5-1/2 inch samples of specified panel; 8 inch long samples of exposed wall molding and suspension system, including main runner.

D. Shop Drawings: Layout and details of ceilings. Show locations of items which are to be coordinated with, or supported by the ceilings.

E. Certifications: Manufacturer's certifications that products comply with specified requirements, including laboratory reports showing compliance with specified tests and standards.

F. All products not conforming to manufacturer's current published values must be removed, disposed of and replaced with complying product at the expense of the Contractor performing the work.

1.05 QUALITY ASSURANCE

A. Single-Source Responsibility: Provide ceiling panel units and grid components by a single manufacturer.

B. Fire Performance Characteristics: Identify ceiling components with appropriate markings of applicable testing and inspecting organization.

1. Surface Burning Characteristics: As follows, tested per ASTM E 84 and complying with ASTM E 1264 for Class A products.
   a. Flame Spread: 25 or less
   b. Smoke Developed: 50 or less
2. HPVA (Hardwood Plywood and Veneer Association) certification and audit program per ASTM E-84 tunnel test.

C. Woodworking Standards: Manufacturer must comply with specified provisions of Architectural Woodworking Institute quality standards.

D. Linear Wood, as with other architectural features located at the ceiling, may obstruct or skew the planned fire sprinkler water distribution pattern, or possibly delay or accelerate the activation of the sprinkler or fire detection systems by channeling heat from a fire either toward or away from the device. Designers and installers are advised to consult a fire protection engineer, NFPA 13, or their local codes for guidance where automatic fire detection and suppression systems are present.

E. Coordination of Work: Coordinate ceiling work with installers of related work including, but not limited to building insulation, gypsum board, light fixtures, mechanical systems, electrical systems, and sprinklers.

1.06 DELIVERY, STORAGE, AND HANDLING

A. Store ceiling components in a dry interior location in their cartons prior to installation to avoid damage. Store cartons in a flat, horizontal position. The protectors between the panels should not be removed until installation.

B. Do not store in unconditioned spaces with humidity greater than 55 percent or lower than 25 percent relative humidity and temperatures lower than 50 degrees F or greater than 86 degrees F. Panels must not be exposed to extreme temperatures, for example, close to a heating source or near a window with direct sunlight.

C. Handle ceiling units carefully to avoid chipped edges or damage to units in any way.

1.07 PROJECT CONDITIONS

A. Wood veneer ceiling materials should be permitted to reach room temperature and have a stabilized moisture content for a minimum of 72 hours before installation.

B. The wood veneer panels should not be installed in spaces where the temperature or humidity conditions vary greatly from the temperatures and conditions that will be normal in the occupied space.

C. As interior finish products, the wood veneer panels are designed for installation in temperature conditions between 50 degrees F and 86 degrees F, in spaces where the building is enclosed and HVAC systems are functioning and will be in continuous operation. Relative humidity should not fall below 25 percent or exceed 55 percent.

1.08 WARRANTY

A. Wood Veneer Panel: Submit a written warranty executed by the manufacturer, agreeing to repair or replace panels that fail within the warranty period. Failures include, but are not limited to:

1. Ceiling Panels: Defects in materials or factory workmanship.
2. Grid System: Rusting and manufacturing defects.

B. Warranty Period:

1. Wood veneer panels: One (1) year from date of installation.
2. Grid: Ten years from date of installation.

C. The Warranty shall not deprive the Owner of other rights the Owner may have under other provisions of the Contract Documents and will be in addition to and run concurrent with other warranties made by the Contractor under the requirements of the Contract Documents.

1.09 MAINTENANCE

A. Extra Materials: Deliver extra materials to Owner. Furnish extra materials described below that match products installed. Packaged with protective covering for storage and identified with appropriate labels.

1. Ceiling Units: Furnish quantity of full-size units equal to 5.0 percent of amount installed.
2. Exposed Suspension System Components: Furnish quantity of each exposed suspension component equal to 2.0 percent of amount installed.

PART 2 - PRODUCTS

2.01 MANUFACTURERS

A. Ceiling Panels:
1. Armstrong World Industries, Inc.

B. Suspension Systems:
2. Armstrong World Industries, Inc.

2.02 WOOD VENEER CEILING UNITS

A. Ceiling Panels Type AP-1:
1. Surface Texture: Smooth
2. Composition: Wood
3. Finish: Manufacturer's standard natural veneer - Natural Variations
4. Species: Natural Variations Maple
5. Size: 96in X 3-3/4in X 3/4in
6. Reveal: 3/4 inch black fleece reveal
7. Edge Banding and Trim: To match face veneer
8. Noise Reduction Coefficient (NRC): ASTM C 423
   a. Nominal 4-1/2" Module - 0.50; 0.65 with optional acoustical backing
   b. Nominal 6" Module - 0.40; 0.50 with optional acoustical backing
9. Flame Spread: ASTM E 1264; Class A.
10. Dimensional Stability: Standard
11. Acceptable Product: WoodWorks Linear, 6440W1, as manufactured by Armstrong World Industries.

B. Accessories:
1. Item #5374: #20 Wood Biscuits, for joining and aligning planks end-to-end.
2. Item #6093: 1/2 inch acoustical backing.

2.03 SUSPENSION SYSTEMS

A. Components: All linear carriers shall be commercial quality hot dipped galvanized steel as per ASTM A 653. Linear carriers are double-web steel construction with 15/16 inch type concealed flange design. Exposed sur-

faces chemically cleansed, capping prefinished galvanized steel in baked polyester paint. Linear carriers shall have rotary stitching.

1. Structural Classification: ASTM C 635, Heavy Duty.
2. Color: Black, unless noted otherwise.
3. Clips: Integral, factory-applied, spring steel clips on linear carriers in sufficient number to receive 8 foot linear wood (nominal 4 inch) (nominal 6 inch) planks.
4. Acceptable Product: HD Linear Carrier as manufactured by Armstrong World Industries, Inc.

B. Attachment Devices: Size for five times design load indicated in ASTM C 635, Table 1, Direct Hung unless otherwise indicated.

C. Wire for Hangers and Ties: ASTM A 641, Class 1 zinc coating, soft temper, pre-stretched, with a yield stress load of at least time three design load, but not less than 12 gauge.

D. Accessories/Edge Moldings and Trim:
1. Linear Splices, Item #5372, for splicing planks together end-to-end
2. RC2 Clip: Radius clip for creating faceted grid applications
3. Wall Molding:
   a. Angle Molding, Item #7805BL - 1-1/2 inch x 1-1/2 inch, Tech Black
   b. Shadow Molding, Item #7823BL - 2 inch x 1-1/4 inch x 3/4 inch, Tech Black

## PART 3 – EXECUTION

### 3.01 EXAMINATION

A. Do not proceed with installation until all wet work such as concrete, terrazzo, plastering and painting has been completed and thoroughly dried out.

B. Proper designs for both supply air and return air, maintenance of the HVAC filters and building interior space are essential to minimize soiling. Before starting the HVAC system, make sure supply air is properly filtered and the building interior is free of construction dust.

### 3.02 PREPARATION

A. Measure each ceiling area and establish layout of acoustical units to balance border widths at opposite edges of each ceiling. Avoid use of less than half width units at borders, and comply with reflected ceiling plans. Coordinate panel layout with mechanical and electrical fixtures.

### 3.03 INSTALLATION

A. Install suspension system and panels in compliance with ASTM C636; CISCA Seismic Guidelines; approved construction drawings; with the authorities having jurisdiction; and in accordance with the manufacturer's installation instructions, WoodWorks Linear Installation Instructions, LA-297076.

B. Suspend linear carriers from overhead construction with hanger wires spaced 4 feet on center along the length of the linear carrier. Install hanger wires plumb and straight. Install linear carriers 24 inches on center (or less).

C. Install wall moldings at intersection of suspended ceiling and vertical surfaces.

D. Follow the instructions found in "WoodWorks Linear Installation Instructions", LA-297076, for border treatment of the WoodWorks Linear planks.

### 3.04 ADJUSTING AND CLEANING

A. Replace damaged and broken panels.

B. Clean exposed surfaces of ceilings panels, including trim, edge moldings, and suspension members. Comply with manufacturer's instructions for cleaning and touch up of minor finish damage. Remove and replace work that cannot be successfully cleaned and repaired to permanently eliminate evidence of damage.

## PART 4 - MEASUREMENT AND PAYMENT:

### 4.01 METHOD OF MEASUREMENT:

Wood Panel Ceilings will be measured by the lump sum, complete and accepted. The Wood Panel Ceilings limits shall be as shown or described in the Contract Documents.

### 4.02 BASIS OF PAYMENT:

Wood Panel Ceilings will be paid for at the contract lump sum price. Payment for Wood Panel Ceilings will be under:

| Pay Item | | Pay Unit |
|---|---|---|
| DIV. 9 | Finishes | Lump Sum |

**END OF SECTION**

# SECTION 09 65 00 - RESILIENT FLOORING

All work and materials shall conform to the Contract Documents and the provisions of the State of Maine Department of Transportation Standard Specifications, Revision November 2014, with the following additions:

Add the following:

## PART 1 - GENERAL

### 1.01 SUMMARY

A. This Section includes the following:
   1. Static dissipating vinyl composition floor tile.

### 1.02 PERFORMANCE REQUIREMENTS

A. Static Coefficient of Friction: For flooring installed on walkway surfaces, provide products with the values indicated as determined by testing identical products per ASTM C 1028.

### 1.03 SUBMITTALS

A. Product Data: For each type of product specified.

B. Samples for Selection: Manufacturer's color charts consisting of units or sections of units showing the full range of colors and patterns available for each type of product indicated.
   1. For resilient accessories, manufacturer's standard-size samples, but not less than 12 inches long, of each resilient accessory color and pattern specified.
   2. For heat-welding bead, manufacturer's standard-size Samples, but not less than 9 inches long, of each color required.

C. Product Certificates: Signed by manufacturers of resilient products certifying that each product furnished complies with requirements.

D. Maintenance Data: For resilient flooring to include in the maintenance manuals specified in Division 1.

### 1.04 QUALITY ASSURANCE

A. Installer Qualifications: A qualified installer who employs workers for this Project who are competent in techniques required by manufacturer for floor covering installation and seaming method indicated.
   1. Engage an installer who employs workers for this Project who are trained or certified by floor covering manufacturer for installation techniques required.

B. Source Limitations: Obtain each type, color, and pattern of product specified from one source with resources to provide products of consistent quality in appearance and physical properties without delaying the Work.

C. Fire-Test-Response Characteristics: Provide products with the following fire-test-response characteristics as determined by testing identical products per test method indicated below by a testing and inspecting agency acceptable to authorities having jurisdiction.
   1. Critical Radiant Flux: 0.45 W/sq. cm or greater when tested per ASTM E 648.
   2. Smoke Density: Maximum specific optical density of 450 or less when tested per ASTM E 662.

### 1.05 DELIVERY, STORAGE, AND HANDLING

A. Deliver products to Project site in manufacturer's original, unopened cartons and containers, each bearing names of product and manufacturer, Project identification, and shipping and handling instructions.

B. Store products in dry spaces protected from the weather, with ambient temperatures maintained between 50 and 90 deg F.

C. Store tiles on flat surfaces. Do not stake boxes of tiles over 5 high.

D. Move products into spaces where they will be installed at least 48 hours before installation, unless longer conditioning period is recommended in writing by manufacturer.

1.06 PROJECT CONDITIONS

A. Maintain a temperature of not less than 70 deg F or more than 95 deg F in spaces to receive products for at least 48 hours before installation, during installation, and for at least 48 hours after installation, unless manufacturer's written recommendations specify longer time periods. After postinstallation period, maintain a temperature of not less than 55 deg F or more than 95 deg F.

B. Do not install products until they are at the same temperature as the space where they are to be installed.

C. Close spaces to traffic during flooring installation and for time period after installation recommended in writing by manufacturer.

D. Install products and accessories after other finishing operations, including painting, have been completed.

E. Where demountable partitions and other items are indicated for installation on top of resilient tile flooring, install tile before these items are installed.

F. Do not install flooring over concrete slabs until slabs have cured and are sufficiently dry to bond with adhesive, as determined by flooring manufacturer's recommended bond and moisture test as well as acceptable pH range.

1.07 EXTRA MATERIALS

A. Furnish extra materials described below that match products installed, are packaged with protective covering for storage, and are identified with labels describing contents.
   1. Furnish not less than one box of each type, color, pattern, class, wearing surface, and size of resilient tile flooring installed.
   2. Furnish not less than 10 linear feet for each type, color, pattern, and size of resilient accessory installed.
   3. Deliver extra materials to Owner.

PART 2 - PRODUCTS

2.01 MANUFACTURERS

A. Available Products: Subject to compliance with requirements, products that may be incorporated into the Work include, but are not limited to, those indicated in the following paragraphs of Part 2.

2.02 RESILIENT TILE

A. Vinyl Composition Tile: Where this designation is indicated, provide static dissipating vinyl composition floor tile complying with ASTM F 1066 and the following:
   1. Products: As follows:

a. Armstrong World Industries: Excelon
2. Color and Pattern: As selected by Architect from manufacturer's full range of colors and as indicated on the drawings.
3. Class: Class 2 (through-pattern tile).
4. Static Coefficient of Friction: Level Surfaces, minimum 0.6.
5. Thickness: 1/8 inch.
6. Size: 12 by 12 inches.
7. Application: Server Room

2.03 RESILIENT ACCESSORIES

A. Vinyl Accessory Molding: Where this designation is indicated, provide vinyl accessory molding complying with the following:
1. Available Products: As follows:
a. Johnsonite.
2. Color: As selected by Architect from manufacturer's full range of colors produced for vinyl accessory molding complying with requirements indicated.
3. Transition Strip between VCT and Carpet: CE-XX-A by Johnsonite or approved substitute.

2.04 INSTALLATION ACCESSORIES

A. Trowelable Leveling and Patching Compounds: Latex-modified, portland-cement-based formulation provided or approved by flooring manufacturer for applications indicated.

B. Adhesives: Water-resistant type recommended by manufacturer to suit resilient products and substrate conditions indicated.
1. Use adhesives that comply with the following limits for VOC content when calculated according to 40 CFR 59, Subpart D (EPA Method 24):
a. VCT Adhesives: 50 g/L.
b. Cove Base Adhesives: 50 g/L.

C. Urethane Waterproofing and Tile-Setting Adhesive: Manufacturer's standard proprietary product consisting of 1-part liquid-applied urethane in a consistency suitable for trowel application and intended for use as both waterproofing and tile-setting adhesive in a 2-step process.
1. Product: Hydroment Ultra-Set; Bostik.
2. For use with slip-resistant VCT only.

PART 3 - EXECUTION

3.01 EXAMINATION

A. Examine substrates, areas, and conditions where installation of resilient products will occur, with Installer present, for compliance with requirements for maximum moisture content, alkalinity range, installation tolerances, and other manufacturer's requirements. Verify that substrates and conditions are satisfactory for resilient product installation and comply with requirements specified.

B. Concrete Subfloors: Verify that concrete slabs comply with ASTM F 710 and the following:
1. Slab substrates are dry and free of curing compounds, sealers, hardeners, and other materials that may interfere with adhesive bond.
2. Verify that adhesion and dryness characteristics have been determined as required in Division 7 Section "Vapor Retarders, Vapor Barriers, and Air Barriers" and meet flooring manufacturer's recommendations.
3. Subfloor finishes comply with requirements specified in Division 3 Section "Cast-in-Place Concrete" for slabs receiving resilient flooring.
4. Subfloors are free of cracks, ridges, depressions, scale, and foreign deposits.

C. For wood subfloors, verify the following:
   1. Underlayment over subfloor complies with requirements specified in Division 6 Section "Rough Carpentry."
   2. Underlayment surface is free of irregularities and substances that may interfere with adhesive bond, show through surface, or stain flooring.

D. Do not proceed with installation until unsatisfactory conditions have been corrected.

3.02 PREPARATION

A. General: Comply with resilient product manufacturer's written installation instructions for preparing substrates indicated to receive resilient products.

B. Use trowelable leveling and patching compounds, according to manufacturer's written instructions, to fill cracks, holes, and depressions in substrates.

C. Use stair-tread-nose filler, according to resilient tread manufacturer's written instructions, to fill nosing substrates that do not conform to tread contours.

D. Remove coatings, including curing compounds, and other substances that are incompatible with flooring adhesives and that contain soap, wax, oil, or silicone, using mechanical methods recommended by manufacturer. Do not use solvents.

E. Broom and vacuum clean substrates to be covered immediately before product installation. After cleaning, examine substrates for moisture, alkaline salts, carbonation, or dust. Do not proceed with installation until unsatisfactory conditions have been corrected.

3.03 TILE INSTALLATION

A. General: Comply with tile manufacturer's written installation instructions.

B. Lay out tiles from center marks established with principal walls, discounting minor offsets, so tiles at opposite edges of room are of equal width. Adjust as necessary to avoid using cut widths that equal less than one-half of a tile at perimeter.
   1. Lay tiles square with room axis, unless otherwise indicated.

C. Match tiles for color and pattern by selecting tiles from cartons in the same sequence as manufactured and packaged, if so numbered. Cut tiles neatly around all fixtures. Discard broken, cracked, chipped, or deformed tiles.
   1. Lay tiles in basket-weave pattern with grain direction alternating in adjacent tiles.

D. Scribe, cut, and fit tiles to butt neatly and tightly to vertical surfaces and permanent fixtures, including built-in furniture, cabinets, pipes, outlets, edgings, door frames, thresholds, and nosings.

E. Extend tiles into toe spaces, door reveals, closets, and similar openings.

F. Maintain reference markers, holes, and openings that are in place or marked for future cutting by repeating on finish flooring as marked on subfloor. Use chalk or other nonpermanent, nonstaining marking device.

G. Install tiles on covers for telephone and electrical ducts, and similar items in finished floor areas. Maintain overall continuity of color and pattern with pieces of flooring installed on covers. Tightly adhere edges to perimeter of floor around covers and to covers.

H. Adhere tiles to flooring substrates using a full spread of adhesive applied to substrate to comply with tile manufacturer's written instructions, including those for trowel notching, adhesive mixing, and adhesive open and working times.
   1. Provide completed installation without open cracks, voids, raising and puckering at joints, telegraphing of adhesive spreader marks, and other surface imperfections.

I. Hand roll tiles according to tile manufacturer's written instructions.

J. Provide waterproofing to set tiles where slip-resistant VCT is indicated on the drawings.

## 3.04 RESILIENT ACCESSORY INSTALLATION

A. General: Install resilient accessories according to manufacturer's written installation instructions.

B. Apply resilient wall base to walls, columns, pilasters, casework and cabinets in toe spaces, locker bases, and other permanent fixtures in rooms and areas where base is required.
   1. Install wall base in lengths as long as practicable without gaps at seams and with tops of adjacent pieces aligned.
   2. Tightly adhere wall base to substrate throughout length of each piece, with base in continuous contact with horizontal and vertical substrates.
   3. Do not stretch base during installation.
   4. On masonry surfaces or other similar irregular substrates, fill voids along top edge of resilient wall base with manufacturer's recommended adhesive filler material.
   5. Form outside corners on job from straight pieces of maximum lengths possible, without whitening at bends. Shave back of base at points where bends occur and remove strips perpendicular to length of base that are only deep enough to produce a snug fit without removing more than half the wall base thickness.
   6. Form inside corners on job, from straight pieces of maximum lengths possible, by cutting an inverted V-shaped notch in toe of wall base at the point where corner is formed. Shave back of base where necessary to produce a snug fit to substrate.

C. Place resilient accessories so they are butted to adjacent materials and bond to substrates with adhesive. Install reducer strips at edges of flooring that would otherwise be exposed.
   1. Locate reducer strips or transition strips to line up centered under doors, unless noted otherwise.

D. Apply resilient products to stairs as indicated and according to manufacturer's written installation instructions with epoxy adhesive and nose filler.

## 3.05 CLEANING AND PROTECTING

A. Perform the following operations immediately after installing resilient products:
   1. Remove adhesive and other surface blemishes using cleaner recommended by resilient product manufacturers.
   2. Sweep or vacuum floor thoroughly.
   3. Do not wash floor until after time period recommended by flooring manufacturer.
   4. Damp-mop floor to remove marks and soil.

B. Clean floor surfaces as soon as possible after installation. Clean products according to manufacturer's written recommendations.
   1. After cleaning, apply polish to floor surfaces to provide protective floor finish according to flooring manufacturer's written recommendations. Apply stain resistant sealer under polish as recommended by manufacturer at all areas to receive VCT. Coordinate with Owner's maintenance program.
   2. Protect flooring with covers from time of installation to time of polish application per manufacturer’s written instructions.

3.06 WASTE MANAGEMENT

1. Separate waste in accordance with the Waste Management Plan and place in designated areas.

B. Close and seal tightly all partly used adhesive containers and store protected in well-ventilated, fire-safe area at moderate temperatures.

PART 4 - MEASUREMENT AND PAYMENT:

4.01 METHOD OF MEASUREMENT:

Resilient Flooring will be measured by the lump sum, complete and accepted. The Resilient Flooring limits shall be as shown or described in the Contract Documents.

4.02 BASIS OF PAYMENT:

Resilient Flooring will be paid for at the contract lump sum price. Payment for Resilient Flooring will be under:

| Pay Item | | Pay Unit |
|---|---|---|
| DIV. 9 | Finishes | Lump Sum |

**END OF SECTION**

# SECTION 09 68 00 - CARPETING

All work and materials shall conform to the Contract Documents and the provisions of the State of Maine Department of Transportation Standard Specifications, Revision November 2014, with the following additions:

Add the following:

PART 1 - GENERAL

1.01 GENERAL CONDITIONS The General Conditions, Supplementary General Conditions and all Sections of Division 1 shall apply to each and every contract and contractor, person or persons supplying material, labor or entering into the work directly or indirectly.

1.02 SCOPE This section includes all labor, materials, equipment and related services necessary for the fabrication, delivery and installation of the work shown on the drawings and or specified herein, including but not limited to the following:

A. Carpet Tile as scheduled.

B. Carpet adhesives, seaming, anchorage edge treatment and other accessories.

1.03 ALTERNATES: Refer to DIVISION 1 SECTIONS ALLOWANCES, UNIT PRICES, and ALTERNATES, to determine extent, if any, work of this Section will be affected by Alternates, Unit Prices or Allowances.

1.04 SUBMITTALS:

A. Prior to installation submit to the Architect two copies of the manufacturer's current recommendations for installation of the materials specified.

B. Also prior to installation, submit to the Architect a sketch showing location of all seams proposed to be made in the carpeting.

C. Prior to ordering carpet submit a full range of samples for color selection.

D. Laboratory test reports as required.

1.05 QUALITY ASSURANCE

A. For cutting, laying and trimming of carpeting, use only thoroughly trained and experienced carpet installers who are completely familiar with the materials specified, the manufacturer's recommended methods of installation, and the requirements of this work.

B. The manufacturer's recommended methods of installation shall be the basis for acceptance or rejection of methods of installation used in this work.

PART 2 - PRODUCTS

2.01 CARPET TYPE 1 (MODULAR CARPET TILE):

A. Product: "Raffia" by Mannington. Carpet tile quick-ship product.

B. Color: As selected by Architect from standard range of colors.

C. Installation: Ashlar, staggered.

2.02 CARPET TYPE 2 (MODULAR WALK-OFF MAT TILE):

A. Product: "Journey Tile" 24"x24" Tile by Mats Inc. as selected by Architect.

B. Carpet Tile Specifications:

| | |
|---|---|
| Yarn..... | 100% High Abrasive Nylon |
| Dye Method ..... | Solution Dyed |
| Secondary Backing ..... | Waterproof Backing |
| Yarn Weight ..... | 36 Oz. |
| Total Weight…… | 160 Oz Per Sq. Yd. |
| Flooring Radiant Panel Test ..... | ASTM E-648 – Class 1 |
| Smoke Density…….. | NFPA 258- Passes |
| Capret Tile Size ..... | 24" x 24" x 5/16" |
| | Program. |

2.03 ACCESSORIES

A. General: Installation materials shall conform with the quality, function, and substance of the products listed below. Architect will be the sole judge of the quality of materials to be used on the project.

B. Edging: No. 12-1812 universal molding by Roberts Consolidated Industries, Inc., or approved equal. Color of vinyl insert shall be as selected by Architect.

C. Installation Adhesive: Provide adhesive recommended by carpet manufacturer for adequate adhesion and water resistance at each application, but which will allow removal of carpet/cushion with minimum damage to carpeting materials and substrate, and which complies with requirements for overall flammability rating (if any) for carpeting installation.

D. Seaming Cement: Hot melt seaming adhesive of type recommended by the carpet manufacturer for taping seams and buttering cut edges of carpet backing (and bottom of face pile) at seams, to form secure seams and eliminate pile loss at seams.

E. Concrete Sealer: 35% solution of 42° Baume sodium silicate and a non-acid penetrating agent, compatible with adhesive.

F. Floor Filler: Levelastic or equal.

PART 3 - EXECUTION

3.01 PRE-INSTALLATION REQUIREMENTS: Installer must examine substrates and conditions which carpeting is to be installed and notify Contractor in writing of conditions detrimental to proper completion of the work. Do not proceed with installation of carpeting until unsatisfactory conditions have been corrected in a manner acceptable to Installer and carpet manufacturer.

3.02 CARPET Shall be direct cement installation. Adhesive shall be non-toxic, waterproof and latex base formulated particularly for installing carpet and approved or recommended by the carpet manufacturer. This Contractor shall coordinate and verify with General Contractor to insure compatibility of floor topping and curing compound materials with adhesive employed.

3.03 INSTALLATION

A. General:
1. Comply with manufacturer's instructions and recommendations. Place seams in directions indicated, and as accepted on shop drawings, if any. Maintain direction of pattern and

texture, including lay of pile. Do not seam weft to warp, except as specifically indicated for a direction change.

2. Extend carpet under open bottomed and raised bottom obstructions, and under removable flanges of obstructions. Extend carpet into closets and alcoves of rooms indicated for such spaces. Extend carpet under movable furniture and equipment, unless otherwise indicated.
3. Provide cutouts as indicated for removable access devices in substrate. Bind edges as neatly as possible and secure both sides of cuts to the substrate. Use double faced tape on carpet cutouts which must be lifted from substrate to gain access to devices, unless otherwise indicated. Cut only 3 sides where feasible to provide carpet flap in lieu of fully removable cutout.
4. Install carpet edge guard at locations where edge of carpet is exposed to traffic, except where another device, such as expansion joint cover system or threshold, is indicated with integral carpet binder bar or edge guard. Anchor edge guard to substrate.
5. Doors: Where seams relate to doors, center seams under door thickness. Do not place carpet seams in traffic direction in doorways.
6. Expansion Joints: Provide special carpeting treatment as indicated at expansion joints in substrate or, if none is indicate, install carpeting with provisions to accommodate movement without damaging carpet installation.

B. Glue-Down Installation:

1. Treat concrete surfaces with sealer specified. Remove excess sealer promptly. Existing floors shall be clean, wax free and sound.
2. Install a test sample to demonstrate effectiveness of adhesive. With Owner's personnel present, remove sample, demonstrating procedure to minimize damage to carpet. Apply primer to entire substrate where necessary for adequate bond of carpet.
3. Fit sections of carpet into each room or space prior to application of adhesive. Trim off mill edges unless carpet has been pre-trimmed. Maintain straight seams, true with lines of building.
4. Apply seaming cement on cut edges of carpet at seams, without being in evidence on face of carpet but securing base of pile at cut.
5. Apply adhesive uniformly to substrate in accordance with manufacturer's instructions. Butt carpet edges tightly together to form seams without gaps. Roll lightly to eliminate air pockets and ensure uniform total area bond of carpet to substrate. Remove adhesive (if any appears) promptly from face of installed carpet.
6. Coordinate with installation of base materials. Unless otherwise indicated or instructed by Architect, apply glue-down carpet before installation of resilient or wood base materials.

## 3.04 CLEANING, PROTECTION, FOLLOW-UP SERVICE

A. Remove debris from installation, carefully sorting pieces to be saved from scraps to be disposed of.

B. Vacuum carpet with a commercial machine, with rotating agitator or beater in nozzle. Remove spots and replace carpet where spots cannot be removed.

C. Advise Contractor of areas which should be protected during remainder of construction period, so that carpet will be in undamaged and unsoiled condition at time of acceptance. Recommend type of non-staining cover material that should be used for protective cover.

D. Follow-up Service: Return to installation at mutually agreeable time(s), within 6 months following substantial completion of Project (or portion thereof), unless otherwise directed or approved by Owner.

3.05 EXTRA STOCK: Upon completion of the work, and as a condition of its acceptance, deliver to the Owner 5% overage of tiles for each color and pattern of carpeting installed in this work for the Owner's future use in patching

PART 4 - MEASUREMENT AND PAYMENT:

4.01 METHOD OF MEASUREMENT:

Carpeting will be measured by the lump sum, complete and accepted. The Carpeting limits shall be as shown or described in the Contract Documents.

4.02 BASIS OF PAYMENT:

Carpeting will be paid for at the contract lump sum price. Payment for Carpeting will be under:

| Pay Item | | Pay Unit |
|---|---|---|
| DIV. 9 | Finishes | Lump Sum |

**END OF SECTION**

# SECTION 09 91 23 - INTERIOR PAINTING

All work and materials shall conform to the Contract Documents and the provisions of the State of Maine Department of Transportation Standard Specifications, Revision November 2014, with the following additions:

Add the following:

## PART 1 - GENERAL

### 1.01 RELATED DOCUMENTS

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

### 1.02 SUMMARY

A. This Section includes surface preparation and the application of paint systems on the following interior substrates:
   1. Concrete.
   2. Concrete masonry units.
   3. Wood.
   4. Gypsum board.

B. This Section includes exposed interior items and surfaces with low VOC coatings complying with ME DEP regulations.

C. Related Sections include the following:
   1. Division 06 Sections for shop priming carpentry with primers specified in this Section.
   2. Division 08 Sections for factory priming windows and doors with primers specified in this Section.
   3. Division 09 painting Sections for special-use coatings.
   4. Division 09 Section "Exterior Painting" for surface preparation and the application of paint systems on exterior substrates.

### 1.03 SUBMITTALS

A. Product List: For each product indicated, include the following:
   1. Product data.
   2. Manufacturer's Information: Manufacturer's technical information, including label analysis and instructions for handling, storing, and applying each coating material proposed for use.
   3. Cross-reference to paint system and locations of application areas. Use same designations indicated on Drawings and in schedules.
   4. Include printed statement of VOC content for each product.

B. Samples for Initial Selection: For each type of topcoat product indicated.

C. Samples for Verification: For each type of paint system and in each color and gloss of topcoat indicated.
   1. Submit Samples on rigid backing, 8 inches square.
   2. Step coats on Samples to show each coat required for system.
   3. Label each coat of each Sample.
   4. Label each Sample for location and application area.

### 1.04 QUALITY ASSURANCE

A. Applicator Qualifications: Engage an experienced Applicator who has completed painting system applications similar in material, design, and extent to those indicated for this Project, whose work has resulted in applications with a record of successful in-service performance.

B. Source Limitations: Obtain block fillers, primers and undercoat materials for each coating system from the same manufacturer as the finish coats.

C. Mockups: Apply benchmark samples of each paint system indicated and each color and finish selected to verify preliminary selections made under sample submittals and to demonstrate aesthetic effects and set quality standards for materials and execution.
   1. Architect will select one surface to represent surfaces and conditions for application of general wall paint system specified in Part 3.
      a. Wall and Ceiling Surfaces: Provide samples of at least 100 sq. ft..
      b. Other Items: Architect will designate items or areas required.
   2. Apply benchmark samples after permanent lighting and other environmental services have been activated.
   3. Final approval of color selections will be based on benchmark samples.
      a. If preliminary color selections are not approved, apply additional benchmark samples of additional colors selected by Architect at no added cost to Owner.

1.05 DELIVERY, STORAGE, AND HANDLING

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

1.06 PROJECT CONDITIONS

A. Apply paints only when temperature of surfaces to be painted and ambient air temperatures are between 50 and 95 deg F.

B. Do not apply paints when relative humidity exceeds 85 percent; at temperatures less than 5 deg F above the dew point; or to damp or wet surfaces.

1.07 EXTRA MATERIALS

A. Furnish extra materials described below that are from same production run (batch mix) as materials applied and that are packaged for storage and identified with labels describing contents.
   1. Quantity: Furnish an additional 5 percent, but not less than 1 gal. of each material and color applied.

PART 2 - PRODUCTS

2.01 MANUFACTURERS

A. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include the following:
   1. Benjamin Moore & Co
   2. Sherwin Williams
   3. Pratt & Lambert

2.02 PAINT, GENERAL

A. Material Compatibility:
   1. Provide materials for use within each paint system that are compatible with one another and substrates indicated, under conditions of service and application as demonstrated by manufacturer, based on testing and field experience.
   2. For each coat in a paint system, provide products recommended in writing by manufacturers of topcoat for use in paint system and on substrate indicated.

B. VOC Content of Field-Applied Interior Paints and Coatings: Provide products that comply with the following limits for VOC content, exclusive of colorants added to a tint base, when calculated according to 40 CFR 59, Subpart D (EPA Method 24); these requirements do not apply to paints and coatings that are applied in a fabrication or finishing shop:
   1. Flat Paints, Coatings, and Primers: VOC content of not more than 50 g/L.
   2. Nonflat Paints, Coatings, and Primers: VOC content of not more than 150 g/L.
   3. Anti-Corrosive and Anti-Rust Paints Applied to Ferrous Metals: VOC not more than 250 g/L.
   4. Floor Coatings: VOC not more than 100 g/L.
   5. Shellacs, Clear: VOC not more than 730 g/L.
   6. Shellacs, Pigmented: VOC not more than 550 g/L.
   7. Flat Topcoat Paints: VOC content of not more than 50 g/L.
   8. Nonflat Topcoat Paints: VOC content of not more than 150 g/L.
   9. Anti-Corrosive and Anti-Rust Paints Applied to Ferrous Metals: VOC not more than 250 g/L.
   10. Floor Coatings: VOC not more than 100 g/L.
   11. Shellacs, Clear: VOC not more than 730 g/L.
   12. Shellacs, Pigmented: VOC not more than 550 g/L.
   13. Primers, Sealers, and Undercoaters: VOC content of not more than 200 g/L.
   14. Dry-Fog Coatings: VOC content of not more than 400 g/L.
   15. Zinc-Rich Industrial Maintenance Primers: VOC content of not more than 340 g/L.
   16. Pre-Treatment Wash Primers: VOC content of not more than 420 g/L.

C. Chemical Components of Field-Applied Interior Paints and Coatings: Provide topcoat paints and anti-corrosive and anti-rust paints applied to ferrous metals that comply with the following chemical restrictions; these requirements do not apply to paints and coatings that are applied in a fabrication or finishing shop:
   1. Aromatic Compounds: Paints and coatings shall not contain more than 1.0 percent by weight of total aromatic compounds (hydrocarbon compounds containing one or more benzene rings).
   2. Restricted Components: Paints and coatings shall not contain any of the following:
      a. Acrolein.
      b. Acrylonitrile.
      c. Antimony.
      d. Benzene.
      e. Butyl benzyl phthalate.
      f. Cadmium.
      g. Di (2-ethylhexyl) phthalate.
      h. Di-n-butyl phthalate.
      i. Di-n-octyl phthalate.
      j. 1,2-dichlorobenzene.
      k. Diethyl phthalate.
      l. Dimethyl phthalate.
      m. Ethylbenzene.
      n. Formaldehyde.
      o. Hexavalent chromium.
      p. Isophorone.
      q. Lead.
      r. Mercury.
      s. Methyl ethyl ketone.
      t. Methyl isobutyl ketone.
      u. Methylene chloride.
      v. Naphthalene.
      w. Toluene (methylbenzene).
      x. 1,1,1-trichloroethane.
      y. Vinyl chloride.

D. Colors: Provide color selections made by the Architect. Allow for up to 10 different color selections.

2.03 PRIMERS/SEALERS

A. Low-VOC Latex Primer/Sealer:
1. Moore: Pristine Eco Spec Interior Latex Primer Sealer, No. 231

B. Wood-Knot Sealer: Sealer recommended in writing by topcoat manufacturer for use in paint systems indicated.

2.04 METAL PRIMERS

A. Rust-Inhibitive Primer (Water Based):
1. Moore: IMC Acrylic Metal Primer M04. (51 g/L)

2.05 LATEX PAINTS

A. Low-VOC Latex (Flat):
1. Moore: Pristine Eco Spec Interior Latex Flat, No. 219.

B. Low-VOC Latex (Low Luster):
1. Moore: Pristine Eco Spec Interior Latex Eggshell, No. 223

C. Low-VOC Latex (Semigloss):
1. Moore: Pristine Acrylic Semi-Gloss, No. 214

2.06 HIGH PERFORMANCE EPOXY PAINTS

A. Waterborne Epoxy Finish:
1. Moore: Moorcraft Super Spec Acrylic Epoxy Coating No. 256.

2.07 FLOOR COATINGS

A. Latex Floor and Porch Paint (Low-Luster):
1. Moore Latex Floor & Patio Enamel 122.

PART 3 - EXECUTION

3.01 EXAMINATION

A. Examine substrates and conditions, with Applicator present, for compliance with requirements for maximum moisture content and other conditions affecting performance of work.

B. Maximum Moisture Content of Substrates: When measured with an electronic moisture meter as follows:
1. Concrete: 12 percent.
2. Masonry (Clay and CMU): 12 percent.
3. Wood: 15 percent.
4. Gypsum Board: 12 percent.

C. Verify suitability of substrates, including surface conditions and compatibility with existing finishes and primers.

D. Begin coating application only after unsatisfactory conditions have been corrected and surfaces are dry.
1. Beginning coating application constitutes Contractor's acceptance of substrates and conditions.

## 3.02 PREPARATION

A. Comply with manufacturer's written instructions and recommendations in "MPI Architectural Painting Specification Manual" applicable to substrates indicated.

B. Remove plates, machined surfaces, and similar items already in place that are not to be painted. If removal is impractical or impossible because of size or weight of item, provide surface-applied protection before surface preparation and painting.
   1. After completing painting operations, use workers skilled in the trades involved to reinstall items that were removed. Remove surface-applied protection if any.
   2. Do not paint over labels of independent testing agencies or equipment name, identification, performance rating, or nomenclature plates.

C. Clean substrates of substances that could impair bond of paints, including dirt, oil, grease, and incompatible paints and encapsulants.
   1. Remove incompatible primers and reprime substrate with compatible primers as required to produce paint systems indicated.

D. Concrete Substrates: Remove release agents, curing compounds, efflorescence, and chalk. Do not paint surfaces if moisture content or alkalinity of surfaces to be painted exceeds that permitted in manufacturer's written instructions.

E. Concrete Masonry Substrates: Remove efflorescence and chalk. Do not paint surfaces if moisture content or alkalinity of surfaces to be painted exceeds that permitted in manufacturer's written instructions.

F. Steel Substrates: Remove rust and loose mill scale. Clean using methods recommended in writing by paint manufacturer.

G. Galvanized-Metal Substrates: Remove grease and oil residue from galvanized sheet metal fabricated from coil stock by mechanical methods to produce clean, lightly etched surfaces that promote adhesion of subsequently applied paints. Uniformly abrade galvanized surfaces with a palm sander and 60 grit aluminum oxide so surface is free of oil and surface contaminants.

H. Wood Substrates:
   1. Scrape and clean knots, and apply coat of knot sealer before applying primer.
   2. Sand surfaces that will be exposed to view, and dust off.
   3. Prime edges, ends, faces, undersides, and backsides of wood.
   4. After priming, fill holes and imperfections in the finish surfaces with putty or plastic wood filler. Sand smooth when dried.

I. Gypsum Board Substrates: Do not begin paint application until finishing compound is dry and sanded smooth.

J. Cotton or Canvas Insulation Covering Substrates: Remove dust, dirt, and other foreign material that might impair bond of paints to substrates.

## 3.03 APPLICATION

A. Apply paints according to manufacturer's written instructions.
   1. Use applicators and techniques suited for paint and substrate indicated.
   2. Paint surfaces behind movable equipment and furniture same as similar exposed surfaces. Before final installation, paint surfaces behind permanently fixed equipment or furniture with prime coat only.
   3. Paint front and backsides of access panels, removable or hinged covers, and similar hinged items to match exposed surfaces.
   4. Apply an additional coat of primer on metal surfaces that have been shop primed.

B. Tinting: Tint primer of colors such as reds, yellows, and oranges with a gray basecoat system designed to help provide color coverage.
   1. Do not tint prime or base coat for multi-colored finishes.

C. If undercoats or other conditions show through topcoat, apply additional coats until cured film has a uniform paint finish, color, and appearance. Give special attention to ensure edges, corners, crevices, welds, and exposed fasteners receive a dry film thickness equivalent to that of flat surfaces. When using colors such as red, yellow or orange, an extra coat of finish may be necessary. Notify Architect when additional coats do not fix the problem.

D. Apply paints to produce surface films without cloudiness, spotting, holidays, laps, brush marks, roller tracking, runs, sags, ropiness, or other surface imperfections. Cut in sharp lines and color breaks.

E. Painting Mechanical and Electrical Work: Paint items exposed in equipment rooms and occupied spaces including, but not limited to, the following:
   1. Mechanical, Plumbing and Fire Protection Work:
      a. Uninsulated metal and plastic piping.
      b. Pipe hangers and supports.
      c. Tanks that do not have factory-applied final finishes.
      d. Visible portions of internal surfaces of metal ducts, without liner, behind air inlets and outlets.
      e. Duct, equipment, and pipe insulation having cotton or canvas insulation covering or other paintable jacket material.
      f. Mechanical equipment that is indicated to have a factory-primed finish for field painting.
   2. Electrical Work:
      a. Switchgear and panelboards.
      b. Electrical equipment that is indicated to have a factory-primed finish for field painting.

## 3.04 CLEANING AND PROTECTION

A. At end of each workday, remove rubbish, empty cans, rags, and other discarded materials from Project site.

B. After completing paint application, clean spattered surfaces. Remove spattered paints by washing, scraping, or other methods. Do not scratch or damage adjacent finished surfaces.

C. Protect work of other trades against damage from paint application. Correct damage to work of other trades by cleaning, repairing, replacing, and refinishing, as approved by Architect, and leave in an undamaged condition.

D. At completion of construction activities of other trades, touch up and restore damaged or defaced painted surfaces.

## 3.05 INTERIOR PAINTING SCHEDULE

A. VOC Compliance, General: Provide the manufacturers' formulations for the products specified below that comply with the VOC requirements for the State of Maine Department of Environmental Protection in paragraph 2.2 of this Section.

B. Concrete Substrates, Traffic Surfaces:
   1. Latex Floor Coating System:
      a. Prime Coat: Latex floor and porch paint (low gloss).
      b. Intermediate Coat: Latex floor and porch paint (low gloss).
      c. Topcoat: Latex floor and porch paint (low gloss).
   2. High-Performance Epoxy System:
      a. Prime Coat: Latex block filler.
      b. Intermediate Coat: High-performance architectural latex matching topcoat.
      c. Topcoat: High-performance architectural latex (semigloss).

C. Steel Substrates: Including, but not limited to structural steel columns, steel doors and frames, steel stairs (including risers and stringers), handrails and guardrails, lintel plates and angles, wood door glass lite kits and astragals, access panels (both sides), metal fabrications; see Division 05 Section "Metal Fabrications", and miscellaneous metal items.
   1. Low-VOC Latex Over DTM Primer System:
      a. Prime Coat: DTM anticorrosive metal primer.
      b. Intermediate Coat: Low-VOC latex paint matching topcoat.
      c. Topcoat: Low-VOC latex semi-gloss paint.

D. Steel Substrates: Including, but not limited to structural steel beams, structural steel bar joists, and galvanized steel roof decking.
   1. Low-VOC Latex Dry-Fall System:
      a. Prime Coat for Beams and Bar Joists: By Others.
      b. Prime Coat for Beams and Bar Joists: By Others.
      c. One Coat: Low-VOC dry-fall latex semi-gloss paint.
         1) Color selection shall include mid-tone colors.
         2) Include deep-tone base product.

E. Galvanized-Metal Substrates:
   1. Low-VOC Latex Over DTM Primer System:
      a. Prime Coat: DTM anticorrosive metal primer.
      b. Intermediate Coat: Low-VOC latex paint matching topcoat.
      c. Topcoat: Low-VOC latex semi-gloss paint.

F. Dressed Lumber Substrates: Including architectural woodwork.
   1. Low-VOC Latex System:
      a. Prime Coat: Interior latex-based wood primer.
      b. Intermediate Coat: Low-VOC latex paint matching topcoat.
      c. Topcoat: Low-VOC latex (semigloss) paint.

G. MDF Substrates: Including window sills by architectural woodwork.
   1. Alkyd Based Primer/Sealer System:
      a. Prime Coat: Zinsser “Cover Stain” #3501 White.
      b. Intermediate and Top Coat: By others.

H. Gypsum Board Substrates:
   1. Low-VOC Latex System:
      a. Prime Coat: Low-VOC latex primer/sealer.
      b. Intermediate Coat: Low-VOC latex paint matching topcoat.
      c. Topcoat: Low-VOC latex (flat for ceilings) (eggshell for walls) paint.

## PART 4 - MEASUREMENT AND PAYMENT:

### 4.01 METHOD OF MEASUREMENT:

Interior Painting will be measured by the lump sum, complete and accepted. The Interior Painting limits shall be as shown or described in the Contract Documents.

### 4.02 BASIS OF PAYMENT:

Interior Painting will be paid for at the contract lump sum price. Payment for Interior Painting will be under:

| Pay Item | | Pay Unit |
|---|---|---|
| DIV. 9 | Finishes | Lump Sum |

**END OF SECTION**

# SECTION 10 14 00 - SIGNS

All work and materials shall conform to the Contract Documents and the provisions of the State of Maine Department of Transportation Standard Specifications, Revision November 2014, with the following additions:

Add the following:

## PART 1 - GENERAL

### 1.01 RELATED DOCUMENTS

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

### 1.02 SUMMARY

A. This Section includes the following types of signs:
   1. Panel signs as shown and as listed herein.

B. Related Sections: The following Sections contain requirements that relate to this Section:
   1. Division 01 Section "Temporary Facilities and Controls" for temporary project identification signs.
   2. Divisions 22 and 23 Sections for labels, tags, and nameplates for mechanical equipment.
   3. Division 26 Sections for labels, tags, and nameplates for electrical equipment.
   4. Division 26 Section "Interior Lighting Fixtures" for illuminated exit signs.

### 1.03 SUBMITTALS

A. Product Data: For each type of sign specified, including details of construction relative to materials, dimensions of individual components, profiles, and finishes.

B. Shop Drawings: Show fabrication and erection of signs. Include plans, elevations, and large-scale sections of typical members and other components.
   1. Provide message list for each sign required, including large-scale details of wording and lettering layout.
   2. For signs supported by or anchored to permanent construction, provide setting drawings, templates, and directions for installation of anchor bolts and other anchors to be installed as a unit of Work in other Sections.

C. Samples: Provide the following samples of each sign component for initial selection of color, pattern and surface texture as required and for verification of compliance with requirements indicated.
   1. Samples for selection of color, pattern, and texture:
      a. Cast Acrylic Sheet and Plastic Laminate: Manufacturer's color charts consisting of actual sections of material including the full range of colors available for each material required.

### 1.04 QUALITY ASSURANCE

A. Sign Fabricator Qualifications: Firm experienced in producing signs similar to those indicated for this Project, with a record of successful in-service performance, and sufficient production capacity to produce sign units required without causing delay in the Work.

B. Single-Source Responsibility: For each separate sign type required, obtain signs from one source of a single manufacturer.

C. Regulatory Requirements: Comply with the Americans with Disabilities Act (ADA) and with code provisions as adopted by authorities having jurisdiction.
   1. Interior Code Signage: Provide signage as required by accessibility regulations and requirements of authorities having jurisdiction. These include, but are not limited to, the following:
      a. Illuminated Exit Signs: Refer to Division 26.
      b. Elevator Signs: Refer to Division 14.
      c. Stairway Identification:
      d. Signs for Accessible Spaces:
         1) Accessible entrances when not all are accessible (inaccessible entrances shall have directional signage to indicate the route to the nearest accessible entrance.
         2) Accessible toilet and bathing facilities when not all are accessible.
   2. Notify Architect of details or specifications not conforming to code.

D. Design Concept: The Drawings indicate sizes, profiles, and dimensional requirements of signs and are based on the specific types and models indicated. Sign units by other manufacturers may be considered provided deviations in dimensions and profiles do not change the design concept as judged by the Architect. The burden of proof of equality is on the proposer.

1.05 PROJECT CONDITIONS

A. Field Measurements: Take field measurements prior to preparation of shop drawings and fabrication to ensure proper fitting. Show recorded measurements on final shop drawings. Coordinate fabrication schedule with construction progress to avoid delay.

PART 2 - PRODUCTS

2.01 MANUFACTURERS

A. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated in the Work include, but are not limited to, the following:
   1. Manufacturers of Panel Signs:
      a. Welch Architectural Signage.
      b. Mohawk Sign Systems.

2.02 MATERIALS

A. Cast Acrylic Sheet: Provide cast (not extruded or continuous cast) methyl methacrylate monomer plastic sheet, in sizes and thicknesses indicated, with a minimum flexural strength of 16,000 psi when tested according to ASTM D 790, with a minimum allowable continuous service temperature of 176 deg F, and of the following general types:
   1. Opaque Sheet: Where sheet material is indicated as "opaque," provide colored opaque acrylic sheet in colors and finishes as selected from the manufacturer's standards.

B. Colored Coatings for Acrylic Plastic Sheet: Use colored coatings, including inks and paints for copy and background colors, that are recommended by acrylic manufacturers for optimum adherence to acrylic surface and are nonfading for the application intended.

2.03 PANEL SIGNS

A. Substrate: Fabricate signs from 1/8 inch thick matte clear acrylic with edges mechanically and smoothly finished to eliminate cut marks. Background color to be subsurface.

1. Background Color: As selected by the Architect from manufacturer's standard colors.
   a. Provide additional backer sheet, projecting ¼ in. beyond face panel at all sides.
   b. Contrasting color as selected by the Architect.
2. Edge Condition: Beveled.
3. Corner Condition: Rounded to 3/8 inch radius.
4. Size: 6 by 6 inch, unless noted otherwise.

B. Copy: Helvetica.

C. Letterform: route copy into face of substrate 1/32 inch deep. Chemically weld (inlay) computer precision cut tactile copy into routed letter openings so that tactile copy is embedded in substrate and remains at least 1/32" above surface of substrate.
1. Height: 5/8 inch minimum letter height.

D. Braille: Use engrave process for all Braille areas. Engrave Braille dots into surface of clear material.

E. Symbols of Accessibility:
1. Accessible elements: Provide international symbol of accessibility.
   a. Provide male and female symbols as required for toilets.

F. Provide characters complying with ADA Accessibility Guidelines and ICC/ANSI A117.1. Text shall be accompanied by Grade 2 braille.

## 2.04 FINISHES

A. Colors and Surface Textures: For exposed sign material that requires selection of materials with integral or applied colors, surface textures or other characteristics related to appearance, provide color matches indicated, or if not indicated, as selected by the Architect from the manufacturer's standards.

# PART 3 - EXECUTION

## 3.01 INSTALLATION

A. General: Locate sign units and accessories where indicated, using mounting methods of the type described and in compliance with the manufacturer's instructions.
1. Install signs level, plumb, and at the height indicated, with sign surfaces free from distortion or other defects in appearance.
2. Locate signs in accordance with approved shop drawings and ADA requirements.

B. Wall-Mounted Panel Signs: Attach panel signs to wall surfaces using the methods indicated below:
1. Vinyl-Tape Mounting: Use double-sided foam tape to mount signs to smooth, nonporous surfaces. Do not use this method for vinyl-covered or rough surfaces.

## 3.02 CLEANING AND PROTECTION

A. After installation, clean soiled sign surfaces according to the manufacturer's instructions. Protect units from damage until acceptance by the Owner.

## 3.03 PANEL SIGN SCHEDULE

| A. Types: | Sizes: | Quantity: |
|---|---|---|
| HC Accessible Symbols | Provide 4" x 4" | 3 |
| Exit | Provide 6" x 6" | one for each exit |

| | | |
|---|---|---|
| Room Identification | Provide 6" x 6" | one for each room |

B. Account for an informational sign at room. Rooms with more than one entrance door shall have a sign at each door. Final room names and numbers will be verified during the submittal.

PART 4 - MEASUREMENT AND PAYMENT:

4.01 METHOD OF MEASUREMENT:

Signs will be measured by the lump sum, complete and accepted. The Signs limits shall be as shown or described in the Contract Documents.

4.02 BASIS OF PAYMENT:

Signs will be paid for at the contract lump sum price. Payment for Signs will be under:

| Pay Item | | Pay Unit |
|---|---|---|
| DIV. 10 | Specialties | Lump Sum |

**END OF SECTION**

# SECTION 10 21 13 - SOLID PLASTIC TOILET COMPARTMENTS

All work and materials shall conform to the Contract Documents and the provisions of the State of Maine Department of Transportation Standard Specifications, Revision November 2014, with the following additions:

Add the following:

## PART 1 - GENERAL

### 1.01 SUMMARY

A. This Section includes toilet compartments and screens as follows:
   1. Type: Solid plastic (HDPE), integral color.
   2. Compartment Style: Overhead braced and floor anchored.
   3. Screen Style: Wall hung.

### 1.02 SUBMITTALS

A. Product Data: For each type and style of toilet compartment and screen specified. Include details of construction relative to materials, fabrication, and installation. Include details of anchors, hardware, and fastenings.

B. Shop Drawings: For fabrication and installation of toilet compartment and screen assemblies. Include plans, elevations, sections, details, and attachments to other work.
   1. Show locations of reinforcement and cutouts for compartment-mounted toilet accessories.

C. Samples for Selection: Manufacturer's color charts consisting of sections of actual units showing the full range of colors, textures, and patterns available for each type of compartment or screen indicated.

## PART 2 - PRODUCTS

### 2.01 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:
   1. Scranton Products.
   2. Hadrian Inc.
   3. Bradley Corp.
   4. ASI.

### 2.02 MATERIALS

A. General: Provide materials that have been selected for surface flatness and smoothness. Exposed surfaces that exhibit pitting, seam marks, roller marks, stains, discolorations, telegraphing of core material, or other imperfections on finished units are unacceptable.

B. Material: Manufacturer's standard HDPE with finished thickness of 1 inch (25 mm) minimum for doors, panels, screens, and pilasters.

C. Pilaster Shoes and Sleeves (Caps): ASTM A 666, Type 302 or 304 stainless steel, not less than 0.0312 inch (0.8 mm) thick and 3 inches (75 mm) high, finished to match hardware.

D. Full-Height (Continuous) Brackets: Manufacturer's standard design for attaching panels and screens to walls and pilasters of the following material:

1. Material: Clear-anodized aluminum.

E. Hardware and Accessories: Manufacturer's standard design, heavy-duty operating hardware and accessories of the following material:
1. Material: Stainless steel.

F. Overhead Bracing: Manufacturer's standard continuous, extruded-aluminum head rail with anti-grip profile in manufacturer's standard finish.

G. Anchorages and Fasteners: Manufacturer's standard exposed fasteners of stainless steel or chrome-plated steel or brass, finished to match hardware, with theft-resistant-type heads. Provide sex-type bolts for through-bolt applications. For concealed anchors, use hot-dip galvanized or other rust-resistant, protective-coated steel.

2.03 FABRICATION

A. General: Provide standard doors, panels, screens, and pilasters fabricated for compartment system. Provide units with cutouts and drilled holes to receive compartment-mounted hardware, accessories, and grab bars, as indicated.
1. Provide internal reinforcement in metal units for compartment-mounted hardware, accessories, and grab bars, as indicated.

B. Overhead-Braced-and-Floor-Anchored Compartments: Provide manufacturer's standard corrosion-resistant supports, leveling mechanism, fasteners, and anchors at pilasters to suit floor conditions. Make provisions for setting and securing continuous head rail at top of each pilaster. Provide shoes at pilasters to conceal supports and leveling mechanism.

C. Wall-Hung Screens: Provide units in sizes indicated of same construction and finish as compartment panels, unless otherwise indicated.
1. Provide metal-faced screens with integral full-height flanges for attachment to wall.

D. Doors: Unless otherwise indicated, provide 24-inch- (610-mm-) wide in-swinging doors for standard toilet compartments and 36-inch- (914-mm-) wide out-swinging doors with a minimum 32-inch- (813-mm-) wide clear opening for compartments indicated to be handicapped accessible.
1. Hinges: Manufacturer's standard self-closing type that can be adjusted to hold door open at any angle up to 90 degrees.
2. Latch and Keeper: Manufacturer's standard surface-mounted latch unit with combination rubber-faced door strike and keeper designed for emergency access. Provide units that comply with accessibility requirements of authorities having jurisdiction at compartments indicated to be handicapped accessible.
3. Coat Hook: Manufacturer's standard combination hook and rubber-tipped bumper, sized to prevent door from hitting compartment-mounted accessories.
4. Door Bumper: Manufacturer's standard rubber-tipped bumpers at out-swinging doors or entrance screen doors.
5. Door Pull: Manufacturer's standard unit that complies with accessibility requirements of authorities having jurisdiction at out-swinging doors. Provide units on both sides of doors at compartments indicated to be handicapped accessible.

PART 3 - EXECUTION

3.01 INSTALLATION

A. General: Comply with manufacturer's written installation instructions. Install units rigid, straight, plumb, and level. Provide clearances of not more than 1/2 inch (13 mm) between pilasters and panels and not more than 1 inch (25 mm) between panels and walls. Secure units in position with manufacturer's recommended anchoring devices.
1. Secure panels to walls and panels with continuous bracket attached to one side of panel.

B. Overhead-Braced-and-Floor-Anchored Compartments: Secure pilasters to floor and level, plumb, and tighten. Secure continuous head rail to each pilaster with not less than 2 fasteners. Hang doors and adjust so tops of doors are parallel with overhead brace when doors are in closed position.

C. Screens: Secure screen to wall with full height brackets on each side. Attach with anchoring devices according to manufacturer's written instructions and to suit supporting structure. Set units level and plumb and to resist lateral impact.

D. Where full height brackets are mounted on tile wainscot, cut bracket into two pieces and attached flush to tile and wall surfaces.

## PART 4 - MEASUREMENT AND PAYMENT:

### 4.01 METHOD OF MEASUREMENT:

Solid Plastic Toilet Compartments will be measured by the lump sum, complete and accepted. The Solid Plastic Toilet Compartments limits shall be as shown or described in the Contract Documents.

### 4.02 BASIS OF PAYMENT:

Solid Plastic Toilet Compartments will be paid for at the contract lump sum price. Payment for Solid Plastic Toilet Compartments will be under:

| Pay Item | | Pay Unit |
|---|---|---|
| DIV. 10 | Specialties | Lump Sum |

**END OF SECTION**

# SECTION 10 28 00 - TOILET AND BATH ACCESSORIES

All work and materials shall conform to the Contract Documents and the provisions of the State of Maine Department of Transportation Standard Specifications, Revision November 2014, with the following additions:

Add the following:

## PART 1 - GENERAL

### 1.01 SUMMARY

A. This Section includes the following:
   1. Toilet and bath accessories.

### 1.02 SUBMITTALS

A. Product Data: Include construction details, material descriptions and thicknesses, dimensions, profiles, fastening and mounting methods, specified options, and finishes for each type of accessory specified.

B. Setting Drawings: For cutouts required in other work; include templates, substrate preparation instructions, and directions for preparing cutouts and installing anchoring devices.

C. Product Schedule: Indicating types, quantities, sizes, and installation locations by room of each accessory required. Use designations indicated in the Toilet and Bath Accessory Schedule and room designations indicated on Drawings in product schedule.

D. Maintenance Data: For accessories to include in maintenance manuals specified in Division 1. Provide lists of replacement parts and service recommendations.

### 1.03 COORDINATION

A. Coordinate accessory locations with other work to prevent interference with clearances required for access by disabled persons, proper installation, adjustment, operation, cleaning, and servicing of accessories.

B. Deliver inserts and anchoring devices set into concrete or masonry as required to prevent delaying the Work.

### 1.04 WARRANTY

A. General Warranty: Special warranty specified in this Article shall not deprive Owner of other rights Owner may have under other provisions of the Contract Documents and shall be in addition to, and run concurrent with, other warranties made by Contractor under requirements of the Contract Documents.

B. Manufacturer's Mirror Warranty: Written warranty, executed by mirror manufacturer agreeing to replace mirrors that develop visible silver spoilage defects within minimum warranty period indicated.
   1. Minimum Warranty Period: 10 years from date of Substantial Completion.

## PART 2 - PRODUCTS

### 2.01 MANUFACTURERS

A. Available Manufacturers: Subject to compliance with requirements, manufacturers offering accessories that may be incorporated into the Work include, but are not limited to, the following:

1. Toilet and Bath Accessories:
   a. American Specialties, Inc.
   b. Bobrick Washroom Equipment, Inc.
   c. Bradley Corporation.
   d. Gamco (General Accessory Manufacturing Company)

B. Available Products: Subject to compliance with requirements, products that may be incorporated into the Work include, but are not limited to, those indicated in the Toilet and Bath Accessory Schedule at the end of Part 3.

## 2.02 MATERIALS

A. Stainless Steel: ASTM A 666, Type 304, with No. 4 finish (satin), in 0.0312-inch (0.8-mm) minimum nominal thickness, unless otherwise indicated.

B. Sheet Steel: ASTM A 366/A 366M, cold rolled, commercial quality, 0.0359-inch (0.9-mm) minimum nominal thickness; surface preparation and metal pretreatment as required for applied finish.

C. Galvanized Steel Sheet: ASTM A 653/A 653M, G60 (Z180).

D. Chromium Plating: ASTM B 456, Service Condition Number SC 2 (moderate service), nickel plus chromium electrodeposited on base metal.

E. Baked-Enamel Finish: Factory-applied, gloss-white, baked-acrylic-enamel coating.

F. Mirror Glass: ASTM C 1036, Type I, Class 1, Quality q2, nominal 6.0 mm thick, with silvering, electroplated copper coating, and protective organic coating complying with FS DD-M-411.

G. Galvanized Steel Mounting Devices: ASTM A 153/A 153M, hot-dip galvanized after fabrication.

H. Fasteners: Screws, bolts, and other devices of same material as accessory unit, tamper and theft resistant when exposed, and of galvanized steel when concealed.

## 2.03 FABRICATION

A. General: One, maximum 1-1/2-inch- (38-mm-) diameter, unobtrusive stamped manufacturer logo, as approved by Architect, is permitted on exposed face of accessories. On interior surface not exposed to view or back surface of each accessory, provide printed, waterproof label or stamped nameplate indicating manufacturer's name and product model number.

B. General: Names or labels are not permitted on exposed faces of accessories. On interior surface not exposed to view or on back surface of each accessory, provide printed, waterproof label or stamped nameplate indicating manufacturer's name and product model number.

C. Surface-Mounted Toilet Accessories: Unless otherwise indicated, fabricate units with tight seams and joints, and exposed edges rolled. Hang doors and access panels with continuous stainless-steel hinge. Provide concealed anchorage where possible.

D. Framed Glass-Mirror Units: Fabricate frames for glass-mirror units to accommodate glass edge protection material. Provide mirror backing and support system that permits rigid, tamper-resistant glass installation and prevents moisture accumulation.
   1. Provide galvanized steel backing sheet, not less than 0.034 inch (0.85 mm) and full mirror size, with nonabsorptive filler material. Corrugated cardboard is not an acceptable filler material.

E. Mirror-Unit Hangers: Provide mirror-unit mounting system that permits rigid, tamper- and theft-resistant installation, as follows:
   1. One-piece, galvanized steel, wall-hanger device with spring-action locking mechanism to hold mirror unit in position with no exposed screws or bolts.
   2. Heavy-duty wall brackets of galvanized steel, equipped with concealed locking devices requiring a special tool to remove.

F. Keys: Provide universal keys for internal access to accessories for servicing and resupplying. Provide minimum of six keys to Owner's representative.

## PART 3 - EXECUTION

### 3.01 INSTALLATION

A. Install accessories according to manufacturers' written instructions, using fasteners appropriate to substrate indicated and recommended by unit manufacturer. Install units level, plumb, and firmly anchored in locations and at heights indicated.

B. Secure mirrors to walls in concealed, tamper-resistant manner with special hangers, toggle bolts, or screws. Set units level, plumb, and square at locations indicated, according to manufacturer's written instructions for substrate indicated.

C. Install grab bars to withstand a downward load of at least 250 lbf (1112 N), when tested according to method in ASTM F 446.

### 3.02 ADJUSTING AND CLEANING

A. Adjust accessories for unencumbered, smooth operation and verify that mechanisms function properly. Replace damaged or defective items.

B. Remove temporary labels and protective coatings.

C. Clean and polish exposed surfaces according to manufacturer's written recommendations.

### 3.03 TOILET AND BATH ACCESSORY SCHEDULE

A. Combination Towel Dispenser/Waste Receptacle: PT/WR-1 & PT/WR-2 Where this designation is indicated, provide stainless-steel combination unit complying with the following:
   1. Products: Available products include the following:
      a. PT/WR-1 Similar to No. B-38032 by Bobrick.
      b. PT/WR-2 Similar to No B-380349 by Bobrick
   2. Semi Recessed and surface Type with Single Flush Door: Designed for nominal 4-inch (100-mm) wall depth with continuous, seamless wall flange; towel dispenser in unit's upper compartment designed to dispense minimum of 600 C-fold or 800 multifold paper towels; waste receptacle in unit's lower portion and with minimum 6.3-gal. (12-L) capacity, reusable, vinyl liner; and compartment double-panel door with continuous hinge and tumbler locksets.

B. Toilet Tissue Dispenser: TP Where this designation is indicated, provide toilet tissue dispenser complying with the following:
   1. Products: Available products include the following:
      a. Bobrick No. B-2888.
   2. Type: Roll-in-reserve dispenser with hinged front secured with tumbler lockset.
   3. Mounting: Surface mounted with concealed anchorage.
   4. Material: Stainless steel.
   5. Operation: Noncontrol delivery with mfr's standard spindle.

6. Capacity: Designed for 4-1/2- or 5-inch- (114- or 127-mm-) diameter-core tissue rolls.

C. Soap Dispenser: SD-1 Where this designation is indicated, provide soap dispenser complying with the following:
   1. Products: Available products include the following:
      a. Bobrick No. B-2112.
   2. Liquid Soap Dispenser, Horizontal-Tank Type: Surface-mounted type, minimum 40-oz. (1182.9-mL) capacity tank with stainless-steel piston, springs, and internal parts designed to dispense soap in measured quantity by pump action; and stainless-steel cover with unbreakable window-type refill indicator.
      a. Soap Valve: Designed for dispensing soap in liquid form.

D. Soap Dispenser: SD-2 Where this designation is indicated, provide soap dispenser complying with the following:
   1. Products: Available products include the following:
      a. Bobrick No. B-822

E. Grab Bars: GB36 ; GB42 Where this designation is indicated, provide stainless-steel grab bar complying with the following:
   1. Products: Available products include the following:
      a. Bobrick No. B-5806 Series.
   2. Stainless-Steel Nominal Thickness: Minimum 0.05 inch (1.3 mm).
   3. Mounting: Concealed with manufacturer's standard flanges and anchors.
   4. Gripping Surfaces: Manufacturer's standard slip-resistant texture.
   5. Outside Diameter: 1-1/4 inches (32 mm) for medium-duty applications.

F. Sanitary Napkin Disposal Unit: SND Where this designation is indicated, provide stainless-steel sanitary napkin disposal unit complying with the following:
   1. Products: Available products include the following:
      a. Bobrick No. B-254.
   2. Surface-Mounted Type: With seamless exposed walls; self-closing top cover; locking bottom panel with stainless-steel, continuous hinge; and removable, reusable receptacle.

G. Mirror Unit: M24X36 Where this designation is indicated, provide mirror unit complying with the following:
   1. Products: Available products include the following:
      a. Bobrick No. B-165 2436.
   2. Stainless-Steel, Channel-Framed Mirror: Fabricate frame from stainless-steel channels in manufacturer's standard satin or bright finish with square corners mitered to hairline joints and mechanically interlocked.

H. Robe Hook:
   1. Products: Available products include the following:
      a. Similar to No. B-7671 by Bobrick.
   2. Single-Prong Unit: Stainless-steel, single-prong robe hook with rectangular wall bracket and backplate for concealed mounting.

H. Towel Bar: TB30 Where this designation is indicated, provide 30” long Stainless Steel towel bar complying with the following:
   1. Products: 5800SF by Franklin Brass
   2. Outside Diameter: 1 inch

## PART 4 - MEASUREMENT AND PAYMENT:

### 4.01 METHOD OF MEASUREMENT:

Toilet Accessories will be measured by the lump sum, complete and accepted. The Toilet Accessories limits shall be as shown or described in the Contract Documents.

4.02 BASIS OF PAYMENT:

Toilet Accessories will be paid for at the contract lump sum price. Payment for Toilet Accessories will be under:

| Pay Item | | Pay Unit |
|---|---|---|
| DIV. 10 | Specialties | Lump Sum |

**END OF SECTION**

# SECTION 10 44 13 - FIRE EXTINGUISHER CABINETS

All work and materials shall conform to the Contract Documents and the provisions of the State of Maine Department of Transportation Standard Specifications, Revision November 2014, with the following additions:

Add the following:

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

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

1.02 SUMMARY

A. Section Includes:
   1. Fire protection cabinets for the following:
      a. Portable fire extinguishers.

B. Related Sections:
   1. Division 10 Section "Fire Extinguishers."

1.03 SUBMITTALS

A. Product Data: For each type of product indicated. Include construction details, material descriptions, dimensions of individual components and profiles, and finishes for fire protection cabinets.

   1. Fire Protection Cabinets: Include roughing-in dimensions, details showing mounting methods, relationships of box and trim to surrounding construction, door hardware, cabinet type, trim style, and panel style.
   2. Show location of knockouts for hose valves.

B. Shop Drawings: For fire protection cabinets. Include plans, elevations, sections, details, and attachments to other work.

C. Product Schedule: For fire protection cabinets. Coordinate final fire protection cabinet schedule with fire extinguisher schedule to ensure proper fit and function. Use same designations indicated on Drawings.

D. Maintenance Data: For fire protection cabinets to include in maintenance manuals.

1.04 QUALITY ASSURANCE

A. Fire-Rated, Fire Protection Cabinets: Listed and labeled to comply with requirements in ASTM E 814 for fire-resistance rating of walls where they are installed.

1.05 COORDINATION

A. Coordinate size of fire protection cabinets to ensure that type and capacity of fire extinguishers indicated are accommodated.

B. Coordinate size of fire protection cabinets to ensure that type and capacity of fire hoses, hose valves, and hose racks indicated are accommodated.

C. Coordinate sizes and locations of fire protection cabinets with wall depths.

## PART 2 - PRODUCTS

### 2.01 MATERIALS

A. Cold-Rolled Steel Sheet: ASTM A 1008/A 1008M, Commercial Steel (CS), Type B.

B. Stainless-Steel Sheet: ASTM A 666, Type 304.

C. Tempered Float Glass: ASTM C 1048, Kind FT, Condition A, Type I, Quality q3, 3 mm thick, Class 1 (clear).

### 2.02 FIRE PROTECTION CABINET

A. Cabinet Type: Suitable for fire extinguisher.

B. Basis of Design Product: Potter-Roemer FRC-7060-DV, Recessed, Stainless Steel

C. Available Products: Subject to compliance with requirements, products that may be incorporated into the Work include, but are not limited to, the following.
   1. J.L. Industries: Cosmopolitan Series .
   2. Larsen's: Architectural Series.
   3. Potter-Roemer: Alta Series.

D. Cabinet Construction: Fire rated.

E. Cabinet Material: Stainless steel.
   1. Shelf: Enameled steel.

F. Semi-recessed Cabinet: Cabinet box partially recessed in walls of sufficient depth to suit style of trim indicated; with one-piece combination trim and perimeter door frame overlapping surrounding wall surface with exposed trim face and wall return at outer edge (backbend). Provide where walls are of insufficient depth for recessed cabinets but are of sufficient depth to accommodate semi-recessed cabinet installation.
   1. Rolled-Edge Trim: 2-1/2-inch backbend depth.

G. Surface-Mounted Cabinet: Cabinet box fully exposed and mounted directly on wall with no trim. Provide where indicated on the drawings.

H. Cabinet Trim Material: Stainless-steel sheet.

I. Door Material: Stainless-steel sheet.

J. Door Style: Fully glazed panel with frame.

K. Door Glazing: Clear tempered glass, 3 mm.

L. Door Hardware: Manufacturer's standard door-operating hardware of proper type for cabinet type, trim style, and door material and style indicated.
   1. Provide projecting door pull and friction latch.
   2. Provide manufacturer's standard hinge permitting door to open 180 degrees.

M. Finishes:
   1. Manufacturer's standard baked-enamel paint for the following:
      a. Interior of cabinet and door.

   2. Stainless Steel: No. 4.

2.03 FABRICATION

A. Fire Protection Cabinets: Provide manufacturer's standard box (tub) with trim, frame, door, and hardware to suit cabinet type, trim style, and door style indicated.
   1. Weld joints and grind smooth.
   2. Provide factory-drilled mounting holes.

B. Cabinet Doors: Fabricate doors according to manufacturer's standards, from materials indicated and coordinated with cabinet types and trim styles selected.
   1. Fabricate door frames with tubular stiles and rails and hollow-metal design, minimum 1/2 inch thick.
   2. Fabricate door frames of one-piece construction with edges flanged.
   3. Miter and weld perimeter door frames.

C. Cabinet Trim: Fabricate cabinet trim in one piece with corners mitered, welded, and ground smooth.

2.04 GENERAL FINISH REQUIREMENTS

A. Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for recommendations for applying and designating finishes.

B. Protect mechanical finishes on exposed surfaces of fire protection cabinets from damage by applying a strippable, temporary protective covering before shipping.

C. Finish fire protection cabinets after assembly.

D. Appearance of Finished Work: Noticeable variations in same piece are not acceptable. Variations in appearance of adjoining components are acceptable if they are within the range of approved Samples and are assembled or installed to minimize contrast.

2.05 STEEL FINISHES

A. Baked-Enamel or Powder-Coat Finish: AAMA 2603 except with a minimum dry film thickness of 1.5 mils. Comply with coating manufacturer's written instructions for cleaning, conversion coating, and applying and baking finish.
   1. Color and Gloss: As selected by Architect from manufacturer's full range.

2.06 STAINLESS-STEEL FINISHES

A. Surface Preparation: Remove tool and die marks and stretch lines, or blend into finish.

B. Polished Finishes: Grind and polish surfaces to produce uniform finish, free of cross scratches.
   1. Run grain of directional finishes with long dimension of each piece.
   2. When polishing is completed, passivate and rinse surfaces. Remove embedded foreign matter and leave surfaces chemically clean.
   3. Directional Satin Finish: No. 4.

PART 3 - EXECUTION

3.01 EXAMINATION

A. Examine roughing-in for hose and cabinets to verify actual locations of piping connections before cabinet installation.

B. Examine walls and partitions for suitable framing depth and blocking where semirecessed cabinets will be installed.

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

3.02 PREPARATION

A. Prepare recesses for semirecessed fire protection cabinets as required by type and size of cabinet and trim style.

3.03 INSTALLATION

A. General: Install fire protection cabinets in locations and at mounting heights indicated or, if not indicated, at heights indicated below:

1. Fire Protection Cabinets: 54 inches above finished floor to top of cabinet.

B. Fire Protection Cabinets: Fasten cabinets to structure, square and plumb.

1. Unless otherwise indicated, provide recessed fire protection cabinets. If wall thickness is not adequate for recessed cabinets, provide semirecessed fire protection cabinets.

3.04 ADJUSTING AND CLEANING

A. Remove temporary protective coverings and strippable films, if any, as fire protection cabinets are installed unless otherwise indicated in manufacturer's written installation instructions.

B. Adjust fire protection cabinet doors to operate easily without binding. Verify that integral locking devices operate properly.

C. On completion of fire protection cabinet installation, clean interior and exterior surfaces as recommended by manufacturer.

D. Touch up marred finishes, or replace fire protection cabinets that cannot be restored to factory-finished appearance. Use only materials and procedures recommended or furnished by fire protection cabinet and mounting bracket manufacturers.

E. Replace fire protection cabinets that have been damaged or have deteriorated beyond successful repair by finish touchup or similar minor repair procedures.

PART 4 - MEASUREMENT AND PAYMENT:

4.01 METHOD OF MEASUREMENT:

Fire Extinguisher Cabinets will be measured by the lump sum, complete and accepted. The Fire Extinguisher Cabinets limits shall be as shown or described in the Contract Documents.

4.02 BASIS OF PAYMENT:

Fire Extinguisher Cabinets will be paid for at the contract lump sum price. Payment for Fire Extinguisher Cabinets will be under:

| Pay Item | | Pay Unit |
|---|---|---|
| DIV. 10 | Specialties | Lump Sum |

**END OF SECTION**

# SECTION 10 44 16 - FIRE EXTINGUISHERS

All work and materials shall conform to the Contract Documents and the provisions of the State of Maine Department of Transportation Standard Specifications, Revision November 2014, with the following additions:

Add the following:

## PART 1 - GENERAL

### 1.01 RELATED DOCUMENTS

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

### 1.02 SUMMARY

A. Section includes portable, hand-carried fire extinguishers and mounting brackets for fire extinguishers.

B. Related Sections:
   1. Division 10 Section "Fire Extinguisher Cabinets."

### 1.03 SUBMITTALS

A. Product Data: For each type of product indicated. Include rating and classification, material descriptions, dimensions of individual components and profiles, and finishes for fire extinguisher and mounting brackets.

B. Product Schedule: For fire extinguishers. Coordinate final fire extinguisher schedule with fire protection cabinet schedule to ensure proper fit and function. Use same designations indicated on Drawings.

C. Operation and Maintenance Data: For fire extinguishers to include in maintenance manuals.

D. Warranty: Sample of special warranty.

### 1.04 QUALITY ASSURANCE

A. NFPA Compliance: Fabricate and label fire extinguishers to comply with NFPA 10, "Portable Fire Extinguishers."

B. Fire Extinguishers: Listed and labeled for type, rating, and classification by an independent testing agency acceptable to authorities having jurisdiction.
   1. Provide fire extinguishers approved, listed, and labeled by FMG.

### 1.05 COORDINATION

A. Coordinate type and capacity of fire extinguishers with fire protection cabinets to ensure fit and function.

### 1.06 WARRANTY

A. Special Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace fire extinguishers that fail in materials or workmanship within specified warranty period.
   1. Failures include, but are not limited to, the following:
      a. Failure of hydrostatic test according to NFPA 10.

b. Faulty operation of valves or release levers.
2. Warranty Period: Six years from date of Substantial Completion.

## PART 2 - PRODUCTS

### 2.01 PORTABLE, HAND-CARRIED FIRE EXTINGUISHERS

A. Fire Extinguishers: Type, size, and capacity for each fire protection cabinet and mounting bracket indicated.
1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
a. Amerex Corporation.
b. Ansul Incorporated; Tyco International Ltd.
c. Badger Fire Protection; a Kidde company.
d. Buckeye Fire Equipment Company.
e. J. L. Industries, Inc.; a division of Activar Construction Products Group.
f. Kidde Residential and Commercial Division; Subsidiary of Kidde plc.
g. Larsen's Manufacturing Company.
h. Potter Roemer LLC.
2. Valves: Manufacturer's standard.
3. Handles and Levers: Manufacturer's standard.
4. Instruction Labels: Include pictorial marking system complying with NFPA 10, Appendix B and bar coding for documenting fire extinguisher location, inspections, maintenance, and recharging.

B. Multipurpose Dry-Chemical Type in Steel Container: UL-rated 3-A : 40-B:C, 5-lb nominal capacity, with monoammonium phosphate-based dry chemical in enameled-steel container.

### 2.02 MOUNTING BRACKETS

A. Mounting Brackets: Manufacturer's standard steel, designed to secure fire extinguisher to wall or structure, of sizes required for types and capacities of fire extinguishers indicated, with plated or red baked-enamel finish.
1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
a. Amerex Corporation.
b. Ansul Incorporated; Tyco International Ltd.
c. Badger Fire Protection; a Kidde company.
d. Buckeye Fire Equipment Company.
e. Fire End & Croker Corporation.
f. J. L. Industries, Inc.; a division of Activar Construction Products Group.
g. Larsen's Manufacturing Company.
h. Potter Roemer LLC.

## PART 3 - EXECUTION

### 3.01 EXAMINATION

A. Examine fire extinguishers for proper charging and tagging.
1. Remove and replace damaged, defective, or undercharged fire extinguishers.

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

3.02 INSTALLATION

A. General: Install fire extinguishers and mounting brackets in locations indicated and in compliance with requirements of authorities having jurisdiction.
   1. Mounting Brackets: 54 inches above finished floor to top of fire extinguisher.

B. Mounting Brackets: Fasten mounting brackets to surfaces, square and plumb, at locations indicated.

PART 4 - MEASUREMENT AND PAYMENT:

4.01 METHOD OF MEASUREMENT:

Fire Extinguishers will be measured by the lump sum, complete and accepted. The Fire Extinguishers limits shall be as shown or described in the Contract Documents.

4.02 BASIS OF PAYMENT:

Fire Extinguishers will be paid for at the contract lump sum price. Payment for Fire Extinguishers will be under:

| Pay Item | | Pay Unit |
|---|---|---|
| DIV. 10 | Specialties | Lump Sum |

**END OF SECTION**

# SECTION 10 51 13 - METAL LOCKERS

All work and materials shall conform to the Contract Documents and the provisions of the State of Maine Department of Transportation Standard Specifications, Revision November 2014, with the following additions:

Add the following:

## PART 1 - GENERAL

### 1.01 RELATED DOCUMENTS

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

### 1.02 SUMMARY

A. This Section includes the following:
   1. Standard metal lockers
   2. Floor-mounted laminated wood benches

B. Related Sections include the following:
   1. Division 06 Section "Rough Carpentry" for furring, blocking, and shims required for installing metal lockers and concealed within other construction before metal locker installation.

### 1.03 DEFINITIONS

A. Uncoated Steel Sheet Thicknesses: Indicated as the minimum thicknesses.

### 1.04 SUBMITTALS

A. Product Data: Include construction details, material descriptions, dimensions of individual components and profiles, and finishes for each type of metal locker.

B. Shop Drawings: Include plans, elevations, sections, details, and attachments to other work.
   1. Show base, filler panels, recessed trim, and other accessories.
   2. Include locker identification system.

C. Samples for Selection: For units with factory-applied color finishes.

D. Maintenance Data: For adjusting, repairing, and replacing locker doors and latching mechanisms to include in maintenance manuals.

E. Warranty: Special warranty specified in this Section.

### 1.05 QUALITY ASSURANCE

A. Source Limitations: Obtain metal lockers and accessories through one source from a single manufacturer.

B. Product Options: Drawings indicate size, profiles, and dimensional requirements of metal lockers and are based on the specific system indicated. Refer to Division 01 Section "Product Requirements."

   1. Do not modify intended aesthetic effects, as judged solely by Architect, except with Architect's approval. If modifications are proposed, submit comprehensive explanatory data to Architect for review.

C. Regulatory Requirements: Where metal lockers are indicated to comply with accessibility requirements, comply with the U.S. Architectural & Transportation Barriers Compliance Board's "Americans with Disabilities Act (ADA), Accessibility Guidelines for Buildings and Facilities (ADAAG)."
   1. Provide not less than 1 shelf located no higher than 48 inches (1219 mm) above the floor for forward reach.
   2. Provide 1 shelf located at bottom of locker no lower than 15 inches (381 mm) above the floor for forward reach.
   3. Provide hardware that does not require tight grasping, pinching, or twisting of the wrist, and that operates with a force of not more than 5 lbf (22.2 N).

1.06 DELIVERY, STORAGE, AND HANDLING

A. Do not deliver metal lockers until spaces to receive them are clean, dry, and ready for metal locker installation.

1.07 PROJECT CONDITIONS

A. Field Measurements: Verify the following by field measurements before fabrication and indicate measurements on Shop Drawings:
   1. Concealed framing, blocking, and reinforcements that support metal lockers before they are enclosed.
   2. Recessed openings.
   3. Established Dimensions: Where field measurements cannot be made without delaying the Work, establish recessed opening dimensions and proceed with fabricating metal lockers without field measurements. Coordinate wall and floor construction to ensure that actual recessed opening dimensions correspond to established dimensions.

1.08 COORDINATION

A. Coordinate sizes and locations of framing, blocking, furring, reinforcements, and other related units of Work specified in other Sections to ensure that metal lockers can be supported and installed as indicated.

1.09 WARRANTY

A. Special Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace components of metal lockers that fail in materials or workmanship, excluding finish, within specified warranty period.
   1. Failures include, but are not limited to, the following:
      a. Structural failures.
      b. Faulty operation of latches and other door hardware.
   2. Damage from deliberate destruction and vandalism is excluded.
   3. Warranty Period for Knocked-Down Metal Lockers: Two years from date of Substantial Completion.

PART 2 - PRODUCTS

2.01 MANUFACTURERS

A. In other Part 2 articles where titles below introduce lists, the following requirements apply to product selection:
   1. Available Products: Subject to compliance with requirements, products that may be incorporated into the Work include, but are not limited to, products specified.

2.02 MATERIALS

A. Cold-Rolled Steel Sheet: ASTM A 1008, Commercial Steel (CS) Type B, suitable for exposed applications.

B. Expanded Metal: ASTM F 1267, Type II (flattened), Class I, 3/4-inch (19-mm) steel mesh, with at least 70 percent open area.

C. Fasteners: Zinc- or nickel-plated steel, slotless-type exposed bolt heads, and self-locking nuts or lock washers for nuts on moving parts.

D. Anchors: Select material, type, size, and finish required for secure anchorage to each substrate.
1. Provide nonferrous-metal or hot-dip galvanized anchors and inserts on inside face of exterior walls and elsewhere as required for corrosion resistance.
2. Provide toothed-steel or lead expansion sleeves for drilled-in-place anchors.

## 2.03 STANDARD METAL LOCKERS

A. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:
1. ASI Storage Solutions Inc.; Traditional Collection.
2. DeBourgh Mfg. Co.; Corridor KD Lockers.
3. List Industries Inc.; Standard KD Lockers.
4. Penco Products, Inc., Subsidiary of Vesper Corporation; Guardian Lockers.
5. Republic Storage Systems Company; Standard Lockers.

B. Locker Arrangement: As shown.

C. Body: Assembled by riveting or bolting body components together. Fabricate from unperforated, cold-rolled steel sheet with thicknesses as follows:
1. Tops, Bottoms, and Intermediate Dividers: 0.0209 inch (0.55 mm), with single bend at sides.
2. Backs and Sides: 0.0209 inch (0.55 mm) thick, with full-height, double-flanged connections.

D. Frames: Channel formed; fabricated from 0.0528-inch (1.35-mm-) thick, cold-rolled steel sheet; lapped and factory welded at corners; with top and bottom main frames factory welded into vertical main frames. Form continuous, integral door strike full height on vertical main frames.

E. Doors: One-piece; fabricated from 0.0528-inch (1.35-mm-) thick, cold-rolled steel sheet; formed into channel shape with double bend at vertical edges, and with right-angle single bend at horizontal edges.
1. Doors less than 12 inches (305 mm) wide may be fabricated from 0.0428-inch- (1.1-mm-) thick, cold-rolled steel sheet.
2. Reinforcement: Manufacturer's standard reinforcing angles, channels, or stiffeners for doors more than 15 inches (381 mm) wide; welded to inner face of doors.
3. Stiffeners: Manufacturer's standard full-height stiffener fabricated from 0.0428-inch- (1.1-mm-) thick, cold-rolled steel sheet; welded to inner face of doors.
4. Door Style: Vented panel as follows:
a. Louvered Vents: Not less than three louver openings at top and bottom for double-tier lockers.

F. Hinges: Heavy-duty, minimum 0.0500-inch- (1.27-mm-) thick steel, full loop, five or seven knuckle; tight pin; minimum 2 inches (51 mm) high. Weld to inside of door frame and attach to door with at least two factory-installed fasteners that are completely concealed and tamper resistant when door is closed.

A. Projecting Door Handle and Latch: Finger-lift latch control designed for use with either built-in combination locks or padlocks; positive automatic latching, chromium plated; pry and vandal resistant.
1. Latch Hooks: Equip doors less than 48 inches (1219 mm) high with two latch hooks; fabricated from 0.105-inch (2.66-mm) nominal-thickness steel sheet; welded or riveted to full-height door strikes; with resilient silencer on each latch hook.
2. Latching Mechanism: Manufacturer's standard, rattle-free latching mechanism and moving components isolated to prevent metal-to-metal contact, and incorporating a prelocking device that allows locker door to be locked while door is open and then closed without unlocking or damaging lock or latching mechanism.

B. Equipment: Equip each metal locker with identification plate and the following, unless otherwise indicated:
1. Double-Tier Units: One double-prong ceiling hook and two single-prong wall hooks.

2. Single-Tier Units: One shelf and two single prong wall hooks.

C. Accessories:
1. Continuous Base: Fabricated from cold-rolled steel sheet, 0.0528 inch (1.35 mm) thick.
a. Height: 4 inches (102 mm).
2. Continuous Sloping Tops: Fabricated from cold-rolled steel sheet, manufacturer's standard thickness, but not less than 0.0329 inch (0.85 mm) thick.
a. Closures: Vertical-end type.
3. Finished End Panels: Fabricated from 0.024-inch (0.61-mm) nominal-thickness steel sheet.

D. Finish: Baked enamel or powder coat.

## 2.04 FABRICATION

A. General: Fabricate metal lockers square, rigid, and without warp; with metal faces flat and free of dents or distortion. Make exposed metal edges free of sharp edges and burrs, and safe to touch.
1. Form body panels, doors, shelves, and accessories from one-piece steel sheet, unless otherwise indicated.
2. Provide fasteners, filler plates, supports, clips, and closures as required for a complete installation.

B. Knocked-Down Construction: Fabricate metal lockers for nominal assembly at Project site using nuts, bolts, screws, or rivets. Factory weld frame members together to form a rigid, one-piece assembly.

C. Hooks: Manufacturer's standard ball-pointed type, aluminum or steel; zinc plated.

D. Identification Plates: Manufacturer's standard etched, embossed, or stamped aluminum plates; with numbers and letters at least 3/8 inch (9 mm) high.

E. Continuous Sloping Tops: Fabricated in lengths as long as practicable, without visible fasteners at splice locations; finished to match lockers.
1. Sloped top corner fillers, mitered.

F. Filler Panels: Fabricated in an unequal leg angle shape; finished to match lockers. Provide slip joint filler angle formed to receive filler panel.

G. Finished End Panels: Designed for concealing unused penetrations and fasteners, except for perimeter fasteners, at exposed ends of nonrecessed metal lockers; finished to match lockers.
1. Provide one-piece panels for double-row (back-to-back) locker ends.

## 2.05 STEEL SHEET FINISHES

A. General: Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for recommendations for applying and designating finishes.

B. Factory finish steel surfaces and accessories except stainless-steel and chrome-plated surfaces.

C. Surface Preparation: Clean surfaces of dirt, oil, grease, mill scale, rust, and other contaminants that could impair paint bond. Use manufacturer's standard methods.

D. Baked-Enamel Finish: Immediately after cleaning, pretreating, and phosphatizing, apply manufacturer's standard thermosetting baked-enamel finish. Comply with paint manufacturer's written instructions for application, baking, and minimum dry film thickness.

E. Allow for color to be selected during the submittal phase of the project. Architect will indicate location of the colors on the returned submittal.

## PART 3 - EXECUTION

### 3.01 EXAMINATION

A. Examine walls, floors, and support bases, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of work.
   1. For the record, prepare written report, endorsed by Installer, listing conditions detrimental to performance of work.

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

### 3.02 INSTALLATION

A. General: Install level, plumb, and true; shim as required, using concealed shims.
   1. Anchor locker runs at ends and at intervals recommended by manufacturer, but not more than 36 inches (910 mm) o.c. Install anchors through backup reinforcing plates, channels, or blocking as required to prevent metal distortion, using concealed fasteners.
   2. Anchor single rows of metal lockers to walls near top of lockers and to floor.

B. Knocked-Down Metal Lockers: Assemble knocked-down metal lockers with standard fasteners, with no exposed fasteners on door faces or face frames.

C. Equipment and Accessories: Fit exposed connections of trim, fillers, and closures accurately together to form tight, hairline joints, with concealed fasteners and splice plates.
   1. Attach hooks with at least two fasteners.
   2. Identification Plates: Identify metal lockers with identification indicated on Drawings.
      a. Attach plates to each locker door, near top, centered, with at least two aluminum rivets.
   3. Attach sloping top units to metal lockers, with closures at exposed ends.
   4. Attach finished end panels with fasteners only at perimeter to conceal exposed ends of nonrecessed metal lockers.

### 3.03 ADJUSTING, CLEANING, AND PROTECTION

A. Clean, lubricate, and adjust hardware. Adjust doors and latches to operate easily without binding.

B. Protect metal lockers from damage, abuse, dust, dirt, stain, or paint. Do not permit metal locker use during construction.

C. Touch up marred finishes, or replace metal lockers that cannot be restored to factory-finished appearance. Use only materials and procedures recommended or furnished by metal locker manufacturer.

### 3.04 METAL LOCKER SCHEDULE

A. Standard Metal Locker: Where metal lockers of this designation are indicated, provide products complying with the following:
   1. Locker Arrangement:
      a. Locker Room 122: Single tier
   2. Size: 12 inches wide by 12 inches deep by 72 inches high
   3. Backs: Solid.
   4. Sides: Solid.
   5. Door Style: Louvered.
   6. Shelves: One (1) shelf
   7. Hinges: Heavy-duty hinge.
   8. Handles/Latches: Projecting.

9. Locks: By others.
10. Accessories:
    a. Hooks.
    b. Number Plates.
    c. Sloping Tops: Continuous.
    d. Finished End Panels.
11. Colors: Color selected by Architect from manufacturer's full range.

PART 4 - MEASUREMENT AND PAYMENT:

4.01 METHOD OF MEASUREMENT:

Metal Lockers will be measured by the lump sum, complete and accepted. The Metal Lockers limits shall be as shown or described in the Contract Documents.

4.02 BASIS OF PAYMENT:

Metal Lockers will be paid for at the contract lump sum price. Payment for Metal Lockers will be under:

| Pay Item | | Pay Unit |
|---|---|---|
| DIV. 10 | Specialties | Lump Sum |

**END OF SECTION**

# SECTION 10 95 00 - BUILDING SPECIALTIES

All work and materials shall conform to the Contract Documents and the provisions of the State of Maine Department of Transportation Standard Specifications, Revision November 2014, with the following additions:

Add the following:

## PART 1 - GENERAL

### 1.01 SUMMARY

A. This Section includes the following:
1. Knox Box.

### 1.02 SUBMITTALS

A. Product Data: Include construction details, material descriptions and thicknesses, dimensions, profiles, fastening and mounting methods, specified options, and finishes for each type of accessory specified.

## PART 2 - PRODUCTS

### 2.01 KNOX BOX

A. Where indicated on the drawings, provide Series 3200, surface-mounted key box by Knox Box.

## PART 3 - EXECUTION

### 3.01 INSTALLATION

A. Install accessories according to manufacturers' written instructions, using fasteners appropriate to substrate indicated and recommended by unit manufacturer. Install units level, plumb, and firmly anchored in locations and at heights indicated.

### 3.02 ADJUSTING AND CLEANING

A. Adjust specialties for unencumbered, smooth operation and verify that mechanisms function properly. Replace damaged or defective items.

### 3.03 CLEANING

A. Clean surfaces prior to inspection. Replace damaged or defective items.

## PART 4 - MEASUREMENT AND PAYMENT:

### 4.01 METHOD OF MEASUREMENT:

Building Specialties will be measured by the lump sum, complete and accepted. The Building Specialties limits shall be as shown or described in the Contract Documents.

### 4.02 BASIS OF PAYMENT:

Building Specialties will be paid for at the contract lump sum price. Payment for Building Specialties will be under:

| Pay Item | | Pay Unit |
|---|---|---|
| DIV. 10 | Specialties | Lump Sum |

**END OF SECTION**

# SECTION 11 31 00 - RESIDENTIAL APPLIANCES

All work and materials shall conform to the Contract Documents and the provisions of the State of Maine Department of Transportation Standard Specifications, Revision November 2014, with the following additions:

Add the following:

## PART 1 - GENERAL

### 1.01 RELATED DOCUMENTS

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

### 1.02 SUMMARY

A. Section Includes:
   1. Microwave cooking appliances.
   2. Refrigeration appliances.

### 1.03 SUBMITTALS

A. Product Data: For each type of product indicated. Include rated capacities, operating characteristics, dimensions, furnished accessories, and finishes for each appliance.

B. Product Schedule: For appliances. Use same designations indicated on Drawings.

C. Operation and Maintenance Data: For each residential appliance to include in operation and maintenance manuals.

D. Warranties: Sample of special warranties.

### 1.04 QUALITY ASSURANCE

A. Installer Qualifications: An employer of workers trained and approved by manufacturer for installation and maintenance of units required for this Project.

B. Regulatory Requirements: Comply with the following:

   1. NFPA: Provide electrical appliances listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.

C. Accessibility: Where residential appliances are indicated to comply with accessibility requirements, comply with the U.S. Architectural & Transportation Barriers Compliance Board's ADA-ABA Accessibility Guidelines.

### 1.05 WARRANTY

A. Special Warranties: Manufacturer's standard form in which manufacturer agrees to repair or replace residential appliances or components that fail in materials or workmanship within specified warranty period.

B. Refrigerator/Freezer, Sealed System: Limited warranty including parts and labor for first year and parts thereafter for on-site service on the product.

1. Warranty Period for Sealed Refrigeration System: Five years from date of Substantial Completion.

## PART 2 - PRODUCTS

### 2.01 REFRIGERATOR/FREEZER

A. Type 1. Basis-of-Design Product: General Electric Profile Series 12.0 cu. Ft. Top Freezer Refrigerator Model# GTR12HAX Color: White

### 2.02 MICROWAVE OVEN

A. Basis-of-Design Product: General Electric Profile Series 1.0 Cu. Ft. Countertop Microwave Oven. Model #PEM31SM. Finish: Stainless Steel. Provide Hanging Kit #JXA019K at undercab locations shown on drawings.

### 2.04 GENERAL FINISH REQUIREMENTS

A. Protect mechanical finishes on exposed surfaces from damage by applying a strippable, temporary protective covering before shipping.

B. Appearance of Finished Work: Noticeable variations in same piece are not acceptable. Variations in appearance of adjoining components are acceptable if they are within the range of approved Samples and are assembled or installed to minimize contrast.

## PART 3 - EXECUTION

### 3.01 EXAMINATION

A. Examine substrates and conditions, with Installer present, for compliance with requirements for installation tolerances, power connections, and other conditions affecting installation and performance of residential appliances.

B. Examine roughing-in for piping systems to verify actual locations of piping connections before appliance installation.

C. Prepare written report, endorsed by Installer, listing conditions detrimental to performance of the Work.

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

### 3.02 INSTALLATION, GENERAL

A. General: Comply with manufacturer's written instructions.

B. Built-in Equipment: Securely anchor units to supporting cabinets or countertops with concealed fasteners. Verify that clearances are adequate for proper functioning and that rough openings are completely concealed.

C. Freestanding Equipment: Place units in final locations after finishes have been completed in each area. Verify that clearances are adequate to properly operate equipment.

D. Utilities: See Divisions 22 and 26 for plumbing and electrical requirements.

### 3.03 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. Perform visual, mechanical, and electrical inspection and testing for each appliance according to manufacturers' written recommendations. Certify compliance with each manufacturer's appliance-performance parameters.
2. Leak Test: After installation, test for leaks. Repair leaks and retest until no leaks exist.
3. Operational Test: After installation, start units to confirm proper operation.
4. Test and adjust controls and safeties. Replace damaged and malfunctioning controls and components.

C. An appliance will be considered defective if it does not pass tests and inspections.

D. Prepare test and inspection reports.

3.04 DEMONSTRATION

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

PART 4 - MEASUREMENT AND PAYMENT:

4.01 METHOD OF MEASUREMENT:

Residential Appliances will be measured by the lump sum, complete and accepted. The Residential Appliances limits shall be as shown or described in the Contract Documents.

4.02 BASIS OF PAYMENT:

Residential Appliances will be paid for at the contract lump sum price. Payment for Residential Appliances will be under:

| Pay Item | | Pay Unit |
|---|---|---|
| DIV. 11 | Equipment | Lump Sum |

**END OF SECTION**

# SECTION 13 34 23.16 - FABRICATED GUARD BOOTHS

All work and materials shall conform to the Contract Documents and the provisions of the State of Maine Department of Transportation Standard Specifications, Revision November 2014, with the following additions:

Add the following:

The Contractor shall take note that the size of the modular guard booth shall be coordinated with the plan dimensions of the 2-inch raised concrete base atop the concrete security slab. The base of the modular guard booth shall fit atop the raised concrete base so as to prevent water from entering the enclosed area.

The modular guard booth shall be a prefabricated structure erected atop the concrete security slab as shown on the plans. The modular guard booth shall be designed by a professional engineer licensed in the State of Maine, and shall be designed to the wind and snow loads prevalent in the Portland, Maine region in accordance with the latest edition of the International Building Code. The Contractor shall submit the plans for the modular security prior to the installation of the electrical provisions and raised concrete slab, so as to coordinate the locations and dimensions, accordingly. The product shall be as noted below or an approved equal with the specific features as described below:

## 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. Pre-fabricated control booth.

B. Related Sections include the following:
   1. Division 26 Section "Electrical" for power and control work.
   2. Division 32 Section “Site Improvements” for paving and concrete work.

### 1.3 SUBMITTALS

A. Product Data: For each type of product indicated. Include rated capacities, operating characteristics, dimensions, furnished accessories, and finishes for each appliance.

B. Product Schedule: For equipment. Use same designations indicated on Drawings.

C. Operation and Maintenance Data: For each residential appliance to include in operation and maintenance manuals.

D. Warranties: Sample of special warranties.

### 1.4 QUALITY ASSURANCE

A. Installer Qualifications: An employer of workers trained and approved by manufacturer for installation and maintenance of units required for this Project.

1.5 WARRANTY

A. Special Warranties: Manufacturer's standard form in which manufacturer agrees to repair or replace doors or components which fail in materials or workmanship within specified warranty period.

PART 2 - PRODUCTS

2.1 BASIS OF DESIGN PRODUCT

A. Provide skid-mounted, wood-framed, prefabricated unit with the following features:

| | |
|---|---|
| Manufacturer: | Twin Modular Services, Inc. of Blackwood, NJ (www.guardhousesonline.com), or an approved equal. |
| Model: | 8 ft x 12 ft Customized Guardhouse Plan |
| Frame: | Main wall beams and floor cross members shall be comprised of 6-inch steel C-channel at 8.5 lbs/ft (min.) around the perimeter of the building.<br><br>Lift points and anchor points shall be provided. At least six steel angle anchor points shall be provided with a 3/4-inch hole for fastening to the concrete slab. |
| Floor: | Steel cross members as noted above with R-19 rigid aluminum foil-faced insulation with thermal sheathing type decking; 3/4-inch plywood fastened to steel members and topped with 1/8-inch aluminum tread plate flooring. Provide cove base modeling, 2-inch min., along perimeter of floor. |
| Ext. Walls: | Steel tube corner columns no less than HSS 3x3x1/4-inch welded to base frame and top supports comprised of similar HSS members.<br><br>Studs shall be 2x4 timber framing at 16-inches on center with single 2x4 top and bottom plates. The bottom plate shall be pressure treated. Sheathing shall be 7/16-inch OSB fastened to studs on outside, with 1/8-inch vinyl covered paneling on inside. Insulation shall be 3.5-inch R-13 F/G Kraft-Faced batts. Provide cove base modeling, 2-inch min., along perimeter of floor.<br><br>Provide units rated for current NEC and IBC structural and component and cladding wind loads. Exterior siding shall be 0.019 vertical aluminum, light gray in color with stainless steel exterior fasteners. Trim shall be 0.019 aluminum, dark gray in color. |
| Roof: | Rafters shall be timber 2x8 members at 16-inches on center. There shall be a minimum of 3-inch overhang on all sides, and sheathing shall be 1/2-inch CDX plywood. Roof insulation shall be R-30 unfaced. The ceiling shall be timber 2x4 T-Grid drop-type, 92-inches from the floor.<br><br>The roof material shall be EPDM rubber, black in color, with venting on each wall. A J-rail aluminum gutter shall be installed. |
| Doors: | Exterior door shall be 36 x 80 inch steel insulated with 22 x 22 inch vision area.<br><br>Hardware shall include three stainless steel ball bearing hinges, a heavy duty closer, and an entrance lockset-ball knob. |
| Windows: | Three standard sized windows of 36 x 39 inch fixed picture style with white vinyl and thermal-insulated double-glazed materials.<br><br>Two standard sized window of 36 x 39 inch horizontal sliding style with white vinyl and thermal-insulated double-glazed materials.<br><br>Exterior trim shall be 2 x 2 0.019 aluminum, light gray in color. Interior trim shall be 1 x 1 steel corner white.<br><br>All windows, including the vision area of the door shall be tinted. |
| Electrical: | Load Center surface mount exterior 120/240V single phase 100-amp service with 12 breaker |

spaces.

Two interior overhead drop-in fluorescent lights 2 ft x 4 ft; one 150-watt exterior halogen security light at doorway.

Two 110V, 15-amp grounded toggle switches; Four 110V 15-amp grounded duplex type receptacles; One 220V 20-amp dedicated outlet; and 14/2 and 12/2 raceways with grounded copper BX - metal jacket.

HVAC: Heating: 4,000-watt electrical wall heater with fan on 240V dedicated circuit.

Cooling: 11,600-BTU wall mount A/C unit on dedicated circuit

Thermostat: On A/C and base heat.

Furnishings: Built-in 24” x 135” White mica countertop with two (2) 12” x 30” returns. Include two (2) under counter storage drawers. Add two file cabinets and two swivel chairs on hard-floor casters.

2.2 GENERAL FINISH REQUIREMENTS

A. Protect mechanical finishes on exposed surfaces from damage by applying a strippable, temporary protective covering before shipping.

B. Appearance of Finished Work: Noticeable variations in same piece are not acceptable. Variations in appearance of adjoining components are acceptable if they are within the range of approved Samples and are assembled or installed to minimize contrast.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates and conditions, with Installer present, for compliance with requirements for installation tolerances, power connections, and other conditions affecting installation and performance of residential appliances.

B. Examine roughing-in for piping systems to verify actual locations of piping connections before appliance installation.

C. Prepare written report, endorsed by Installer, listing conditions detrimental to performance of the Work.

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

3.2 INSTALLATION, GENERAL

A. General: Comply with manufacturer's written instructions.

B. Built-in Equipment: Securely anchor units to supporting cabinets or countertops with concealed fasteners. Verify that clearances are adequate for proper functioning and that rough openings are completely concealed.

C. Freestanding Equipment: Place units in final locations after finishes have been completed in each area. Verify that clearances are adequate to properly operate equipment.

D. Utilities: See Divisions 22 and 26 for plumbing and electrical requirements.

3.3 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. Perform visual, mechanical, and electrical inspection and testing for each appliance according to manufacturers' written recommendations. Certify compliance with each manufacturer's appliance-performance parameters.
2. Operational Test: After installation, start units to confirm proper operation.
3. Test and adjust controls and safeties. Replace damaged and malfunctioning controls and components.

C. Prepare test and inspection reports.

3.4 DEMONSTRATION

A. Engage a factory-authorized service representative to train Owner's maintenance personnel to adjust, operate, and maintain loading dock equipment.

PART 4 - MEASUREMENT AND PAYMENT:

4.01 METHOD OF MEASUREMENT:

Fabricated Guard Booths will be measured by the lump sum, complete and accepted. The Fabricated Guard Booths limits shall be as shown or described in the Contract Documents.

4.02 BASIS OF PAYMENT:

Fabricated Guard Booths will be paid for at the contract lump sum price. Payment for Fabricated Guard Booths will be under:

| Pay Item | | Pay Unit |
|---|---|---|
| DIV. 13 | Special Construction | Lump Sum |

**END OF SECTION**

# SECTION 21 13 13 - WET-PIPE SPRINKLER SYSTEMS

All work and materials shall conform to the Contract Documents and the provisions of the State of Maine Department of Transportation Standard Specifications, Revision November 2014, with the following additions:

## PART 1 - GENERAL

### 1.01 RELATED DOCUMENTS

A. The drawings and general conditions of the Contract, including General and Supplementary Conditions and MaineDOT Division 100, General Conditions, apply to 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.

D. 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.

### 1.02 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, combination wet / dry pipe sprinkler and standpipe fire protection system for full building protection in accordance with NFPA, IBC, the Portland Fire Department and the Owner's insurance underwriter.

### 1.03 QUALIFICATIONS

A. The Fire Protection Work shall be performed by a qualified Contractor primarily engaged in the design and installation of Fire Protection Systems. The fire protection system design shall be performed under the direction of, and sealed by, a professional engineer registered in the State of Maine or with NICET Level III (minimum) Certification.

B. Welding qualifications of individuals installing welded piping shall be certified by the National Certified Welding Bureau for the type(s) of weld(s) proposed for use in piping assembly.

### 1.04 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.

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.

1.05 SPRINKLER COVERAGE

A. Sprinkler head coverage shall conform with NFPA requirements for the use of the building (Light Hazard, 0.10 GPM/SF density for the hydraulically most remote 1500 S.F.). Coverage in other areas 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

2.01 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. Sprinkler heads shall be centered in acoustical ceiling tiles.

2. Provide a spare head cabinet with wrenches and six (6) heads (minimum) of each orifice size, finish, temperature classification, pattern and length furnished in the project.

3. Provide sprinkler head guards where required.

4. Sprinkler heads in unheated / minimally heated areas including all entrance vestibules shall be dry pendent or sidewall type, or served by a glycol and water loop or separate dry-pipe system.

5. Temperature ratings for sprinkler heads shall be suitable for the space. Heads in rooms with concentrated heat sources shall have heads with the appropriate temperature rating.

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.

2.02 WATER SUPPLIES

A. Conform to the requirements of NFPA-13, Installation of Sprinkler Systems.

2.03 DEVICES

A. Detection devices and associated wiring both within the fire protection system and connected to the building Fire Alarm System shall be the responsibility of the Sprinkler Contractor.

2.04 BACKFLOW PREVENTER

A. Ames 2000 or equal.

20.5 PIPING SYSTEM IDENTIFICATION

A. Piping system and valve identification and color coding shall be in accordance with ANSI.

2.06 CEILING CAVITIES

A. Ceiling cavities are considered combustible and shall be sprinklered. Coordinate sprinkler requirements with the Electrical Drawings.

PART 3 EXECUTION

3.01 PIPING LAYOUT AND DESIGN

A. System requirements, installation requirements, design, plans, and calculations: Conform to NFPA-13, Installation of Sprinkler Systems.

B. Sprinkler piping shall be run concealed above ceilings in occupied areas. Piping in other areas may be run exposed. Piping shall not be exposed in occupied spaces unless indicated on the drawings.

C. Pipe penetrations through walls and floors, including pipe sleeves shall be in accordance with Section 23 05 00 – General Mechanical and the IBC. Floor sleeves thru Mezzanine floors shall be watertight (LinkSeal, or equal). Traverse points of piping shall be escutcheoned with split chrome floor and ceiling plates and spring anchors, where visible to occupancy.

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. Sprinkler system piping may need to be located within the structural system in certain locations.

E. The Architect shall review proposed system layout and reserve the right to relocate heads, substitute head system and in general review final layout for components visible in occupied spaces.

3.02 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 be less than 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.

3.03 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.

PART 4 BASIS OF PAYMENT:

4.01 METHOD OF MEASUREMENT:

A. Wet-Pipe Sprinkler Systems will be measured by the lump sum, complete and accepted. The Wet-Pipe Sprinkler Systems limits shall be as shown or described in the Contract Documents.

4.02 BASIS OF PAYMENT:

A. Wet-Pipe Sprinkler Systems will be paid for at the contract lump sum price. Payment for Wet-Pipe Sprinkler Systems will be under:

| Pay Item | | Pay Unit |
|---|---|---|
| DIV. 21 | FIRE SUPPRESSION | Lump Sum |

**END OF SECTION**

# SECTION 220000 - PLUMBING

All work and materials shall conform to the Contract Documents and the provisions of the State of Maine Department of Transportation Standard Specifications, Revision November 2014, with the following additions:

## PART 1 GENERAL

### 1.01 RELATED DOCUMENTS

A. The drawings and general conditions of the Contract, including General and Supplementary Conditions and MaineDOT Division 100, General Conditions, apply to 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.

D. The drawings and the specifications including Section 23 05 00 “Supplemental General Mechanical Conditions” are hereby made a part of the work of this section.

### 1.02 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.

### 1.03 SUBMITTALS

A. Substitutions: Your attention is directed to Section 23 05 00-"Substitutions", relative to competition and the (ONLY) notation. Familiarity with this section shall be achieved before reading the PRODUCTS section of this specification.

B. The items for which the submittals paragraph in Section 23 05 00, Supplemental General Mechanical Requirements, apply are as follows:

1. Piping materials.
2. Valves.
3. Pipe hangers.
4. Fixtures and trim.
5. Miscellaneous equipment.
6. Water heating equipment.
7. Piping, valves and equipment identification.
8. Firestopping.
9. Electronic trap primers.
10. Rainwater Filters.
11. Pressure Regulating Valve (PRV)

C. Section 01 33 00 - Submittal Procedures: Submittal procedures.

D. Product Data: Submit data on product characteristics, performance criteria and limitations.

E. Manufacturer's Installation Instructions: Submit procedure for preparation and installation.

F. Manufacturer's Certificate: Certify products meet or exceed specified requirements.

PART 2 PRODUCTS

2.01 PIPING MATERIALS

A. Soil and Waste (Sanitary), Roof Drain and Vent Piping:

1. Below Grade: Cast iron with push-on joints or Sched. 40 PVC.

2. Above Grade: Sanitary and Roof Drain piping shall be cast iron "no Hub" (ONLY). Vent piping may be Sched. 40 PVC at contractor's option, cast iron (ONLY) thru roof.

B. Domestic Water Piping:

1. Pipe sizes larger than 1": "Flowguard Gold", or equal, Schedule 40 CPVC with solvent welded joints and fittings,or Type L hard copper tubing and cast bronze or wrought copper solder fittings.

2. Pipe sizes 1" and smaller:

a. Uponor AquaPEX, NSF rated, 180°F at 100psi, red (HW), blue (CW) and white (RHW).

b. "Flowguard Gold" Schedule 40 solvent-welded CPVC pipe and fittings. CPVC pipe and fittings shall be rated at 100 psig at $180^0$F and shall meet or exceed the requirements of ASTM D2846, the IBC, and be certified by the ANSI/NSF for potable water applications. Installation, including supports, shall be per the manufacturer's recommendations.

C. Exposed Water and Waste Piping at Fixtures: I.P.S. copper with cast brass fittings chrome plated finish, with deep one piece escutcheon plates at traverse points.

D. Solder: Lead-free (ONLY), Englehard Silvabrite 100, 440ºF melting point, ASTM B32.

E. Gas and Compressed Air Piping: Schedule 40 black carbon steel with threaded joints and fittings.

2.02 NO HUB COUPLINGS

A. For DWV piping, couplings shall be Clamp-All HI-TORQ125, shall maintain 15 PSI hydrostatic seal, constructed 304SS housing and ASTM C-564 neoprene gasket. Couplings shall meet FM 1680, IBC and local codes and requirements.

2.03 VALVES

A. Ball Valves: Copper alloy with stationary seat ring and chromium plated or stainless steel floating ball per Federal Specification WW-V-35B. Blowout proof stem, reinforced PTFE seal. Sizes 2" and larger shall have threaded ends. Provide lever handle with stem extension as required to allow operation without interfering with pipe insulation.

B. Check Valves: Horizontal Swing, MSS SP-80, Type 3, Class 125.

C. Drain Valves: Provide ball valves with 3/4" hose connection and brass cap.

D. Fixture Service Stop Valves: Angle Wheel Handle Stop, ASME A112.18M.

1. Each plumbing fixture shall have individual stop valves in the hot and cold supplies.

2. Service stop valves exposed in finished areas shall be chrome-plated brass, key-operated; 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$^{o}$F relief settings.

2.04 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$^{o}$ wrap, Carpenter and Paterson Fig. 265P, Type H.

2.05 FIXTURES AND TRIM

A. (**P-1**) Water Closet: Floor-mounted, flush valve type, Toto Model CT705EN, Zurn, or equal, 15" high, elongated bowl, white vitreous china, low consumption (1.28 gpf). Fixture shall be suitable for 10-12" rough-in.

1. Seat: Toto SoftClose Model SS114, heavy weight solid plastic, open front without cover, self sustaining check hinge, for elongated bowl, white color.

2. Manual flush valves shall be Sloan, Zurn, or equal w/ bumper stop. Coordinate with grab bars.

B. (**P-1A**) ADA Water Closet: Floor-mounted, flush valve type, Toto Model CT705ELN, Zurn, or equal, 17½" high, elongated bowl, white vitreous china, low consumption (1.28 gpf). Fixture shall be suitable for 10-12" rough-in.

1. Seat: Toto SoftClose Model SS114, heavy weight solid plastic, open front without cover, self sustaining check hinge, for elongated bowl, white color.

2. Total installed height of front edge of seat shall be 17" to 19" above finished floor. Final installation shall meet ADA guidelines and ANSI A117.1.

3. Manual flush valves shall be Sloan, Zurn, or equal w/ bumper stop. Coordinate with grab bars.

C. (**P-2**) ADA Lavatory, Wall Hung: Toto LT307.4, 20"x18", Zurn, or equal, self-rimming, white vitreous china, concealed arm carrier, faucet holes on 4" centers.

1. Faucet: Symmons Symmetrix Model S-20-2-FR single handle, 0.5 GPM flow aerator, polished chrome finish, ceramic control cartridge.

2. Drain: Perforated grid strainer with bright metal finish.

3. Trap: 1-1/4" PVC P-trap with cleanout plug. Adjustable with connected elbow and nipple to wall.

4. Lavatory shall be installed at 34" above finished floor (See Architectural drawings). Final installation of lavatory and accessories shall meet ADA guidelines and ANSI A117.1. Insulate exposed traps and supplies with Truebro Lavguard.

D. (**P-2A**) ADA Lavatory, Countertop: Toto LT501, 20"x17", Zurn, or equal, self-rimming, white vitreous china, faucet holes on 4" centers.

1. Faucet: Symmons Symmetrix Model S-20-2-FR single handle, 0.5 GPM flow aerator, polished chrome finish, ceramic control cartridge.

2. Drain: Perforated grid strainer with bright metal finish.

3. Trap: 1-1/4" PVC P-trap with cleanout plug. Adjustable with connected elbow and nipple to wall.

4. Lavatory shall be installed at 34" above finished floor (See Architectural drawings). Final installation of lavatory and accessories shall meet ADA guidelines and ANSI A117.1. Insulate exposed traps and supplies with Truebro Lavguard.

E. (**P-3**) ADA Urinal: Wall-hung, ADA-compliant, flush valve type, Zurn Model 5730, white vitreous china, with fastening hardware, 2" brass urinal flange, gasket, siphon-jet, urinal lip shall extend a minimum of 14" from the finished wall. See Architectural drawings for mounting heights.

1. Flush Valve: Delta Model 81T231BTA, H2Optics Technology, or equal, Zurn or Sloan, battery powered sensor with manual override.

2. Carrier: Zurn or Jay R. Smith, concealed wall carrier.

3. ADA urinals shall be installed with front rim a maximum of 17" above finished floor. Final installation shall meet ADA guidelines and ANSI A117.1.

F. (**P-4**) ADA Showers: Aqua-Bath Model C4136BF-FUS ¾", or equal, ADA / ANSI compliant, 41"x36" acrylic construction with 3/4" threshold, collapsible dam by KR Specialties, integral fold-up seat and stainless steel grab bars (inside corner and straight), blocking as required, dome light, curtain rod, weighted shower curtain and soap dishes. Shower unit color selection shall be "White".

1. Symmons, Leonard or Speakman packaged unit, ADA-compliant meeting ASSE 1016 requirements. Pressure balanced, non-scald, mixing valve with lever handle, concealed screw check-stops, maximum limit stop. Furnish with institutional vandal-resistant, 1.8 GPM (maximum), Symmons, or equal, vandal-resistant showerhead. ADA units shall be furnished with a wall/hand-held shower, diverter, vacuum breaker, 5'-0" long flexible metal hose and 24" slide bar. Provide a 2" shower drain. See Drawings.

2. Installation of shower and accessories shall meet ADA guidelines and ANSI A117.1.

G. (**P-5**) Stainless Steel Single Bowl Sink, ADA-compliant, Elkay Model LRAD2521, 18 gauge Type 304 stainless steel, 25"x21" overall size, 5-1/2" deep bowl, offset drain, counter-mounted.

1. Faucet: Elkay Model LK800GN05T4, or Chicago Faucet, ADA-compliant, gooseneck swing spout, 6" wrist-blade handles, ¼ turn ceramic cartridges, 2.2 GPM, 4" or 8" centers per sink requirements. Gooseneck spout shall match sink dimensions.

2. Strainer: Furnish with basket strainer and chrome-plated P-trap.

H. (**P-6**) Mop Basin: Powers-Fiat MSB-2424, molded stone, 24"x24"x10" with 1" wide shoulders; 3" stainless steel drain with combination dome strainer and lint basket, stainless steel wall guards.

1. Faucet: Powers-Fiat Service Faucet #830-AA, Speakman "Commander", or equal, chrome-plated with vacuum breaker, integral check-stops, adjustable wall brace, pail hook, and 3/4" hose thread on spout.

2. Hose and Hose Bracket: Powers-Fiat #832-AA, 30" long heavy duty, 5/8" size, cloth reinforced, rubber hose with 3/4" chrome coupling at one end; 5"x3", 18 gauge, stainless steel bracket with rubber grip.

3. Caulk around sink at floor and walls with white silicone caulk.

I. (**P-7)** Stainless Steel Utility Sink, Free-Standing Single Bowl: Advance-Tabco or Aero Manufacturing Model 4S1-3024 16 GA stainless steel, 33"x27"x12" deep overall size, 2 faucet holes on 8" centers, fully sound deadened, backsplash, free-standing with tubular stainless steel legs. Provide a Zurn Model Z-1180 solids interceptor.

1. Faucet: Chicago Faucets Model 445-E1ABCP, two handle mixing faucet, 6" swing spout, polished chrome finish, Quatern Compression cartridge.

2. Strainers: Dayton Model D-1125 with removable basket and neoprene stopper.

J. (**P-8**) Combination Eyewash / Shower: Encon, Haws Model 8309WC or Guardian Model GBF1909FC20, or Speakman,with 20 GPM flow control, ADA-compliant with four (4) "soft-flo" spray heads, chrome-plated spray ring, dust covers, push flag handle, 10" shower head and extended pull rod, floor-mounted, with identification sign. Furnish with a Leonard Model TM-850-STSTL-EXP, or equal by Powers, dual manifold mixing valve system (**TMV**) with temperature override protection, emergency water-mixing valve with wall support and stainless steel cabinet, set to deliver 85□F. tempered water. The mixing valve shall close down on failure of the cold water supply and bypass cold water on failure of the hot water supply. Provide a ball valve shut-off on each supply to the tempering valve.

K. (**P-9**) Washing Machine Supply and Drain: In-wall, concealed type, Watts Model A2C-WB-M1 "Intelliflow" with leak sensor, or equal, for 2" drain, 16 gauge steel, equipped with an electronic device and leak sensor that interlocks the water supplies with washer operation to control hot and cold water. If a leak is detected the water shall be automatically turned off. Provide integral screwdriver stops or ball valves and water hammer arrestors.

2.06 MISCELLANEOUS EQUIPMENT

A. Floor Drains (**FD**): Floor drains shall be Zurn Z-415, cast iron body with 4" bottom outlet, as indicated, combination invertible membrane clamp and adjustable collar. Strainer shall be 6" diameter Zurn "Type B", polished nickel-bronze. Floor drains shall have "deep seal" traps and trap primer connection, connect to nearest Electronic Trap Primer.

B. 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.

C. Wall Cleanout (WCO): Sanitary tee with threaded raised nut or countersunk-nut cleanout plug located behind Zurn Z-1468 round stainless steel wall access cover.

D. Vacuum Breaker: Watts Model N36, 3/4" size, 20 CFM capacity.

E. Electronic Trap Primer (**ETP**): PPP Inc. PT-series, Mifab or Zurn, 120V., atmospheric vacuum breaker, pre-set 24 hour clock, manual over-ride switch, shut-off valve, water hammer arrestor, calibrated manifold. Individually pipe to floor drain traps. In finished spaces the trap primer shall be enclosed in a flush stainless steel wall box with hinged door and tamper-resistant lock. Run trap primer piping (½" PEX) to each floor drain trap or indirect waste receptor trap as required by Code. Provide a ball shut-off valve on the inlet to the trap primer.

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. Water Hammer Arrestor (Shock Absorber): Plumbing and Drainage Institute listed.

Schedule:

"A" - Size #100 PDI - 0-11 Fixture Units
"B" - Size #200 PDI - 12-32 Fixture Units
"C" - Size #300 PDI - 33-60 Fixture Units

I. Heavy Duty Floor Drains (**HDFD**) shall be Zurn Model Z610, 12" heavy duty square ductile iron hinged grate, with sediment bucket, Dura-coated cast-iron body, H20 traffic loading.

J. Backflow Preventers (**BFP**): Conforming to AWWA C506, FCCHR-USC Manual Section 10, and UL listed. Types, sizes and capacities scheduled, Apollo, Zurn or Watts.

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.

3. 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.

K. Indirect Waste (**IW**) shall be Zurn Model Z325, funnel, 3" plastic ball float, replaceable neoprene seat, Dura-coated cast-iron body.

L. Main Service Entrance Pressure Reducing Valve (**PRV**): Watts Regulator Model X65BP, 1½", lead-free 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 50 GPM at a 6 psig pressure drop.

## 2.07 WATER HEATING EQUIPMENT

A. Natural Gas-Fired Water Heater (**GWH**): Bradford-White, AO Smith, State Industries or approved equal packaged unit of make, model, and performance as scheduled on Drawings; UL 732 and ASHRAE 90.1 compliant, ASME Section IV code construction, designed to burn natural gas, glass-lined or other approved lined tank with replaceable magnesium anode rods and heavy gauge steel jacket with baked enamel finish, factory installed ASME rated temperature and pressure relief valve, dial thermometer and pressure gauges and adjustable range thermostat with digital display. Set to provide 140°F water temperature. Hot and cold water connections shall be 1½". The water heater shall be high efficiency, direct vent, sealed combustion.

1. Burner controls: modulating burner, solid state flame safeguard with direct spark ignition, electronic low-water cut-off, and separate high temperature limit control.

2. The water heater shall have a three (3) year free replacement warranty in commercial service for labor and materials. The pressure vessel and combustion chamber shall have a five (5) year warranty for materials and labor. Furnish with concentric sidewall or roof vent kit as indicated. Furnish with condensate neutralization kit.

3. Installation shall be in accordance with the manufacturer's recommendations. Venting shall be Type AL29-4C stainless steel, Schedule 40 CPVC or polypropylene per the installation instructions.

2.08 THERMOSTATIC MIXING VALVE / TEMPERATURE LIMITING VALVE

A. Thermostatic Mixing Valve (**TMV**): Heat-Timer, Leonard, Symmons, or approved equal packaged unit of make, model, and performance as specified, complying with ASSE 1017 or CSA B125.3. Furnish with integral check-stops and thermometer.

B. Temperature Limiting Valves (**TLV**): Watts, Fiat, or approved equal, with make, model and performance as specified, complying with ASSE 1070 or CSA B125.3. Furnish with integral check-stops.

2.09 RAINWATER FILTERS

A. BioClean Downspout Filter, or equal, installed per the manufacturers recommendations, installed at each roof drain leader. Internal components shall be constructed of stainless steel. Provide service access as recommended by the manufacturer.

PART 3 EXECUTION

3.01 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.

3.02 INSTALLATION OF PIPING

A. Provide and erect in accordance with the best practice of the trade piping shown on the drawings and as required to complete the intended installation. Make offsets as shown or required to place piping in proper position to avoid other work and to allow the application of insulation and finish painting to the satisfaction of the Architect.

B. The size and general arrangements, as well as the methods of connecting piping, valves, and equipment, shall be as indicated, or so as to meet the requirements of the Architect.

C. Piping shall be erected so as to provide for the easy and noiseless passage of fluids under working conditions.

D. Install unions to facilitate removal of equipment.

E. Copper pipe shall be reamed to remove burrs.

F. Connections between copper and steel piping shall be made with dielectric fittings.

G. Solder joints shall be made with lead free solder. Clean surfaces to be soldered and use a paste flux. Wash joints with sodium bicarbonate and water to remove corrosive effects of heated solder paste. Caution: Lead-bearing solder is not permitted.

H. Pipe penetrations through walls, floors and ceilings shall be in accordance with Section 23 05 00 "Supplemental General Mechanical Requirements". Traverse points of piping shall be escutcheoned with split chrome floor and ceiling plates and spring anchors, where visible to occupancy.

I. Provide a cleanout in the vertical position at the base of each sanitary and roof drain drop.

J. Sanitary and vent piping shall be sized and installed at 1/4" per foot slope.

K. All vertical and horizontal penetrations through walls, floors and ceilings shall be sealed against air movement between spaces.

3.03 PIPE HANGERS

A. Impact driven studs are prohibited.

B. Copper Tubing: supported at intervals with rod sizes as follows, double nuts on hangers and on beam clips.

| Copper Size | Hanger Intervals | Rod Sizes |
|---|---|---|
| 1/2" | 5' | 3/8" |
| 3/4" | 6' | 3/8" |
| 1" | 6' | 3/8" |
| 1-1/4" | 8' | 3/8" |
| 1-1/2" | 8' | 3/8" |
| 2" | 10' | 3/8" |

C. Cast Iron Pipe: Supported at intervals with rod sizes as follows, double nuts on hangers and on beam clips.

| Cast Iron Size | Hanger Intervals | Rod Sizes |
|---|---|---|
| 1-1/2" | 5' | 3/8" |
| 2" | 5' | 3/8" |
| 2-1/2" | 5' | 1/2" |
| 3" | 6' | 1/2" |
| 4" | 7' | 5/8" |

D. PVC/CPVC Pipe: Supported at 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.

3.04 CLOSING IN UNINSPECTED WORK

A. General: Cover up or enclose work after it has been properly and completely reviewed.

B. If any of the work is covered or enclosed prior to required inspections and review, uncover the work as required for the test and review. After review, tests and acceptance, repairs and replacements shall be made by the appropriate trades with such materials as necessary for the acceptance by the Architect and at no additional cost to the Owner.

3.05 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.

3.06 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.

3.07 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.

3.08 INSTRUCTIONS

A. On completion of the project, provide a competent technician to thoroughly instruct the Owner's representative in the care and operation of the system. The total period of instruction shall not exceed four (4) hours. The time of instruction shall be arranged with the Owner.

3.09 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.

PART 4 BASIS OF PAYMENT:

4.01 METHOD OF MEASUREMENT:

A. Plumbing will be measured by the lump sum, complete and accepted. The Plumbing limits shall be as shown or described in the Contract Documents.

4.02 BASIS OF PAYMENT:

A. Plumbing will be paid for at the contract lump sum price. Payment for Plumbing will be under:

| Pay Item | | Pay Unit |
|---|---|---|
| DIV. 22 | PLUMBING | Lump Sum |

**END OF SECTION**

# SECTION 230000 - HVAC SYSTEM

All work and materials shall conform to the Contract Documents and the provisions of the State of Maine Department of Transportation Standard Specifications, Revision November 2014, with the following additions:

PART 1 GENERAL

1.01 RELATED DOCUMENTS

A. The drawings and general conditions of the Contract, including General and Supplementary Conditions and MaineDOT Division 100, General Conditions, apply to 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.

D. The drawings and the specifications including Section 23 05 00 "Supplemental Mechanical General Requirements" are hereby made a part of the work of this section.

1.02 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.

1.03 SUBMITTALS

A. Substitutions: Your attention is directed to Section 23 05 00-"Substitutions", relative to competition and the (ONLY) notation. Familiarity with this section should be achieved before reading the PRODUCTS section of this specification.

B. The items for which the submittals paragraph in Section 23 05 00, Supplemental Mechanical General Requirements, apply are as follows:

1. Fans.
2. Minisplit air conditioning units.
3. Gas Unit Heaters.
4. Controls.
5. Heating Equipment.
6. Refrigerant Piping and Insulation.
7. Multi Split Heat Pump Units.
8. Energy Recovery Ventilators (ERV’s).
9. Vehicle Exhaust System.
10. Electric Duct Heaters.

C. Section 01 33 00 - Submittal Procedures: Submittal procedures.

D. Product Data: Submit data on product characteristics, performance criteria and limitations.

E. Manufacturer's Installation Instructions: Submit procedure for preparation and installation.

F. Manufacturer's Certificate: Certify products meet or exceed specified requirements.

PART 2 PRODUCTS

2.01 PIPING MATERIALS

A. Refrigeration Piping: See Part 3-Execution.

2.02 MINISPLIT AIR CONDITIONING / HEAT PUMP UNITS

A. The split system air conditioning units shall be Mitsubishi "Hyperheat H2i" Model as scheduled, or approved equal by Daikin or Samsung, wall mounted or ducted indoor units, as indicated, with ground-mounted outdoor units, on reinforced concrete pads and equipment stands. Ducted units shall have filter boxes with **MERV 8** pleated media filters and two (2) spare sets. Capacities and performance shall be as scheduled. Outdoor units shall be mounted on 24"H. stands (Quick-Sling, or equal). Cooling capacity shall be based on entering conditions of $75^0$F. EDBT, $67^0$F. EWBT and $95^0$F. ambient. The indoor units shall operate on 208V. and the outdoor units shall operate on 208V.-1 phase power. Furnish with integral condensate pumps by Charles Austen, Teel or Little Giant, refrigerant piping, wiring and condensate piping as recommended by the manufacturer. Outdoor units shall have base pan heaters and isolation ball valves for each refrigerant circuit. The heat pump units shall be suitable for heating operation down to $-13^0$F. outside ambient with wind baffles. Furnish with condensate overflow safety switches. Furnish with wall-mounted sensors (wired or wireless), mounted at 48" AFF. Furnish with an Intelligent Touch Manager with BacNet interface for connection to the Building Automation System (BAS). Installation including refrigerant pipe sizes, electrical wiring and general arrangements shall be coordinated with the manufacturer.

B. Provide a BlueFin or equal corrosion resistant coating.

2.03 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.

2.04 GAS-FIRED HEATERS

A. Gas-fired unit heaters shall be Reznor, Sterling, or approved equal, with performance and capacities as scheduled. Unit heaters shall be horizontal type, power-vented, sealed combustion with disconnect switch, wall-mounted thermostat, direct spark ignition, flame rollout safety switch, control transformer and hanging kit and vent kit. Venting shall be CPVC or polypropylene as recommended by the manufacturer.

B. The units shall be installed in accordance with the manufacturers recommendations including venting materials.

2.05 TOTAL ENERGY HEAT RECOVERY EQUIPMENT (ERV-#)

A. Shall be Mitsubishi Lossnay, Renewaire, Venmar, or approved equal, with capacities and performance as scheduled and per **Appendix A**. The heat recovery equipment shall be a factory assembled and tested package, constructed and rated in accordance with ARI, AMCA and UL. System components shall include fan(s), air-to-air heat exchangers, dampers, filter sections, Variable Frequency Drives and/or ECM motors with 0-10V. input

signal, structural steel base, non-fused disconnect switches, unit control package and double-wall, insulated casing with interior sheetmetal liner. The casing shall have 1" thick (minimum) 3.0 pcf fiberglass thermal insulation. Exterior unit shall be furnished with an insulated roof curb, be weathertight and have a baked enamel finish.

B. The air-to-air "total energy" heat recovery units shall be a static plate core certified by AHRI under Standard 1060 and listed under UL 1812 "Standard for Ducted Air to Air Heat Exchangers", capable of sensible and latent energy transfer. The unit shall perform without frosting at -10F., and 40% RH. The heat exchanger shall have a five (5) year replacement warranty for materials and labor.

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. Motor performance shall comply with the 2009 American Recovery and Reinvestment Act. Fan bearings shall be regreasable tapered roller pillow block bearings with an L10 life of 200,000 hours. Provide extended lubrication lines for each bearing. Fans shall have seismic rated 2" static deflection spring vibration isolators. All serviceable components shall be readily accessible via hinged (stainless steel) and latched fully gasketted quick release access doors.

D. Supply and exhaust prefilters shall be 2" thick, 30-35% efficient (MERV8) extended surface pleated media disposable type by Farr, or approved equal. Furnish a total of two (2) complete sets of filters for each filter bank.

E. Motorized Dampers shall be provided per the IECC, galvanized steel, airfoil blade, Ruskin Model CD60, or approved equal, "ultra low leak, insulated" type. Blade seals shall be neoprene and jamb seals shall be compressible aluminum or stainless steel. Insulated, motorized backdraft dampers and actuators with end switches shall be provided for the supply and exhaust fans.

F. Electrical work shall be in accordance with the National Electrical Code (NFPA 70) and shall include disconnects, motor starters, duplex weatherproof receptacle (separate 120V. circuit) and junction boxes. Wiring shall be in galvanized steel or liquidtight conduit. A single point electrical connection shall be provided.

2.06 VEHICLE EXHAUST SYSTEM

A. Shall be Ventaire, Monoxivent, Carmon, Nederman, Plymovent, or approved equal, including hose reels, hose, adapters, fittings, fans and accessories for a complete system (See **Appendix B**).

B. The Contractor shall supply the materials and labor for the installation of the complete ducted 8" hose reel and fan systems. These systems shall include, but not be limited to, overhead duct and fittings, flexible tubing set, motorized hose reels, exhaust fan(s) and exhaust stack(s) or vent(s). The overhead duct shall be installed at the locations as indicated on floor plan. The rigid duct shall be mounted and supported in an approved manner such that it meets all local and federal guide lines. All elbows, fittings, and transitions shall be made according to SMACNA standards. The rigid duct shall be connected to the exhaust fan by means of a flexible connector to minimize noise and vibration. The flexible tubing set shall be attached to the rigid duct using hose clamps. The flexible hose shall be 8" diameter suitable for 600◦F. for trucks (diesel engines). The exhaust system tailpipe connector shall be Ventaire, or equal, diesel stack adaptor with positioning hook. Furnish with 10' long positioning rod.

C. The motorized hose reels shall be Ventaire model TMHR80 with flexible tubing set, 120V. with up / down switch, 600W. Each reel shall be supplied with a 25' length of hose rated at 600F. The hose reels shall be supplied with a hose guide to keep the hose uniform over the drum as it retracts, powder-coated steel construction. The reels shall be constructed of a 14 gauge galvanized steel drum, 16 gauge galvanized steel reinforced side plates, and an 11 gauge galvanized steel frame. The locking mechanism shall be constructed of light weight cast aluminum. The entire assembly shall be capable of being overhead or wall mounted.

D. The fume exhaust fans, **EF1, 2** shall be Ventaire Model JRW807F-3-3, Cook, or equal, 3 Hp., 208/3, designed for vehicle fume exhaust service and roof mounting. Fans shall have a prewired disconnect switch, premium

efficiency fan motor, Cook Model ADSG discharge shutter, high temperature paint, steel drain, weather cover / OSHA belt guard, shaft cooler, shaft seal, rub ring, stainless steel shaft, aluminum wheel, bolted access door concentric lock bearings, isolation rail with spring isolators, AMCA "B" construction, enclosed fan starter. Fans shall be mounted on 12" high equipment supports, flashed into the roofing system, Ventaire, or equal.

E. The exhaust stacks shall be 10" diameter, Van Packer, or equal, Type 304SS, single wall with Model DCR Double Cone Rain Cap. The exhaust stack shall extend 6'-0" above the roof surface.

2.07 ELECTRIC DUCT COILS (**EDC1, 2**)

A. The electric duct preheat coils shall be manufactured by Warren Technologies, or equal, with elements selected to ensure operating within designed electrical and temperature requirements even in still free air, elements shall be supported by ceramic isolators. Coils shall be suitable for use with 208v/3ph/60Hz power with integral panel in a NEMA enclosure. **EDC-1, 2** capacity shall be 4.0 KW, 400 cfm, -10F.-+15F. Provide with airflow proving switch, disconnect, SCR controller for discharge air control, overcurrent protection, over-temperature protection and transformer protection in a UL-listed control panel. Coils shall be interlocked with the associated ERV fan such that the coil can only be energized when the fan is operating. All components shall be UL Listed.

PART 3 EXECUTION

3.01 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.

3.02 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.

3.03 TEST AND ADJUST

A. 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.

B. Correct defects which develop in operational testing, conduct additional testing until defect free operation is achieved.

3.04 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 and Owner's representative shall be present and participate in the Owner's instruction.

3.05 REFRIGERATION PIPING

A. Refrigeration Piping:

1. Provide and install refrigeration piping, hangers, and accessories as specified and required. The piping installation shall be performed by a qualified refrigeration mechanic under the direct supervision of the equipment manufacturer. Submit records of tests.

2. Refrigeration piping shall be Type ACR copper tube with brazed joints, or as recommended by the equipment manufacturer, nitrogen-charged equal to BCUP-2 Classification of American Welding Society.

3. The refrigeration system shall be tested as follows:

| | |
|---|---|
| High pressure Side | 300 psi |
| Low Pressure Side | 150 psi |

4. Support risers, offsets, and equipment, in an acceptable manner.

5. Piping shall be installed to meet Codes and regulations, applicable to the installation and in accordance with the best practice of the trade. Brazing shall be accomplished while sweeping piping with nitrogen.

6. Refrigerant accessories shall include required valves and fittings to provide a complete installation. Refrigerant suction and hot gas piping shall be insulated with ¾" thick Armaflex Type AP, or equal, elastomeric unicellular insulation. Exterior insulation shall have .032" thick circumferentially corrugated aluminum jacketing by Childers, solvent-welded ultraviolet resistant PVC jacketting, or approved equal.

7. Parts of the system not factory charged and field installed piping of components shall be evacuated to within .10 MM/Mercury of a perfect vacuum. Break the vacuum to 0 psig with oil-free nitrogen before charging. Hold vacuum overnight for leak test.

8. Provide complete charges of refrigerant and oil to be maintained for the guarantee period.

9. Elbows shall be long radius.

10. The installation shall be in accordance with the above, with equipment manufacturer's instructions, and with established recommended practices.

11. System installation shall include the following:

    a. Pitch lines down in direction of flow a minimum of 1/2 inch per 10 feet.

    b. Trap suction risers as verified with the equipment manufacturer.

    c. Provide service valves on liquid and suction piping at air cooled condensing units.

    d. Maximum filter-dryer pressure drops:

        1 psi for liquid line filter-dryer.

    e. Liquid line solenoid valve on each refrigeration circuit.

    f. Thermal expansion valve on each refrigeration circuit.

PART 4 BASIS OF PAYMENT:

4.01 METHOD OF MEASUREMENT:

A. HVAC System will be measured by the lump sum, complete and accepted. The HVAC System limits shall be as shown or described in the Contract Documents.

4.02 BASIS OF PAYMENT:

A. HVAC System will be paid for at the contract lump sum price. Payment for HVAC System will be under:

| Pay Item | | Pay Unit |
|---|---|---|
| DIV. 23 | HVAC | Lump Sum |

## APPENDIX A
## ENERGY RECOVERY VENTILATOR (ERV-3)

Back to Unit Reports | Excel Export

**RenewAire** *Energy Recovery Ventilation*

***Think Greener. Breathe Better.***

## Unit Report

| | | | |
|---|---|---|---|
| Project Name: | IMT M & O Building | Project Engineer: | |
| Project Address: | Portland ME | Firm/Company Name: | Bennett Engineering |
| | | Prepared By: | SP Doel |
| Weather Data Location: | Portland, United States | Phone Number: | 207-865-9475 |
| Project General Description: | | Fax Number: | 207-865-1800 |
| | | Email Address: | sdoel@bennettengineering.net |

| Tag/Mark/Designation | Location | Area Served | Manufacturer | Model # | Core | Fresh Air Supply (FA) | | | Exhaust Air (EA) | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | CFM | ESP | Filter | CFM | ESP | Filter |
| ERV-3 | | Maintenance Garage | RenewAire | HE2XRT | | 1,250 | 0.25 in. | MERV-8 | 1,200 | 0.25 in. | MERV-8 |

| Performance Data | RA | | OA | | FA | | Total Heat Recovered (BTU/h) | Total Heat Recovered (Tons) | Sensible Load Savings Ratio (%) | Total Load Savings Ratio (%) |
|---|---|---|---|---|---|---|---|---|---|---|
| | Dry Bulb (F) | RH (%) | Dry Bulb (F) | Wet Bulb (F) | Dry Bulb (F) | Wet Bulb (F) | | | | |
| Winter | 68.0 | 25 | -3.0 | -5.0 | 47.7 | 36.8 | 80,217 | | 71 | 69 |
| Summer | 75.0 | 50 | 86.0 | 71.0 | 78.1 | 66.4 | 21,031 | 1.8 | 71 | 56 |

| Unit Electrical Data | | | | | | | Unit Physical Data | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| V/P/H | FA Motor HP | FA Motor FLA | EA Motor HP | EA Motor FLA | MCA (Amps) | MOPD (Amps) | Length (in) | Width (in) | Height (in) | Weight (lbs) | Notes |
| 208-230/60/3 | 1.5 (w/ VFD) | 4.6-4.8 | 1.5 (w/ VFD) | 4.6-4.8 | 11.9 | 15 | See current dim. drawing | See current dim. drawing | See current dim. drawing | See catalog page | |

| Notes |
|---|
| |

Back to Unit Reports

**RenewAire** *Energy Recovery Ventilation*

***Think Greener. Breathe Better.***

## Unit Images
## Model: HE2XRT

| | | | |
|---|---|---|---|
| Project Name: | IMT M & O Building | Project Engineer: | |
| Project Address: | Portland ME | Firm/Company Name: | Bennett Engineering |
| | | Prepared By: | SP Doel |
| Weather Data Location: | Portland, United States | Phone Number: | 207-865-9475 |
| Project General Description: | | Fax Number: | 207-865-1800 |
| | | Email Address: | sdoel@bennettengineering.net |



http://www.ervcalc.renewaire.com/pages/Report-Full.php?unit_id=98381[10/16/2017 3:29:11 PM]



Back to Unit Reports

RenewAire
Energy Recovery Ventilation
*Think Greener. Breathe Better.*

## Ventilation Rate Calculator Report

| | | | |
|---|---|---|---|
| Project Name: | IMT M & O Building | Project Engineer: | |
| Project Address: | Portland ME | Firm/Company Name: | Bennett Engineering |
| | | Prepared By: | SP Doel |
| Weather Data Location: | Portland, United States | Phone Number: | 207-865-9475 |
| Project General Description: | | Fax Number: | 207-865-1800 |
| | | Email Address: | sdoel@bennettengineering.net |

| Zone Description | Calculated Min. Outdoor Air Intake | Adjusted Min. Outdoor Air Intake | Calculated Min. Room Air Exhaust | Adjusted Min. Room Air Exhaust | Standard | Category | Sub-Category | Area Occupied | Number of People/Other | Distribution Effectiveness |
|---|---|---|---|---|---|---|---|---|---|---|
| No Ventilation Zones found. | | | | | | | | | | |

Back to Unit Reports

RenewAire
Energy Recovery Ventilation
*Think Greener. Breathe Better.*

## Annual Savings Estimate

| | | | |
|---|---|---|---|
| Project Name: | IMT M & O Building | Project Engineer: | |
| Project Address: | Portland ME | Firm/Company Name: | Bennett Engineering |
| | | Prepared By: | SP Doel |
| Weather Data Location: | Portland, United States | Phone Number: | 207-865-9475 |
| Project General Description: | | Fax Number: | 207-865-1800 |
| | | Email Address: | sdoel@bennettengineering.net |

| Zone Description | Season | Runtime % | Energy Savings (BTUs) | Fuel Type | Fuel Cost | Eff % SEER | Annual $ Savings | Total $ Savings | Simple Payback |
|---|---|---|---|---|---|---|---|---|---|
| **Unit: ERV-3** | Heating | 0 | 0 | | | | $0.00 | $0.00 | 0.0 years |
| | Cooling | 0 | 0 | Electric | $/kWh | | $0.00 | | |
| **Totals** | **Heating** | | **0** | | | | **$0.00** | **$0.00** | **0.0** |
| | **Cooling** | | **0** | | | | **$0.00** | | |

This analysis tool is based on AHRI Certified ERV component data. Actual unit performance may vary based on product configuration, actual weather conditions matching historical weather data, installed system and operation matching calculation input and assumptions and system and energy cost input matching actual costs.

http://www.ervcalc.renewaire.com/pages/Report-Full.php?unit_id=98381[10/16/2017 3:29:11 PM]

# APPENDIX B
# VEHICLE EXHAUST SYSTEM

www.ventaire.com
info@ventaire.com

11975 Portland Ave. S., Suite 104
Burnsville, MN 55337
Phone # (952) 894-6637
Fax # (952) 894-0750

# PRODUCT LIST

| DATE |
|---|
| 7/10/2017 |

| REPRESENTATIVE |
|---|
| HVAC Products, Inc.<br>88 Second Street<br>South Portland, ME 04106<br>Attn: Ed Rowe<br>SALES REP: E.R. |

| PROJECT NAME | INTERNATIONAL MARINE TER... |
|---|---|

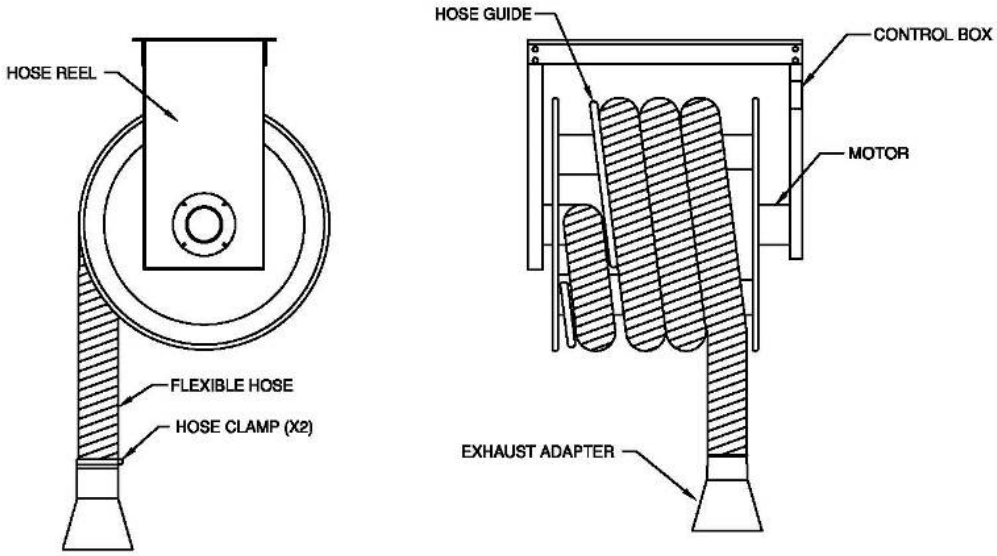
| ITEM# | QTY | MODEL | DESCRIPTION | WGT |
|---|---|---|---|---|
| 1 | 2 | TMHR80 | Motorized Hose Reel - 8"dia x 25' Max Hose, 120/1/60, w/ UP-Down Wall Switch | 350 |
| 2 | 2 | HTN-825 | High Temp Hose (600F) - 8"dia x 25' | 60 |
| 3 | 4 | HC80 | Hose Clamp - 8"dia | - |
| 4 | 2 | DSG80 | Diesel Stack Adapter, 8"dia, Galv. w/ positioning hook | 10 |
| 5 | 2 | ASSM | Factory Assembly Charge | - |
| 6 | 2 | PR10 | Positioning Rod- 10' | 6 |
| 7 | 2 | FAN | JRW807F-3-3 - Belt Drive Exhaust Fan, 1200CFM @ 6"wg, 3HP, 230-460/3/60, ODP, Premo Eff., w/ Bolted Access Door, Weather Cover, 500F Construction & RIS Rails | 430 |
| 8 | 2 | EFC-2XX,3-3-2XX,1 | Enclosed Fan Starter, W/ Overload Protection, 3HP max, NEMA 4X, 230/3/60 fan, 230/1/60 coil, START/STOP + RESET Buttons. (Shipped Loose) | 4 |
| 9 | 2 | DS3R-1/3-25A-NF-4X | Enclosed Non-fused Disconnect Switch, 25A, NEMA 4X (Shipped Loose) | 4 |
| | | 1 | NOTES:<br>1) Rigid duct & fan wiring by others.<br>2) System selected is designed to ventilate a 13.5L engine operating up to 1200rpm.<br>3) Selection assumes:<br>- Hose reel will fit above overhead crane.<br>- 25' of hose required.<br>- 230V or 460V 3 phase electrical service is available to power fans.<br>- Fans to be roof mounted.<br>- Hose reels and fans to be controlled via surface mounted push button stations. | |

PREPARED BY: _____...

| Ventaire www.ventaire.com | LAYOUT | MOTORIZED HOSE REEL SYSTEM |
|---|---|---|

PROJECT: INTERNATIONAL MARINE TERMINAL

| LOCATION: | ENGINEER: | SALES ENGINEER: |
|---|---|---|
| ARCHITECT: | CONTRACTOR: | DATE: 7/10/17 |




NOTES

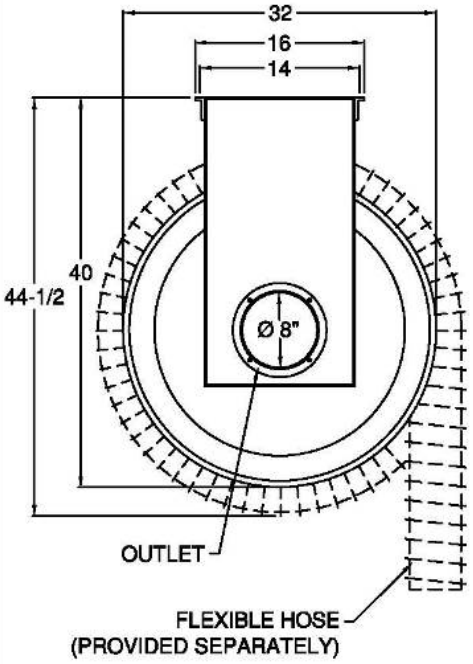
SEE INDIVIDUAL SUBMITTAL DRAWINGS FOR ADDITIONAL INFORMATION.

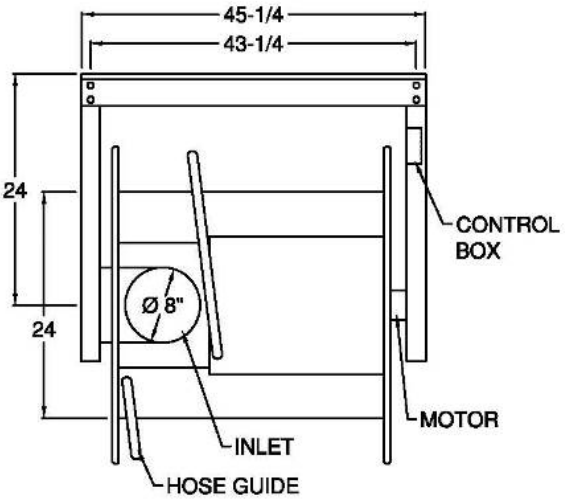
REV. 091203 X LAYOUT-TMHR.DWG

| Ventaire www.ventaire.com | SUBMITTAL | MOTORIZED HOSE REEL 8" DIAMETER |
|---|---|---|

PROJECT: INTERNATIONAL MARINE TERMINAL

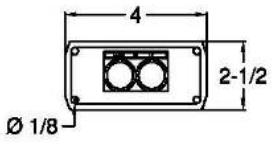
| LOCATION: | ENGINEER: | SALES ENGINEER: |
|---|---|---|
| ARCHITECT: | CONTRACTOR: | DATE: 7/10/17 |




| MODEL | HOSE DIAMETER | HOSE CAPACITY (FT) |
|---|---|---|
| TMHR80 | 8 | 25' |

CONTROL STATION




4-BUTTON STATIONS AND HANGING PENDANTS OPTIONAL

**SPECIFICATIONS:**

DRUM: 14 GA. GALVANIZED STEEL
DRUM SIDE PLATE: 16 GA.REINFORCED GALVANIZED STEEL.
FRAME: POWDER COATED 12 GA. GALVANIZED STEEL.
BEARINGS: SLEEVE BEARINGS.
MOTOR: 120/1/60, 5.1A, 600W, 10 RPM
THERMAL OVERLOAD PROTECTION.
INTEGRAL BRAKE & PUSH BUTTON LIMIT SWITCHES
TOTALLY ENCLOSED TUBULAR CONSTRUCTION.
CONTROL: 2-BUTTON STATION, MOMENTARY PUSH BUTTONS.
FOUR Ø1/2" MOUNTING HOLES, 14" X 43-1/4" RECTANGULAR PATTERN

## SCHEDULE

| ITEM | QTY | HOSE TYPE | HOSE LENGTH | REFERENCE |
|---|---|---|---|---|
| 1 | 2 | HTN | 25' | |
| | | | | |
| | | | | |

NOTES:
ALL DIMENSIONS IN INCHES UNLESS OTHERWISE SPECIFIED.
*CONSULT FACTORY FOR LARGER CAPACITIES OR NON-STANDARD DIAMETERS.

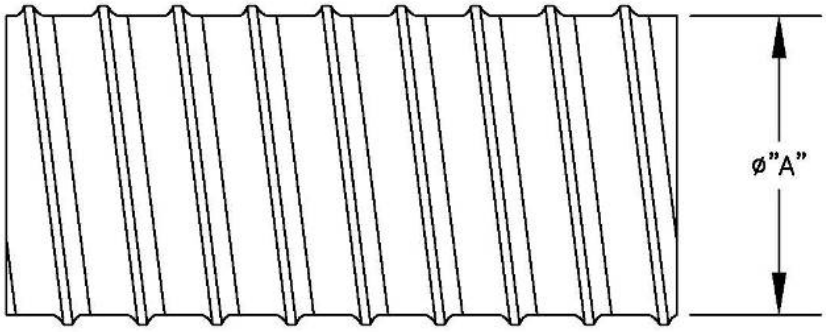
REV:150423 X TMHR80.DWG

| Ventaire www.ventaire.com | SUBMITTAL | FLEXIBLE HOSE W/INTERNAL HELIX |
|---|---|---|

PROJECT: INTERNATIONAL MARINE TERMINAL

| LOCATION: | ENGINEER: | SALES ENGINEER: |
|---|---|---|
| ARCHITECT: | CONTRACTOR: | DATE: 7/10/17 |

# HTN - FLEXIBLE TUBING W/ INTERNAL HELIX




| 'A' DIA | LB/FT |
|---|---|
| 4 | 0.5 |
| 5 | 0.6 |
| 6 | 0.8 |
| 8 | 1.1 |
| 10 | 1.4 |

## SCHEDULE

| ITEM | QTY | MODEL | DIA. | LENGTH | REFERENCE |
|---|---|---|---|---|---|
| 2 | 2 | HTN | 8" | 25' | |
| | | | | | |
| | | | | | |

NOTES:
CONSTRUCTION: 2 PLY REINFORCED NOMEX OUTER LAYER AND SILICONE COATED FIBERGLASS INNER LAYER WITH A FULLY ENCLOSED STEEL WIRE SUPPORTED WITH AN ARAMID CORD.
HOSE TEMPERATURE RANGE: -60° F TO 600° F. CONTINUOUS DUTY, BAKING TEST.
EXHAUST GAS TEMPERATURE RANGE: -60° F TO 1250° F. INTERMITTENT EXHAUST TEMPERATURES.*
COLOR: RED OXIDE.
BENEFITS: HANDLES HIGH AND LOW TEMPERATURE APPLICATIONS. COMBINES THE HIGH TEMPERATURE RESISTANCE OF SILICONE & SUPERIOR FLEXIBLE FATIGUE OF NOMEX AND FIBERGLASS.
NOT RECOMMENDED FOR APPLICATIONS WHERE THE HOSE WILL DRAG ACROSS THE FLOOR.
ALL DIMENSIONS IN INCHES AND NOMINAL.

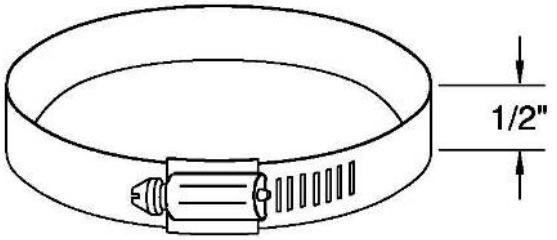
*TEMPERATURE RANGE ASSUMES VENTILATION SYSTEM IS SIZED PROPERLY.

REV:110909 X-X HTN1250.DWG

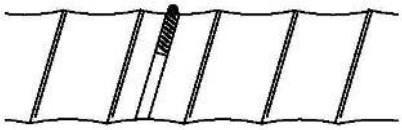
| Ventaire www.ventaire.com | SUBMITTAL | HOSE CLAMPS |
|---|---|---|

PROJECT: INTERNATIONAL MARINE TERMINAL

| LOCATION: | ENGINEER: | SALES ENGINEER: |
|---|---|---|
| ARCHITECT: | CONTRACTOR: | DATE: 7/10/17 |




HC-HOSE CLAMP



USED FOR FLEX WITH INTERNAL HELIX

| MODELS | FLEX DIA. |
|---|---|
| HC30 | 3" |
| HC40 | 4" |
| HC50 | 5" |
| HC60 | 6" |
| HC70 | 7" |
| HC80 | 8" |
| HC90 | 9" |
| HC100 | 10" |

## SCHEDULE

| ITEM | QTY | MODEL | DIA. | REFERENCE |
|---|---|---|---|---|
| 3 | 4 | HC80 | 8" | |
| | | | | |
| | | | | |
| | | | | |
| | | | | |

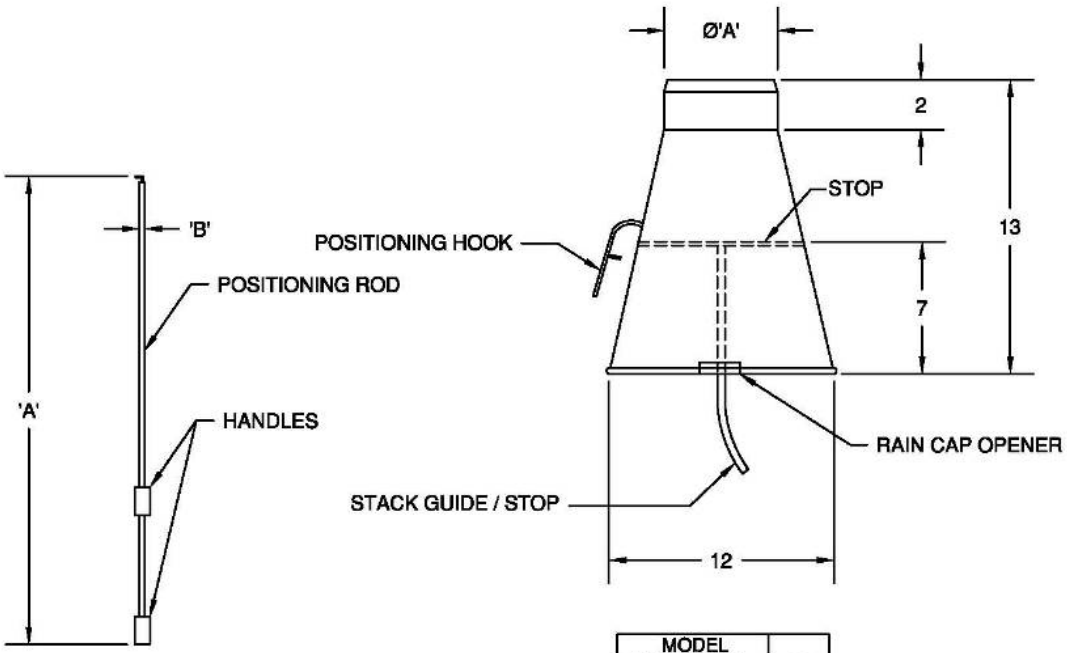
NOTES
HIGH GRADE STAINLESS STEEL CONSTRUCTION

REV: 090827 X-X HC.DWG

| Ventaire www.ventaire.com | SUBMITTAL | METAL DIESEL STACK ADAPTER AND POSITIONING ROD |
|---|---|---|

PROJECT: INTERNATIONAL MARINE TERMINAL

| LOCATION: | ENGINEER: | SALES ENGINEER: |
|---|---|---|
| ARCHITECT: | CONTRACTOR: | DATE: 7/10/17 |




| MODEL | 'A' | 'B' |
|---|---|---|
| PR 8 | 8' | 1/2 |
| PR 10 | 10' | 3/4 |

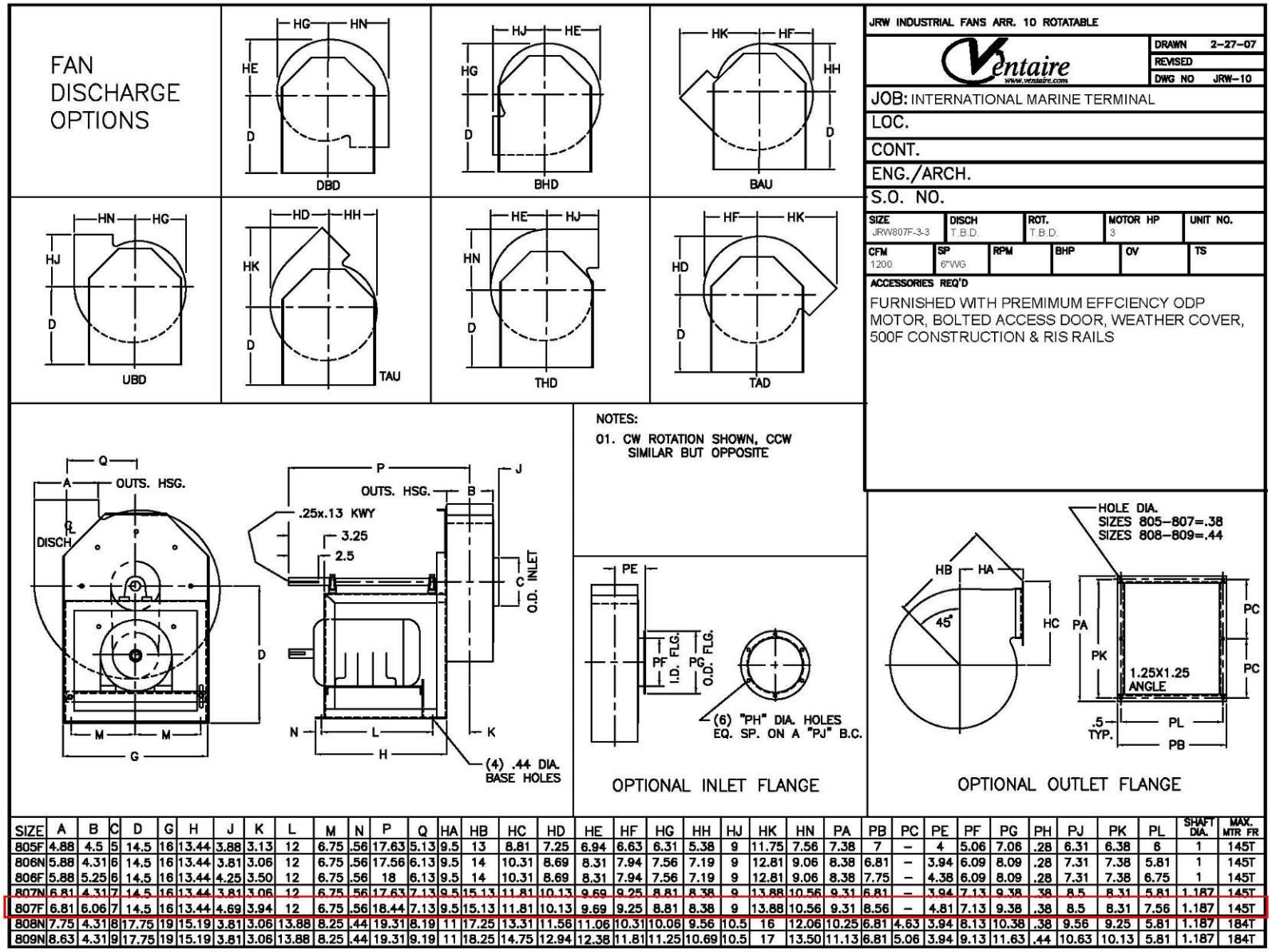
| MODEL | | |
|---|---|---|
| GALV | S.S. | 'A' |
| DSG40 | DSS40 | 3-7/8 |
| DSG50 | DSS50 | 4-7/8 |
| DSG60 | DSS60 | 5-7/8 |
| DSG70 | DSS70 | 6-7/8 |
| DSG80 | DSS80 | 7-7/8 |
| DSG100 | DSS100 | 9-7/8 |
| DSG120 | DSS120 | 11-7/8 |

## SCHEDULE

| ITEM | QTY | MODEL | REFERENCE |
|---|---|---|---|
| 4 | 2 | DSG80 | |
| 6 | 2 | PR10 | |

NOTES:
ALL DIMENSIONS IN INCHES.
DSG - 20 GAUGE GALVANIZED STEEL SHROUD AND Ø1/4" GALVANIZED STEEL HOOK AND STACK GUIDE.
DSS - 20 GAUGE STAINLESS STEEL SHROUD AND Ø1/4" STAINLESS STEEL HOOK AND STACK GUIDE.

REV: 090820 X-X DSG_DSS_PR.DWG




| SIZE | A | B | C | D | G | H | J | K | L | M | N | P | Q | HA | HB | HC | HD | HE | HF | HG | HH | HJ | HK | HN | PA | PB | PC | PE | PF | PG | PH | PJ | PK | PL | SHAFT DIA. | MAX. MTR FR |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 805F | 4.88 | 4.5 | 5 | 14.5 | 16 | 13.44 | 3.88 | 3.13 | 12 | 6.75 | .56 | 17.63 | 5.13 | 9.5 | 13 | 8.81 | 7.25 | 6.94 | 6.63 | 6.31 | 5.38 | 9 | 11.75 | 7.56 | 7.38 | 7 | – | 4 | 5.06 | 7.06 | .28 | 6.31 | 6.38 | 6 | 1 | 145T |
| 806N | 5.88 | 4.31 | 6 | 14.5 | 16 | 13.44 | 3.81 | 3.06 | 12 | 6.75 | .56 | 17.56 | 6.13 | 9.5 | 14 | 10.31 | 8.69 | 8.31 | 7.94 | 7.56 | 7.19 | 9 | 12.81 | 9.06 | 8.38 | 6.81 | – | 3.94 | 6.09 | 8.09 | .28 | 7.31 | 7.38 | 5.81 | 1 | 145T |
| 806F | 5.88 | 5.25 | 6 | 14.5 | 16 | 13.44 | 4.25 | 3.50 | 12 | 6.75 | .56 | 18 | 6.13 | 9.5 | 14 | 10.31 | 8.69 | 8.31 | 7.94 | 7.56 | 7.19 | 9 | 12.81 | 9.06 | 8.38 | 7.75 | – | 4.38 | 6.09 | 8.09 | .28 | 7.31 | 7.38 | 6.75 | 1 | 145T |
| 807N | 6.81 | 4.31 | 7 | 14.5 | 16 | 13.44 | 3.81 | 3.06 | 12 | 6.75 | .56 | 17.63 | 7.13 | 9.5 | 15.13 | 11.81 | 10.13 | 9.69 | 9.25 | 8.81 | 8.38 | 9 | 13.88 | 10.56 | 9.31 | 6.81 | – | 3.94 | 7.13 | 9.38 | .38 | 8.5 | 8.31 | 5.81 | 1.187 | 145T |
| 807F | 6.81 | 6.06 | 7 | 14.5 | 16 | 13.44 | 4.69 | 3.94 | 12 | 6.75 | .56 | 18.44 | 7.13 | 9.5 | 15.13 | 11.81 | 10.13 | 9.69 | 9.25 | 8.81 | 8.38 | 9 | 13.88 | 10.56 | 9.31 | 8.56 | – | 4.81 | 7.13 | 9.38 | .38 | 8.5 | 8.31 | 7.56 | 1.187 | 145T |
| 808N | 7.75 | 4.31 | 8 | 17.75 | 19 | 15.19 | 3.81 | 3.06 | 13.88 | 8.25 | .44 | 19.31 | 8.19 | 11 | 17.25 | 13.31 | 11.56 | 11.06 | 10.31 | 10.06 | 9.56 | 10.5 | 16 | 12.06 | 10.25 | 6.81 | 4.63 | 3.94 | 8.13 | 10.38 | .38 | 9.56 | 9.25 | 5.81 | 1.187 | 184T |
| 809N | 8.63 | 4.31 | 9 | 17.75 | 19 | 15.19 | 3.81 | 3.06 | 13.88 | 8.25 | .44 | 19.31 | 9.19 | 11 | 18.25 | 14.75 | 12.94 | 12.38 | 11.81 | 11.25 | 10.69 | 10.5 | 17 | 13.50 | 11.13 | 6.81 | 5.06 | 3.94 | 9.13 | 11.63 | .44 | 10.63 | 10.13 | 5.81 | 1.187 | 184T |

| Ventaire www.ventaire.com | SUBMITTAL | EFC SERIES ENCLOSED STARTERS |
|---|---|---|

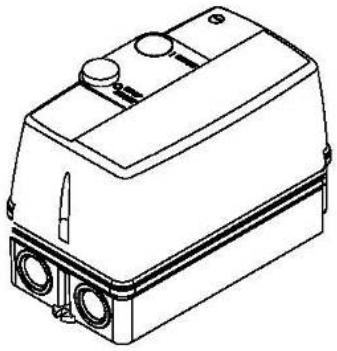
**PROJECT:** INTERNATIONAL MARINE TERMINAL

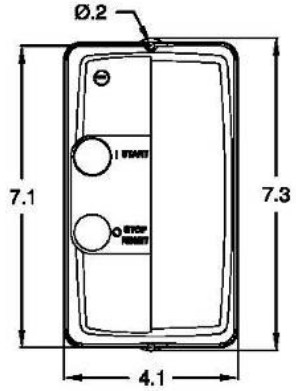
| LOCATION: | ENGINEER: | SALES ENGINEER: |
|---|---|---|
| ARCHITECT: | CONTRACTOR: | DATE: |

MODEL DESIGNATION

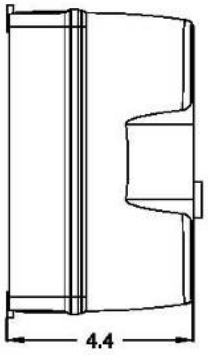
EFC - 120 , 1/1 - 1 - 120 , 1

- 120 , 1/1 — FAN VOLTAGE [ 120 , 208 , 230 , 460 ]
- 120 , 1/1 — FAN PHASE [ 1 , 3 ]
- 1 — FAN H.P.
- 120 — COIL VOLTAGE [ 120 , 208 , 230 , 460 ]
- 1 — COIL PHASE [ 1 ]






FRONT VIEW




SIDE VIEW

## SCHEDULE

| ITEM | QTY | MODEL | HP | FAN VOLTAGE | COIL VOLTAGE | REFERENCE |
|---|---|---|---|---|---|---|
| 8 | 2 | EFC-230,3-3-230,1 | 3 | 230/3/60 | 230/1/60 | |
| | | | | | | |
| | | | | | | |

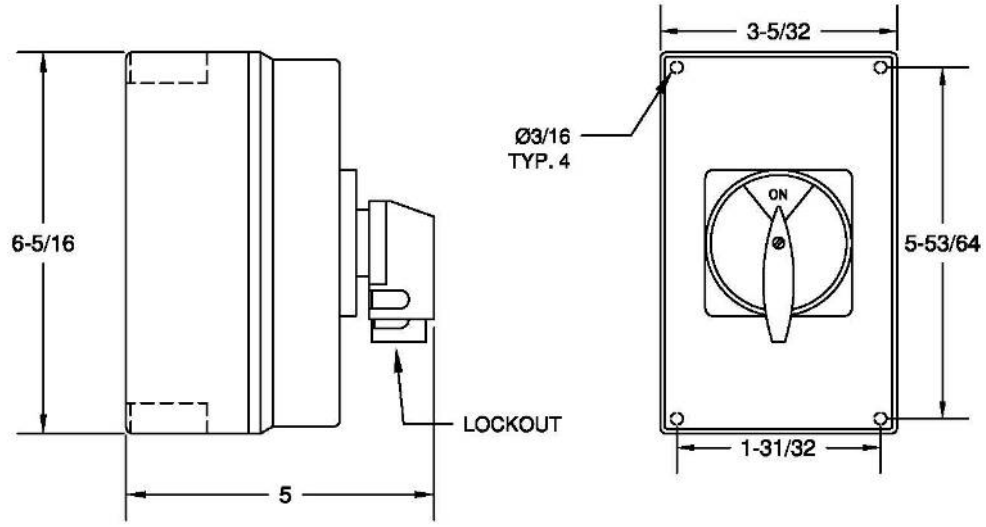
NOTES:
MOTOR PROTECTION FROM OVERLOAD. START/STOP 3-WIRE CONTROL, THROUGH THE COVER OVERLOAD RESET.
UL NEMA 4X RATED, NON-CORROSIVE, OUTDOOR, WASH DOWN RATED.
* DEFAULT VOLTAGES . ADVISE ACTUAL VOLTAGES IF DEFAULT(S) IS INCORRECT.
ALL DIMENSIONS ARE IN INCHES.

REV: 111223 X-X EFC.DWG

| Ventaire www.ventaire.com | SUBMITTAL | ENCLOSED IEC NON-FUSED DISCONNECT SWITCH |
|---|---|---|

PROJECT: INTERNATIONAL MARINE TERMINAL

| LOCATION: | ENGINEER: | SALES ENGINEER: |
|---|---|---|
| ARCHITECT: | CONTRACTOR: | DATE: 7/10/17 |




| MODEL | CURRENT RATING(A) | MAXIMUM HP RATING 1 PHASE 120V | 1 PHASE 240V | 3 PHASE 240V | 3 PHASE 480V | 3 PHASE 600V | POLES |
|---|---|---|---|---|---|---|---|
| DS3R-1/3-25A-4X | 25 | 1-1/2 | 2 | 7-1/2 | 15 | 20 | 3 |
| DS3R-1/3-32A-4X | 32 | 2 | 3 | 7-1/2 | 20 | 25 | 3 |

## SCHEDULE

| ITEM | QTY | MODEL | REFERENCE |
|---|---|---|---|
| 9 | 2 | DS3R-1/3-25A-4X | |
| | | | |

NOTES:
ALL DIMENSIONS ARE IN INCHES UNLESS OTHERWISE NOTED.
FEATURES:
10KA SHORT CIRCUIT RATING AT 600V AC.
SWITCH INCLUDES IP20 TERMINALS.
POLYCARBONATE ENCLOSURE - NEMA 4X/IP65 RATING.
LINE-SIDE TERMINAL SHIELD FOR PROTECTION AGAINST ACCIDENTAL CONTACT WITH LIVE PARTS.
PANEL/BASE MOUNT SWITCHES FOR EASE OF WIRING.
LOCKABLE OPERATING HANDLE.

REV: 140623 X-X DS3R-4X.DWG

**END OF SECTION**

# SECTION 230500 - SUPPLEMENTAL MECHANICAL GENERAL REQUIREMENTS

All work and materials shall conform to the Contract Documents and the provisions of the State of Maine Department of Transportation Standard Specifications, Revision November 2014, with the following additions:

## PART 1 GENERAL

### 1.01 RELATED DOCUMENTS

A. The drawings and general conditions of the Contract, including General and Supplementary Conditions and MaineDOT Division 100, General Conditions, apply to 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 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.

### 1.03 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.

### 1.04 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$^{o}$F throughout the construction period.

1.05 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.

1.06 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.

1.07 EFFICIENCY MAINE

A. This project intends to pursue Efficient Maine prescriptive and/or custom incentives. The contractor shall participate in the activities associated with Efficiency Maine incentive approval process including but not limited to; preparation and submission of required incentive application(s) and the tracking and submission of measure specific invoices to Efficiency Maine within 60 days of the completion of the work.

B. The contractor shall also:

1. Become familiar with the Efficiency Maine Business Program including available incentives and the application and review process.

2. Review plans and specifications for compliance with Efficiency Maine standards for applicable systems and technologies.

3. Review plans and specifications for any and all incentive opportunities, prescriptive and custom.

C. The project schedule shall reflect and accommodate the time required to achieve application preapproval from EM. No equipment shall be purchased until preapproval is received from EM.

D. All invoices shall be forwarded to EM within 60 days of the completion of work. This deliverable shall be shown on the project schedule as a milestone date and coordinated with all contractors to assure compliance with this requirement.

E. Efficiency Maine is available to assist in the application process and can be reached at 866-376-2463

1.08 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.

1.09 INSURANCE

A. Purchase and maintain Public Liability and Property Insurance during the progress of the work and until completion and acceptance of the entire project by the Owner in the amounts as specified in the General Conditions.

## 1.10 APPLICABLE CODES

A. Work and materials shall conform to the latest rules and regulations listed below and these rules and regulations hereby are made part of this specification. They include, but are not necessarily limited to the following:

American Society for Testing and Materials (ASTM)
Underwriters' Laboratories, Inc. (UL)
Air Moving and Conditioning Assoc. (AMCA)
American Society of Heating, Refrigerating, and Air Conditioning Engineers (ASHRAE)
American Society of Mechanical Engineers (ASME)
National Electrical Manufacturers Association (NEMA)
Institute of Electrical and Electronics Engineers (IEEE)
American National Standards Institute (ANSI)
National Fire Protection Association (NFPA)
American Water Works Association (AWWA)
Local Fire Code
Local Plumbing Codes
American Welding Society
International Building Code (IBC)

## 1.11 SHOP DRAWINGS

A. Submit shop drawings, manufacturers' data and certificates for equipment, materials and finish, and pertinent details for each system where specified in each individual section, 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. **Shop drawings that are facsimiled, (FAX) produced, or photocopies of FAX documents OR EMAILED will not be considered or reviewed. Only originals and or photocopied originals, complying with this section will be considered.**

C. 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.

D. **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".**

E. Shop drawings must bear the Engineer's review stamp. In the event that the Engineer returns shop drawings "Amend and Resubmit" or "Rejected", the shop drawing must be revised and resubmitted for review.

F. Furnishing of the specified item must still produce the results and performance, dependability and quality reasonably to be expected within the spirit of the specifications, drawings, and the standard of good mechanical performance normal to the trade.

G. Section 01 33 00 - Submittal Procedures: Submittal procedures.

H. Product Data: Submit data on product characteristics, performance criteria and limitations.

I. Manufacturer's Installation Instructions: Submit procedure for preparation and installation.

J. Manufacturer's Certificate: Certify products meet or exceed specified requirements.

1.12 SUBSTITUTIONS

A. Where the specifications allow the substitution of a product, still this product is subject to review by the Engineer in accordance with the paragraph entitled "Shop Drawings". Review of a substitute item is an indication only that the substitute item is compatible with the specified item as a claim of the manufacturer. Insure dimensional propriety, performance, and quality of the substitute item.

B. Reference in the specifications or on the drawings to any product, material, fixture, form or type of construction, by proprietary name, manufacturer, make or catalog number, establishes a standard of quality or design and is not meant to limit competition. Use any equivalent substitute provided favorable written review by the Engineer is first obtained. The (ONLY) notation in the specification is an exception to this and leaves no option.

C. For materials or equipment which are supplied with integral or factory applied finish, the colors will be considered in evaluating substitutions.

D. For the purpose of avoiding conflicts with other trades, contracts, and adjoining work where more than one (1) article, device, material, fixture, form or proprietary name, manufacturer, make or catalog number, the first named shall be used as the basis of design and details. The cost of any changes because of substituted item shall be borne by the Contractor requesting such change.

PART 2 PRODUCTS

NOT USED

PART 3 EXECUTION

3.01 EQUIPMENT SUPPORTS

A. Furnish and install equipment supports for mechanical equipment as required. Supports shall be subject to review by the Engineer.

3.02 SLEEVES AND PREPARED OPENINGS

A. Coordinate cutting, patching and setting of sleeves, frames, framing and lintels for openings with other trades. Sleeves shall be furnished by the Contractor. All penetrations through concrete shall be sleeved as required by IBC.

B. Failure to give timely notice of and to locate openings and furnish sleeves shall cause no additional expense to the Owner.

3.03 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.

3.04 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.

3.05 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.

3.06 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.

3.07GUARDS

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.

3.08LUBRICATION

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.

3.09 ELECTRIC MOTORS AND MOTOR CONTROLS

A. Unless otherwise noted, motors, motor starters and other electrical accessories which are specified under Mechanical specifications shall be selected with characteristics as follows:

1/2 Horsepower and less - 120 volt, 1 phase, 60 Hz.

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:

| 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.

## 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.

PART 4 BASIS OF PAYMENT:

4.01 METHOD OF MEASUREMENT:

A. Supplemental Mechanical General Requirements will be measured by the lump sum, complete and accepted. The Supplemental Mechanical General Requirements limits shall be as shown or described in the Contract Documents.

4.02 BASIS OF PAYMENT:

A. Supplemental Mechanical General Requirements will be paid for at the contract lump sum price. Payment for Supplemental Mechanical General Requirements will be under:

| Pay Item | | Pay Unit |
|---|---|---|
| DIV. 23 | HVAC | Lump Sum |

**END OF SECTION**

# SECTION 230593 - TESTING, ADJUSTING AND BALANCING FOR HVAC

All work and materials shall conform to the Contract Documents and the provisions of the State of Maine Department of Transportation Standard Specifications, Revision November 2014, with the following additions:

## PART 1 - GENERAL

### 1.01 RELATED DOCUMENTS

A. The drawings and general conditions of the Contract, including General and Supplementary Conditions and MaineDOT Division 100, General Conditions, apply to 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.

D. General Requirements: The provisions of Section 230500 "Common Work Results for HVAC", apply to this section.

### 1.02 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 total supply, return, exhaust and outside airflows and waterflows as indicated.

### 1.03 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.

### 1.04 SUBMITTALS: Submit the following:

A. Standards Compliance:

Testing Agency
Testing Agency Personnel
Professional Engineers
Instrument Calibration

1.05 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, 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 system performance deficiencies disclosed by the test before balancing the systems.

B. Agency Qualifications: Obtain the services of a qualified testing organization to perform the testing and balancing work as herein specified. Prior to commencing work under this section of the specifications, the testing organization shall have been reviewed by the Engineer. The criteria for determining qualifications shall be membership in the AABC, or certification by the NEBB, or the testing organization shall have submitted proof to satisfy the Engineer that the organization meets or exceeds the technical standards for membership of the AABC as published in the AABC 71679. The testing organization shall be independent of both the installing contractors and equipment suppliers for this project.

1.06 AGENDA

A. Preliminary Report: Review drawings and specifications prior to installation of any of the affected system. Submit a written report to the Engineer indicating any deficiencies in the system that would preclude the proper adjusting, balancing, and testing of the systems.

1.07 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 Engineer has the right to request instrument recalibration, or the use of other instruments and test methodology, where accuracy of readings is questionable.

E. Accuracy of Thermometers: Plus or minus one graduation at the temperatures to be measured. Graduations shall conform with the following schedule:

| Medium | Design Temperature Differential (°F) | Maximum Graduation (°F) |
|---|---|---|
| Air | 10 or less | 1/2 |
| Air | over 10 | 1 |

F. Flow Rate Tolerance: Values are based on discussion in ASHRAE "HVAC Applications", Chapter 34. Air filter resistance during tests, artificially imposed if necessary, shall be 80 percent of final values.

1. Air Handling Unit CFM: Minus 0 percent to plus 10 percent.

2. Other Fans: Minus 0 percent to plus 10 percent.

3. Air Terminal Units (VAV Boxes): Minus 5 percent to plus 10 percent.

4. Minimum Outside Air (for manually set dampers): Minus 0 percent to plus 10 percent.

PART 2 - PRODUCTS

NOT USED

PART 3 - EXECUTION

3.01 WATER SYSTEM PROCEDURES

A. Adjustment: Adjust heating, water systems to provide required quantity to, or through each component.

B. Metering: Measure water quantities and pressures with calibrated meters.

C. Water Measurements and Balancing: Use venturi tubes, orifices, or other metering fittings and pressure gages. Adjust systems to provide the design flow rates through the heat transfer equipment prior to the capacity testing. Perform measurement of temperature differential with the air system, adjusted as described herein, in operation.

D. Automatic Controls: Position automatic control valves for full flow through the heat transfer equipment of the system during tests.

E. Flow: Flow through by-pass circuits at three-way valves shall be adjusted to balance that through the supply circuit.

F. Distribution: Adjust distribution by means of balancing devices (cocks, valves, and fittings) and automatic flow control valves. Do not use service valves for adjustment. Where automatic flow control valves are utilized in lieu of venturi tubes, record only the pressure drop across the valve if within the pressure drop rating on the valve tag.

G. Special Procedures: Where available, pump capacity (as designed) is less than total flow requirements of individual heat transfer units of system served, full flow may be simulated by the temporary restriction of flow to portions of the system.

3.02 CERTIFIED REPORTS

A. Submittal: Submit three copies of the reports described herein, covering air system performance, air motion (fpm), to the Engineer 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 balancing and who is not affiliated with any firm involved in the design or construction phases of the project.

3.03 WATER SYSTEM DATA

A. Report: Include data listed below:

1. Pumps:

a. Installation Data:

1) Manufacturer and Model
2) Size

3) Type Drive
4) Motor H.P., Voltage, Phase, and Full Load Amps.

b. Design Data:

1) G.P.M.
2) Head
3) R.P.M.
4) B.H.P. and Amps.

c. Recorded Data:

1) Discharge Pressures (Full-Flow and No-Flow)
2) Suction Pressures (Full-Flow and No-Flow)
3) Operating Head
4) Operating G.P.M. (from pump curves if metering is not provided)
5) No-Load Amps. (where possible)
6) Full-Flow Amps
7) No-Flow Amps

2. Air Heating and Cooling Equipment:

a. Design Data:

1) Load in Btu per hr
2) G.P.M.
3) Entering and Leaving Water Temperature
4) Entering and Leaving Air Conditions (D.B. and W.B.)
5) C.F.M.
6) Water Pressure Drop

b. Recorded Data:

1) Type of Equipment and Identification (location or number designation)
2) Entering and Leaving Air Conditions (D.B. and W.B.)
3) Entering and Leaving Water Temperatures
4) G.P.M. (if metered)
5) Temperature Rise or Drop

3.04 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 air quantities and air motion recorded in the certified report.

C. Points and Areas for Recheck: As selected by the Engineer.

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 Engineer, 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.

PART 4 BASIS OF PAYMENT:

4.01 METHOD OF MEASUREMENT:

A. Testing, Adjusting and Balancing for HVAC will be measured by the lump sum, complete and accepted. The Testing, Adjusting and Balancing for HVAC limits shall be as shown or described in the Contract Documents.

4.02 BASIS OF PAYMENT:

A. Testing, Adjusting and Balancing for HVAC will be paid for at the contract lump sum price. Payment for Testing, Adjusting and Balancing for HVAC will be under:

| Pay Item | | Pay Unit |
|---|---|---|
| DIV. 23 | HVAC | Lump Sum |

**END OF SECTION**

# SECTION 230700 - INSULATION

All work and materials shall conform to the Contract Documents and the provisions of the State of Maine Department of Transportation Standard Specifications, Revision November 2014, with the following additions:

## PART 1 GENERAL

### 1.01 RELATED DOCUMENTS

A. The drawings and general conditions of the Contract, including General and Supplementary Conditions and MaineDOT Division 100, General Conditions, apply to 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.

D. The drawings and the specifications including Section 23 05 00 “Supplemental General Mechanical Conditions” are hereby made a part of the work of this section.

### 1.02 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 ventilating and plumbing systems.

### 1.03 SUBMITTALS

A. Substitutions: Your attention is directed to Section 23 05 00-"Substitutions", relative to competition and the (ONLY) notation. Familiarity with this section shall be achieved before reading the PRODUCTS section of this specification.

B. The items for which the submittals paragraph in Section 23 05 00, Supplemental General Mechanical Requirements, apply are as follows:

1. Piping insulation.
2. Duct insulation.
3. Insulation application schedule.
4. Vapor barrier coating.

C. Section 01 33 00 - Submittal Procedures: Submittal procedures.

D. Product Data: Submit data on product characteristics, performance criteria and limitations.

E. Manufacturer's Installation Instructions: Submit procedure for preparation and installation.

F. Manufacturer's Certificate: Certify products meet or exceed specified requirements.

### 1.04 DEFINITIONS

A. Finished Spaces: Spaces other than furred spaces, pipe and duct shafts, unheated spaces immediately below roof, spaces above ceilings, unexcavated spaces, crawl spaces, and tunnels, unless specifically listed below as an unfinished space.

B. Unfinished Spaces: Mech/Elect Rooms and attic.

C. Unconditioned Spaces: Spaces exposed to near outside ambient temperatures (attic) and spaces not air conditioned.

D. Outside: Areas beyond the exterior side of walls or above the roof, unexcavated spaces, and crawl spaces.

E. Concealed: Not visible in finished or unfinished spaces. For example, above ceilings, below floors, between double walls, furred-in areas, pipe and duct shafts, and similar spaces.

F. Exposed: Visible from a finished or unfinished space.

1.05 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.

1.06 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

2.01 PIPING INSULATION

A. Fiberglass: Heavy density preformed fiberglass with thermal conductivity of 0.29 Btu-in/hr-ft$^2$-$^o$F at 150$^o$F mean temperature. Insulation shall conform to ASTM C547 Class I and shall be suitable for 450$^o$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$^2$-$^o$F at 75$^o$F mean temperature. Insulation shall conform to ASTM C534, Type I, Tubular and shall be suitable for 200$^o$F service. Fitting insulation shall be of same material used for pipe. Permeability shall not exceed 0.10 perms (ASTM E96). Insulation adhesive shall conform to Mil. Spec. MIL-A-24179A, Type II, Class 1.

C. Fittings, Flanges, and Valves: Provide insulation for fittings, flanges, and valves premolded, precut, or job fabricated of the same thickness and conductivity as used on adjacent piping.

D. Insulation Kit: Insulate exposed supply and waste piping at handicapped accessible sinks with fully molded insulation kit. McGuire Products ProWrap, 3/16" thick closed vinyl with anti-microbial additive, 1.02 Btu-in/hr-F$^2$-$^o$F thermal conductivity, white color.

2.02 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$^2$-$^o$F at 150$^o$F mean temperature (ASTM C177), insulation shall be suitable

for 650ºF 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$^2$-ºF at 75ºF mean temperature. Insulation shall conform to ASTM C534, Type II, sheet and shall be suitable for 200ºF service. Permeability shall not exceed 0.10 perms (ASTM E96). Insulation adhesive shall conform to Mil. Spec. MIL-A-24179A, Type II, Class 1.

2.03 DUCT INSULATION

A. Fiberglass (Ductwrap): Fiberglass duct wrap with foil-scrim-kraft facing/vapor barrier, 1.0 lb/cu.ft. density (0.75 lb/cu.ft. for 3" thickness only), 0.29 Btu-in/hr-ft2-oF 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.

2.04 VAPOR BARRIER COATING

A. Raw (cut) ends of fiberglass pipe insulation shall be finished (protected) with the application of a suitable vapor barrier coating or finishing cement (mastic) to maintain the continuous visual and functional integrity of the insulation jacket. Mastic shall be Childers “Chil-Perm” CP-30, elastomeric resin, or approved equal, applied in accordance with the manufacturer’s recommendations.

PART 3 EXECUTION

3.01 SURFACE CONDITIONS

A. Inspection:

1. Prior to work of this Section, carefully inspect the installed work of other trades and verify that such work is complete to the point where this installation may properly commence.

2. Verify that the insulation systems may be installed in accordance with pertinent codes and regulations and the reviewed Submittals.

3.02 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.

## 3.03 PIPING INSULATION

A. Pipe Insulation (Fiberglass): Place sections of insulation around the pipe and joints, tightly butt into place. Draw jacket laps tight and smooth. Secure jacket with fire resistant adhesive, or factory applied self sealing lap. Cover circumferential joints with butt strips, not less than 3-inches wide, of material identical to the jacket material. Overlap longitudinal laps of jacket material not less than 1-1/2 inches. Adhesive used to secure the butt strip shall be the same as used to secure the jacket laps. Exposed fiberglass shall be coated with vapor barrier coating.

B. Flanges, Unions, Valves and Fittings Insulation (Fiberglass): Factory fabricated removable and reusable insulation covers. Place factory pre-molded, precut or field-fabricated segmented insulation of the same thickness and conductivity as the adjoining pipe insulation around the flange, union, valve, and fitting abutting the adjoining pipe insulation. Install factory premolded one-piece PVC fitting covers over the insulation and secure by stapling or with metal or plastic tacks made for securing PVC fitting covers and secure with PVC vapor barrier tape.

C. Pipe Insulation (Flexible Unicellular): Bond cuts, butt joints, ends, and longitudinal joints with adhesive. Miter 90-degree turns and elbows, tees, and valve insulation. Insulate flanges, unions, valves, and fittings.

D. Where penetrating roofs and exterior walls, insulate piping to a point flush with the underside of the deck or wall and seal with a vapor barrier coating.

E. Hangers and Anchors: Pipe insulation shall be continuous through pipe hangers. Where pipe is supported by the insulation, provide MSS SP-58, Type 40 galvanized steel shields (16 gage maximum). For fiberglass insulation systems on pipe sizes 2 inches through 3", provide insulation inserts at points of hangers and supports. Insulation inserts shall be of molded glass fiber (minimum 12 pcf). Insulation inserts shall cover the bottom half of the pipe circumference, 180 degrees, and be not less than 4" long. Vapor-barrier facing of the insert shall be of the same material as the facing on the adjacent insulation. Seal inserts into the insulation. Insulation inserts for pipe sizes 4" and larger shall be welded pipe saddles. Install insulation in void area of saddle of same material used on adjacent insulation. For pipe sizes 2" and smaller, insulation inserts for flexible unicellular insulation systems shall be wooden doweling set on end of length equal to insulation thickness. Seal dowel to insulation with adhesive.

## 3.04 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.

3.05 INSULATION APPLICATION SCHEDULE

| SERVICE | THICKNESS | MATERIAL/JACKET |
|---|---|---|
| PIPING: | | |
| Domestic Cold Water Piping | | |
| 2" and smaller | 1" | Fiberglass w/ASJ or Flexible Unicellular |
| Domestic Hot Water Piping | 1" | Fiberglass w/ASJ or Flexible Unicellular |
| Domestic Water Branch Piping Less than 10 ft in Stud Walls | 1/2" | Fiberglass w/ASJ or Flexible Unicellular |
| Water and Drain Piping Under Handicap Accessible Fixtures | | Insulation Kit (Truebro) |
| PEX Tubing and CPVC Piping for domestic water | 1/2” | Flexible Unicellular |
| Condensate Piping | ½" | Flexible Unicellular |
| Roof Drain Piping | 1" | Fiberglass w/ ASJ |
| Refrigeration Piping | ¾” | Flexible Unicellular |
| Exterior Refrigeration Piping | ¾” | Flexible Unicellular w/ PVC jacket |
| DUCTWORK: | | |
| Concealed Supply Ductwork | 2" | Ductwrap, FSK |
| Exhaust Ductwork from a point three (3) feet interior of the motorized control damper or backdraft damper to the exterior wall, roof, or louver (ERV exhaust) | 2" | FG Ductboard, FSK |
| Outside Air Intake Ductwork from Wall / roof to ERV | 3" | FG Ductboard, FSK |

3.06 FIELD INSPECTION

A. Visually inspect to ensure that materials used conform to specifications. Inspect installations progressively for compliance with requirements.

PART 4 BASIS OF PAYMENT:

4.01 METHOD OF MEASUREMENT:

A. Insulation will be measured by the lump sum, complete and accepted. The Insulation limits shall be as shown or described in the Contract Documents.

4.02 BASIS OF PAYMENT:

A. Insulation will be paid for at the contract lump sum price. Payment for Insulation will be under:

| Pay Item | | Pay Unit |
|---|---|---|
| DIV. 23 | HVAC | Lump Sum |

**END OF SECTION**

# SECTION 230900 - AUTOMATIC TEMPERATURE CONTROLS

All work and materials shall conform to the Contract Documents and the provisions of the State of Maine Department of Transportation Standard Specifications, Revision November 2014, with the following additions:

## PART 1 GENERAL

### 1.01 RELATED DOCUMENTS

A. The drawings and general conditions of the Contract, including General and Supplementary Conditions and MaineDOT Division 100, General Conditions, apply to 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.

D. The drawings and the specifications including Section 23 05 00 "Supplemental Mechanical General Requirements" and Section 26 00 00 “Electrical” are hereby made a part of the work of this section.

### 1.02 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 a direct digital control (DDC) system with human interface panel or web-based access and graphics software providing the sequences as described in these specifications. The ATC system shall be complete with required components including, low voltage and line voltage wiring and conduit, programming and commissioning. Wiring shall be in accordance with Division 16 of the specifications and NFPA 70, National Electrical Code.

B. The automatic temperature controls system shall be provided and installed by trained control mechanics regularly employed in the installation and calibration of ATC equipment by one of the manufacturers’ of such equipment, as listed below. Control installation by any Contractor whose principle business is not direct manufacture and installation is prohibited.

### 1.03 ACCEPTABLE MANUFACTURERS / INSTALLERS

A. Maine Controls.
B. Basix.
C. Siemens.
D. ASI.
E. IB Controls.

### 1.04 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, Supplemental General Mechanical Requirements, apply are as follows:

1. Temperature control system schematic including variables, flow diagrams, ladder diagrams, and point to point wiring diagrams, indicating set points, reset ranges, throttling ranges, controller gains, differentials,

operating ranges, normal positions, controller action, dial ranges, voltages, currents, mounting locations, indicators, and terminal strip points.

2. Sequence of operation for each system and function.

3. Generic, functional description of each control component indicated.

4. Equipment interlocks required by sequence of operation.

5. Automatic valve schedule showing flow, Cv, and pressure drop.

6. Manufacturer's Data:

   a. Dampers, valves and operators.
   b. Controllers, including wiring and connection diagrams.
   c. Thermostats, temperature sensors, including wiring and connection diagrams.
   d. Temperature and pressure indicators.
   e. Pressure sensors, including wiring and connection diagrams.
   f. Switches, relays, transmitters, transformers, including wiring and connection diagrams.

7. Human interface panel or web access with color graphics software data.

C. Section 01 33 0 - Submittal Procedures: Submittal procedures.

D. Product Data: Submit data on product characteristics, performance criteria and limitations.

E. Manufacturer's Installation Instructions: Submit procedure for preparation and installation.

F. Manufacturer's Certificate: Certify products meet or exceed specified requirements.

1.07 WARRANTY

A. The automatic temperature control system shall have a **two (2) year parts and labor** warranty.

PART 2 PRODUCTS

2.01 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.

2.02 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.

## 2.03 TEMPERATURE SENSORS

A. Temperature Sensors: RTD Elements, accuracy of $\pm$0.1% at 70ºF, 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. No devices containing mercury are permitted.

C. Thermostats in “public/common areas” shall have guards.

## 2.04 OPERATOR INTERFACE PANEL (OR WEB BASED ACCESS)

A. Operator Interface Panel shall be a wall mounted interface panel by Price or equal. Each screen shall be capable of displaying and changing all controlled variables. The terminal shall be capable of displaying the system point name (up to 30 characters), current value, priority and status. It shall trend and display alarms. The display shall be an LCD screen displaying a minimum 40 character per line and 2 lines. The terminal shall include an integral alphanumeric keypad.

1. Locate in Mechanical room or as indicated on drawings.

2. System shall be dial-in (or web accessible) and trending capable.

2.05 VENTILATION CONTROL PANEL (VCP)

A. The Ventilation Control Panel (VCP) shall be Honeywell Analytics "E3Point" or Toxalert with NOx and CO remote sensors. Furnish with contacts for high level and emergency high level with an "audible-visual" alarm with silence switch. The unit shall start the exhaust fan if the high level setpoint is reached.

1. Locate in the Maintenance Bay as indicated on the drawings, wall-mounted.

2.06 SEQUENCE OF CONTROL

A. Provide and install all required components to enable the mechanical system to operate in the following sequences:

1. Exhaust Fans (EF-1): Shall operate from the room cooling sensor to maintain a space temperature of 80F.

2. Ventilation Control Panel (**VCP**): The Panel shall be Honeywell Analytics, Tox-A-Lert Model GVU-1, or equal, with sensor(s), located as recommended by the manufacturer. **ERV-3** shall operate to limit the levels of nitrogen dioxide gas. **ERV-3** shall operate at minimum speed during "occupied" periods. When the CO level reaches the lower concentration limit setpoint, the fan speed shall increase to maintain the setpoint. If the critical concentration level is reached, the "audible-visual" alarm with "silence" switch shall be enabled and **EF-3** shall operate and the **L3** motorized intake damper shall open.

3. **EF1** and **EF2** Vehicle Exhaust Fans: Shall operate from manual switches with pilot lights and be interlocked with the respective intake louver motorized dampers. The motorized dampers at the fans shall open and end switches shall start the fans.

4. Energy Recovery Ventilators (**ERV-1, 2**): The units shall operate on an "occupied-unoccupied" cycle. Motorized dampers shall open / close with unit operation. A duct-mounted / room CO2 sensor shall control fan speed / cycle the unit to maintain the setpoint. Connect the ERV's to the Lossnay control panel.

5. Multisplit Heat Pumps (**SAC / SCU**): The BAS shall interface with the BacNet communication board to monitor, display, alarm and control all available variables. Provide wiring from the outdoor unit to all of the indoor units per the manufacturers recommendations.

6. The gas-fired unit heaters shall be enabled if the room temperature drops below the setpoint.

7. Electric Duct Coils (**EDC-1, 2, 3**): The duct coils shall be controlled from a temperature sensor and SCR controller to maintain a 68F. discharge temperature.

PART 3 EXECUTION

3.01 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.

## 3.02 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.

## 3.03 ADJUSTMENTS

A. Adjust controls and equipment to maintain the conditions indicated, to perform the functions indicated, and to operate in the sequence specified.

## 3.04 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.

3.05 FIELD INSPECTION AND TESTS

A. Tests shall be performed or supervised by employees of the ATC system or manufacturer of the ATC system, or by an authorized representative of the ATC manufacturer. Give Architect 14 calendar days advance written notice prior to the date of the field acceptance testing. If the Architect witnesses tests, such tests shall be subject to approval. If the Architect does not witness tests, provide performance certification.

B. Plan for Inspections and Tests: Furnish a written inspections and tests plan at least 60 days prior to the field acceptance test date. This plan shall be developed by the manufacturer of the ATC system. The plan shall delineate the inspections and testing procedures required for the ATC system to demonstrate compliance with the requirements specified. Additionally, the test plan shall indicate how ATC system is to be tested, what variables will be monitored during test, names of individuals performing tests, and what criteria for acceptance should be used. Indicate how operation of H&V system and ATC system in each seasonal condition will be simulated.

C. Field Acceptance Testing: Upon completion of 72 hours of continuous H&V and ATC systems operation and before final acceptance of work, test the automatic temperature control systems in service with the heating, ventilating and air conditioning systems to demonstrate compliance with contract requirements. Test controls through each cycle of operation, including simulation of each season insofar as possible. Test safety controls to demonstrate performance of required function. Adjust or repair defective or malfunctioning automatic space temperature control equipment or replace with new equipment. Repeat tests to demonstrate compliance with contract requirements.

PART 4 BASIS OF PAYMENT:

4.01 METHOD OF MEASUREMENT:

A. Automatic Temperature Controls will be measured by the lump sum, complete and accepted. The Automatic Temperature Controls limits shall be as shown or described in the Contract Documents.

4.02 BASIS OF PAYMENT:

A. Automatic Temperature Controls will be paid for at the contract lump sum price. Payment for Automatic Temperature Controls will be under:

| Pay Item | | Pay Unit |
|---|---|---|
| DIV. 23 | HVAC | Lump Sum |

**END OF SECTION**

# SECTION 233000 - DUCTWORK AND ACCESSORIES

All work and materials shall conform to the Contract Documents and the provisions of the State of Maine Department of Transportation Standard Specifications, Revision November 2014, with the following additions:

## PART 1 GENERAL

### 1.01 RELATED DOCUMENTS

A. The drawings and general conditions of the Contract, including General and Supplementary Conditions and MaineDOT Division 100, General Conditions, apply to 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.

D. The drawings and the specifications including Section 23 05 00 "Supplemental Mechanical General Requirements" are hereby made a part of the work of this section.

### 1.02 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.

### 1.03 SUBMITTALS

A. Substitutions: Your attention is directed to Section 23 05 00-"Substitutions", relative to competition and the (ONLY) notation. Familiarity with this section should be achieved before reading the PRODUCTS section of this specification.

B. The items for which the submittals paragraph in Section 23 05 00, Supplemental General Mechanical Requirements, apply are as follows:

1. Ductwork.
2. Ductwork accessories.
3. Firestopping materials and methods.
4. Ductwork sealing products.
5. Grilles, registers and diffusers.
6. Louvers and dampers.

C. Section 01 33 00 - Submittal Procedures: Submittal procedures.

D. Product Data: Submit data on product characteristics, performance criteria and limitations.

E. Manufacturer's Installation Instructions: Submit procedure for preparation and installation.

F. Manufacturer's Certificate: Certify products meet or exceed specified requirements.

## PART 2 PRODUCTS

### 2.01 DUCTWORK

A. Classification of Ductwork: Low pressure ductwork: up to 2" W.G. static pressure.

B. Materials: Unless otherwise indicated low pressure ductwork shall be galvanized steel. Galvanized sheet metal shall be new galvanized steel sheets of lock forming quality with zinc coating that will not flake or peel under forming operation.

C. Construction for Low Pressure Round and Rectangular Ductwork:

1. Material: Galvanized steel conforming to ASTM A527, weight of galvanized coating shall be not less than 1-1/4 ounces total for both sides of one sq.ft. of a sheet. Construction, metal gage, and reinforcements shall conform with SMACNA "Duct Construction Standards" and NFPA 90A for 2" W.G. pressure class.

2. Fittings: Shall be constructed in accordance with SMACNA Standards and shall be of the types indicated (ONLY). Taps and take-offs shall be at 45 degrees.

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.

D. Construction for Spiral Seam Round and Flat Oval Ductwork:

1. Ductwork and fittings shall be United McGill Uni-seal or Uni-rib, Eastern Sheetmetal, Lindab, Semco or Monroe Sheetmetal, galvanized steel, factory fabricated, spiral lockseam or welded longitudinal seam, round or flat oval type, as indicated. Seams shall be solid welded or spot-welded and factory sealed airtight. Ducts and fittings shall be specifically designed for medium pressure application. Round or flat oval ductwork indicated as acoustically lined or double-wall (DW) shall be United-McGill Acousti-K27, double wall medium pressure construction with solid 26 gauge sheetmetal inner liner and 1" thick fiberglass insulation. Fittings shall be furnished with solid liners. Insulation shall be provided with thermal conductivity of 0.27 BTU/HR-$^{o}$F-FT$^{2}$-IN. Interior ductwork shall be constructed of galvanized sheetmetal. Outside air intake ductwork shall be double-wall construction with 3” thick fiberglass insulation and galvanized steel outer shell.

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$^{o}$ conical type or 45$^{o}$ standard type, with smooth, machine formed entrance, designed for low pressure drop and low noise generation. 90$^{o}$ 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$^{o}$ 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.

2.02 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. 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.

C. Flexible Duct Connections: Ventfabrics, Inc. neoprene coated glass fabric.

D. Drawbands for Flexible Ducts: Clinch type stainless steel with screwdriver adjustment, or nylon with lever action tightening tool provided by the drawband manufacturer.

E. 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.

F. 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.

G. Flexible Ductwork:

1. Low Pressure Duct Systems: Wiremold type WGCF, polyester core with wire helix, 2" thick (R-6 min.), 3/4 lb fiberglass insulation, polyolefin jacket/vapor barrier, 2" W.G. rated pressure.

H. 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.

I. 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/$^{0}$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 are net inside of liner.

J. Fire Dampers: Greenheck DFD-series, Ruskin Model IBD2, or Cesco, curtain type, 100% free area (ONLY), Style C for round duct installations, and Style B or ODFD type 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$^{o}$F fusible link. Fire dampers shall be "dynamic" rated and shall comply with UL "Standard for Safety" 555.

K. Louvers (L): Ruskin Model ELF6375DX, Greenheck, or American Warming and Ventilating. Extruded aluminum construction, 0.081" thick, aluminum extrusions, drainable blade, 1/2" expanded metal bird Screen, size and performance as scheduled. AMCA certified leakage rate shall be a maximum of 0.02 ounces of water per square foot of free area at 1000 FPM free area velocity. Provide Kynar 500 finish, color selected by Architect. Provide frame styles compatible with building construction, see architectural details. Provide concealed architectural or standard visible mullions in multi-panel louver assemblies as indicated on the drawings. Inactive / blanked-off louvers shall have a double wall sheetmetal closure on the interior face of the louver. The closure shall have a 2" thickness of 1.5 pcf rigid fiberglass board insulation with a foil face. Both sides of the sheetmetal shall be painted flat black.

2.03 AIR DEVICES (Krueger, Price, Anemostat, Metal Aire, Titus) 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 the 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 / Linear Slot 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. Ceiling diffusers shall be Metalaire Series 5000 with induction vane (IV) option, Titus or Price. Linear slot ceiling supply diffusers shall be 4'-0" long, 4-slot, 1" slots, extruded aluminum, adjustable pattern controllers, integral boot plenum with ½" thick insulation.

E. Grilles and Registers: Construction and finish as indicated, 1/2" louver spacing, 45$^{o}$ curved blade. Registers shall have opposed-blade volume dampers with screwdriver adjuster. Unless otherwise indicated, registers shall be provided. Linear bar grilles shall be heavy-duty construction suitable for floor applications.

F. Ceiling grille and register construction shall be aluminum, with a white powder coated matte finish. Linear bar floor grilles and sidewall grilles shall have a clear anodized finish.

G. 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.

PART 3 EXECUTION

3.01 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.

3.02 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 MUBEC.

B. Joint Sealing: See PRODUCTS section.

C. Longitudinal joints: See PRODUCTS section.

D. Turns shall be made with long radius elbows or, if physically impossible to use long radius elbows, shall be square turns with specified turning vanes. CAUTION: Turns not conforming to this requirement shall be ordered removed and replaced with properly built turns.

E. Access Doors: Provide access doors for concealed apparatus requiring service and inspection in the duct system including but not limited to dampers, sensors and motors, and upstream and downstream from duct coils.

F. Duct Sleeves and Prepared Openings: Install duct sleeves and prepared openings for duct mains, duct branches, and ducts passing through walls, roofs, and ceilings. Insure the proper size and location of sleeves and prepared openings. Allow one-inch clearance between duct and sleeve or one-inch clearance between insulation and sleeve for insulated ducts, except at grilles, registers, and diffusers.

G. Duct Supports: Unless otherwise indicated, provide one-inch wide by 16 gage galvanized steel sheet metal strips on each side of ducts. Anchor risers in the center of the vertical run to allow ends or riser free vertical movements. Attach supports only to structural framing members. Do not anchor supports to metal decking unless a means is provided (architectural review required) for preventing the anchors from puncturing the metal decking. Where supports are required between structural framing members, provide suitable intermediate metal framing. Where C clamps are used, use retainer clips.

H. Flexible Collars and Connections: Provide flexible collars between fans and ducts or casings and where ducts are of dissimilar metals, as indicated or required. For round ducts, securely fasten flexible connections using stainless steel

clinch-type draw-band. Nylon drawbands may be used if installed using the drawband manufacturer's lever-action tightening tool. For rectangular ducts, lock flexible connections to metal collars.

I. Flexible Ducts: Provide where indicated. No fiberglass shall be in contact with air flow. Flexible duct length shall not be more than 4'-0". Install with metal band hangers and without excess length, provide maximum extension of flex duct. Securely fasten flexible ducts to metal collars using a stainless steel or tool-tightened nylon drawband on the duct core and a second drawband on the insulation vapor barrier. If the duct exceeds 12 inches diameter, position the drawband behind a bead on the metal collar. Taping in lieu of drawbands is not allowed.

J. Any deviation in the duct system must be submitted as a shop drawing and stamped. CAUTION: Any deviation not submitted and favorably reviewed will be ordered removed from the system and replaced with that which is shown on the Drawings.

K. Discrepancies between actual field conditions and the Contract Documents shall be brought to the attention of the Architect prior to fabrication.

L. Field Changes to Ductwork: Field changes of ducts such as those required to suit the sizes of factory-fabricated equipment actually furnished shall be designed to minimize expansion and contraction. Use 4:1 transitions in field changes as well as modifications to connecting ducts.

M. Transitions with a slope greater than 4 to 1 shall be ordered removed from the system and replaced with a transition which meets this criteria.

N. Joints and seams at intake and exhaust plenums and joints on intake and exhaust ductwork for a distance of 3 feet from the plenum shall be sealed watertight on the bottom and side joints and seams.

O. Isolation dampers at intake and exhaust louvers and vent hoods shall be sealed to the ductwork to provide an airtight assembly with similar performance characteristics to the isolation damper.

3.03 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.

3.04 TEST AND ADJUST

A. Before operating any system, the system shall be cleaned out to remove dust and foreign materials.

B. After the installation is complete and ready for operation, test the system under normal operating conditions in the presence of the Architect and demonstrate that the system functions as designed.

C. Correct defects which develop during the test period, conduct additional testing until defect free operation is achieved.

3.05 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.

3.06 INSTRUCTIONS

A. On completion of the project, instruct the Owner's representative in the care and operation of the system. The total period of instruction shall not exceed four (4) hours. The time of instruction shall be arranged with the Owner. In addition to the prime Mechanical Contractor, the control system Contractor, Balancing Contractor, and Owner's representative shall be present and participate in the Owner's instruction.

3.07 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.

PART 4 BASIS OF PAYMENT:

4.01 METHOD OF MEASUREMENT:

A. Ductwork & Accessories will be measured by the lump sum, complete and accepted. The Ductwork & Accessories limits shall be as shown or described in the Contract Documents.

4.02 BASIS OF PAYMENT:

A. Ductwork & Accessories will be paid for at the contract lump sum price. Payment for Ductwork & Accessories will be under:

| Pay Item | | Pay Unit |
|---|---|---|
| DIV. 23 | HVAC | Lump Sum |

**END OF SECTION**

# SECTION 26 00 00 - GENERAL ELECTRICAL REQUIREMENTS

All work and materials shall conform to the Contract Documents and the provisions of the State of Maine Department of Transportation Standard Specifications, Revision November 2014, with the following additions:

Add the following:

PART 1 – GENERAL:

1.01 SECTION INCLUDES:

A. Furnish all materials, labor, tools, transportation, incidentals, and appurtenances to complete in every detail and leave in working order all items of work called for herein or shown on the accompanying drawings, including work related to:
1. Electrical site utilities including electrical service from Central Maine Power Company.
2. Electrical distribution including new circuit breaker panelboards, and associated feeders.
3. Electrical branch circuits, including wiring and devices.
4. Interior lighting including luminaires, lamps, wiring and controls.
5. Exterior lighting including luminaires and wiring and controls.
6. Raceways and boxes for voice/data network system provided under Division 27.
7. Raceways and conductors for Owner furnished door access control system.
8. Raceways and conductors for Owner furnished surveillance system.

B. Include any minor items of work necessary to provide a complete and fully operative electrical system.

C. The Contractor for this work is referred to Bidding Requirements, General Conditions, Special Conditions, Temporary Services and other pertinent Sections of these Specifications. These sections describe work that is a part of this Contract as contained in Division 01. The following General Provisions amplify and supplement these Sections of Specifications. In cases of conflicting requirements, the stipulations set forth in Division 01 supersede and must be satisfied by the Contractor.

1.02 RELATED SECTIONS:

A. 26 05 19 – Low-Voltage Electrical Power Conductors

B. 26 05 26 – Grounding and Bonding for Electrical Systems

C. 26 05 29 – Supporting Devices

D. 26 05 33 – Raceway and Boxes for Electrical Systems

E. 26 05 53 – Electrical Identification

F. 26 06 20.16 – Panelboard Schedule

G. 26 06 50.16 – Lighting Fixture Schedule

H. 26 09 43 – Lighting Controls

I. 26 27 26 – Wiring Devices

J. 26 28 16 – Enclosed Switches and Circuit Breakers

K. 26 29 13 – Enclosed Motor Controllers

L. 26 51 00 – Interior Lighting

1.03 REFERENCES:

A. ANSI/NFPA 70 - National Electrical Code.

B. ANSI/NFPA 101 - Life Safety Code.

C. OSHA 1910 - Occupational Safety and Health Act.

D. ADA - Americans with Disabilities Act.

1.04 GENERAL REQUIREMENTS:

A. Contractor shall read the entire specifications covering other branches of work. He is responsible for coordination of his work with work performed by other trades.

B. Consult all Contract drawings which may affect the location of any equipment or apparatus furnished under this work and make minor adjustments in location as necessary to secure coordination. Contractor shall consult architectural reflected ceiling plans for exact locations of ceiling mounted lighting fixtures. Contractor shall consult architectural interior elevations for mounting heights of wiring devices. Contractor shall consult architectural exterior elevations for mounting heights of wall mounted exterior lighting fixtures.

C. System layout is schematic and exact locations shall be determined by structural and other conditions. This shall not be construed to mean that the design of the system may be arbitrarily changed. The equipment layout is to fit into the building as constructed and to coordinate with equipment included under other Divisions of work.

D. Contractor shall contact the Owner’s Representative immediately if he notices any discrepancies or omissions in either the drawings or the specifications, or if there are any questions regarding the meaning or intent thereof.

E. Submit all changes, other than minor adjustments, to the Architect for approval before proceeding with the work.

F. The Contractor shall notify the owner, and receive approval, at least 72 hours prior to any planned shut-down of the existing electrical service.

1.05 SUBMITTALS:

A. Submit under provisions of the following and Division 01.

B. Submittal shall include complete Specifications, including type of materials, electrical characteristics, capacities, performance and power requirements to determine compliance with Contract Documents. All data submitted shall be complete and shall apply only to this specific project. All extraneous material shall be deleted or marked out. Items to be supplied shall be specifically indicated using a method that will be visible after photocopying.

C. Regardless of any information included in the submittal submitted for review, the requirements of the Drawings and Specifications shall not be superseded in any way by the review. Review by the Architect-Engineer does not relieve responsibility for submittal errors or from meeting the requirements of the Contract Documents.

D. It is intended that Submittal data be complete and accurate at the first submission. If the Submittal is returned marked "Resubmit" only one additional submission will be permitted.

E. Submit related Submittal at one time. SUBMIT ALL ITEMS IN A SPECIFICATION SECTION AT THE SAME TIME. Incomplete submittal will be held until a complete submittal is accumulated or may be rejected without further review and returned to the applicable parties. Include a copy of the Specification Paragraphs pertaining to the items submitted.

F. If proposed equipment deviates from the Specifications or Drawings, indicate in writing on Company letterhead those differences and provide sufficient data to justify acceptance. FAILURE TO INDICATE DEVIATIONS OR SUBSTITUTIONS IMPLIES FULL COMPLIANCE WITH DRAWINGS AND SPECIFICATIONS.

G. The term "by others" or similar wording shall not be used on Submittal. Submittal shall state by whom related items of work are to be provided. Where not indicated, it is implied that the work or item is provided under this Section.

H. Shop Drawings: Provide shop drawings as required by the individual Specification Sections. Submit shop drawings indicating physical size and arrangement, (plans and elevations) construction details, provisions for conduits, access requirements for installation and maintenance, finishes, and materials used in fabrication for all equipment. Supplement shop drawings with wiring diagrams for all systems with wiring connections for multiple components.

I. Submittals shall be made as paper copies. Submittals transmitted only by electronic email shall not be accepted.

1.06 REGULATORY REQUIREMENTS:

A. Complete installation shall conform with all applicable Federal, State and Local laws, Codes and Ordinances, included but not limited to latest approved editions of the following:
1. State Building Codes.
2. Specific Construction Safety Requirements, State Industrial Commission.
3. National Electrical Code - NFPA 70.
4. National Fire Code - NFPA 72.
5. Life Safety Code - NFPA 101.
6. Occupational Safety and Health Act (OSHA) of 1971 and all amendments thereto.
7. ADA - Handicap Accessibility Requirements.

B. Nothing contained in the drawings and specifications shall be construed to conflict with these laws, codes and ordinances, and they are thereby included in these specifications. All work shall comply with the 2011 edition of NFPA 70, The National Electrical Code. It shall be the Contractor’s responsibility to assure that electrical work is in full compliance with the NEC.

C. The Contractor shall visit the site to become familiar with all existing conditions affecting this work. No claim will be recognized for extra compensation due to failure of contractor to familiarize himself/herself with the conditions and extent of proposed work.

D. Obtain and pay for all necessary permits. Request inspections from authority having jurisdiction.

1.07 RECORD DRAWINGS:

A. Record any changes in location of concealed boxes, equipment items, receptacle and device outlets, lighting fixtures, fire alarm devices, underground utility service conduits, and similar construction items on a set of prints and deliver them to the Owner’s Representative upon completion of the work.

B. Record location and depth of exterior work carefully for future reference.

1.08 OPERATING AND MAINTENANCE INSTRUCTIONS:

A. Provide a Complete Instruction and Maintenance Manual: Prepare in the form of an instructional manual for use by Owner's personnel. Provide one (1) draft copy and two (2) final copies.
   1. Format:
      a. Size: 8-1/2" x 11", 20 lb. minimum weight white paper for typed pages, either manufacturer's printed data, or neatly typewritten.
      b. Drawings: Provide reinforced punched binder tab, bind in with text. Fold larger drawings to size of text pages. Clear plastic "binding tape" (not "Scotch" tape) applied to edge of sheet and then punched is acceptable.
      c. Single-sheet product literature and contractor-prepared pages: Provide reinforced punched binder tab. Clear plastic "binding tape" (not "Scotch" tape) applied to edge of page and then punched is acceptable.
      d. Provide indexed tabs and flyleaf for each separate product, or each piece of operating equipment. Include typed description of product, and major component parts of equipment.
      e. Cover: Identify each volume with typed or printed title "OPERATING AND MAINTENANCE INSTRUCTIONS".
      f. Binders:
         1) Commercial quality three-ring binders with durable and cleanable plastic covers, 1" minimum, 2" maximum ring size.
         2) When multiple binders are used, collate the data into related consistent groupings and provide a spine label that includes the volume number and contents of the binder.

B. Provide content as listed in separate Sections of Division 26 of these specifications.

1.10 PROJECT/SITE CONDITIONS:

C. Install Work in locations shown on Drawings, unless prevented by Project conditions.

D. Prepare drawings showing proposed rearrangement of Work to meet Project conditions, including changes to Work specified in other Sections. Obtain permission of Architect/Engineer before proceeding.

1.11 COORDINATION WITH WORK PROVIDED UNDER DIVISIONS 22 AND 23:

A. Electrical work for mechanical systems equipment furnished under Divisions 22 and 23 shall be coordinated with these respective Divisions.

B. Power wiring and connections shall be provided under Division 26 for all Division 22 and 23 equipment, including:
   1. Branch circuit power wiring.
   2. Local disconnect switches for 208-volt single and three phase equipment items (except where an integral means of disconnect is specified to supplied with the equipment item by the manufacturer).
   3. Motor starters for 208-volt single and three phase equipment items (except where an integral starter is specified to supplied with the equipment item by the manufacturer or where a variable speed drive is provided under Division 23).
   4. SPST Manual motor starter switch for 120-volt motors.

C. Work provided under Divisions 22 and 23 shall include:
   1. Motors.
   2. Motor speed controller switches.
   3. Low-voltage automatic temperature controls and associated wiring.
   4. Variable speed drives for motors.

D. In general, motors will be furnished and installed under other Divisions of work as a factory-installed item. Unless they are factory installed on equipment units supplied under other Divisions, all safety switches and motor starters shall be furnished and installed by the Electrical Contractor. Coordinate prior to submission of bid.

1. Electrical Contractor shall obtain all wiring diagrams necessary to connect and control equipment requiring electrical energy.

1.12 COORDINATION WITH WORK PROVIDED UNDER OTHER DIVISIONS:

A. Division 27 - Telecommunications:
   1. Voice/Data Network System (wiring, outlets, equipment racks provided under Division 27; switches, servers provided by owner)
      a. Provide 120-volt power requirements for all voice/data racks.
      b. Provide conduit and boxes for voice/data network systems wiring.

B. Division 28 – Alarms:
   1. Fire Alarm System (equipment and wiring provided under Division 28)
      a. Provide 120-volt power requirements for the fire alarm equipment control panels.
      b. Provide conduit and boxes for interior fire alarm system wiring.
   2. Door Access Control System (equipment and wiring terminations provided by owner).
      a. Provide 120-volt power requirements for the door access control system.
      b. Provide conduit, boxes, and wiring for door access control system devices.
   3. Surveillance System (cameras and wiring terminations provided by owner; wiring provided under Division 27)
      a. Provide conduit and boxes for surveillance camera wiring.

1.13 UTILITY SERVICE WORK:

A. Electrical Service Modifications:
   1. Work associated with the new electrical services shall be coordinated with:
      a. *Central Maine Power Company*
   2. Maintenance and Operations Building Electrical Service:
      a. Arrange with *CMP* to provide a new pole mounted service transformer at a new utility pole at Commercial Street. Arrange with *CMP* to modify the existing utility pole line at the street as required.
      b. Provide a new underground secondary 120/208 volt service underground conduit and wiring from the new *CMP* utility pole at Commercial Street.
      c. Arrange with *CMP* for connections to new service metering.
      d. Provide new service grounding.
   3. Office Trailer:
      a. Following the completion of the construction of the Maintenance and Operations Building, Arrange with *CMP* to disconnect and remove the temporary overhead secondary service to the construction Office Trailer.

B. Work Provided Under Division 26:
   1. Conduit.
   2. Secondary electrical wiring.
   3. Electrical service metering.

C. Work Provided by the General Contractor Under Other Divisions:
   1. Excavation and backfill.
   2. Concrete encasement of primary electrical service conduits.

1.14 FIRESTOPPING:

A. Firestopping around electrical cable, conduit and/or boxes and firestopping within boxes shall be as specified under Section 26 05 33 to maintain fire ratings at walls, floors and ceilings. The Contractor shall coordinate penetrations of rated surfaces with the architectural drawings and specifications to assure that the proper fire rating is achieved.

1.15 TEMPORARY POWER AND LIGHTING:

A. The Contractor shall be responsible for provision of temporary electrical power and lighting as required to facilitate construction work.
   1. Temporary electrical power shall be obtained from the existing electrical distribution system. The Contractor shall make all necessary provisions for the connection of a temporary power service.
   2. The Contractor shall provide temporary electrical power distribution as required to facilitate construction activities including:
      a. Wire/conduit
      b. Over-current protection
      c. Receptacle outlets
      d. Motor disconnect means
      e. Grounding
   3. The Contractor shall provide temporary lighting as required to facilitate construction activities.
   4. All temporary electrical power and lighting shall be completely removed prior to substantial completion of the project.

1.16 SUBSTANTIAL AND FINAL COMPLETION:

A. Refer to General Conditions and Supplementary Conditions.

B. Substantial Completion shall not be considered unless all systems are tested and verified for adherence with Contract Documents and any work remaining is less than one percent of the total Contract Value of this Section.
   1. Record Drawings, Operation and Maintenance Manuals, Acceptance Demonstrations, Owner personnel training, spare parts or extra materials required, test reports, warranties and certifications of installation inspections shall be submitted and accepted prior to Substantial Completion.

C. Final Completion shall be when all work under this Section is completed as defined by the Contract Documents and accepted by the Architect-Engineer.

D. When Architect-Engineer determines Work is complete, close out submittals will be considered.

PART 2 – PRODUCTS:

2.01 MATERIALS:

A. Furnish new and undeteriorated materials and of a quality not less than what is specified.

B. The selection of materials and equipment to be furnished shall be governed by the following:
   1. Where single trade name, brand of manufacturer or material is listed in the specification, the exact equipment listed shall be used in the bid.
   2. Where more than one name is listed, Contractor may select any one of the several brands specified.
   3. Where trade name, brand of manufacturer of equipment or material is listed in the specification followed by the word “or approved equal,” the Contractor may substitute product of equal quality from another manufacturer for consideration by the Engineer.

C. Conduit shall be as specified under Section 26 05 33.

PART 3 – EXECUTION:

3.01 PROTECTION AND CLEANING:

A. Protect all electrical work and products against damage during construction and pay the cost of repair or replacement of electrical products made necessary by failure to provide suitable safeguards or protection.

B. After all work has been inspected and approved, thoroughly clean all equipment, provided under this work.

C. Repair all dents and scratches in factory prime or finish coated on all electrical equipment.

3.02 CUTTING AND PATCHING:

A. Cut and patch as required to install new work. Patching shall match existing surfaces in kind and finish.

B. Obtain prior approval from the Engineer before cutting any structural members.

3.03 DEMOLITION:

A. Disconnect and remove an existing high-mast lighting pole and an existing reefer outlet pedestal, along with all associated wiring. Deliver the items in undamaged, and in full working condition, to be stored on site at the direction of the owner.

PART 4 – BASIS OF PAYMENT

4.01 METHOD OF MEASUREMENT

A. The Electrical Systems limits shall be as shown or described in the Contract Documents, including all Division 26 Sections. Electrical Systems will be measured by the lump sum, complete and accepted. The Electrical Systems limits shall be as shown or described in the Contract Documents.

4.02 BASIS OF PAYMENT

A. Electrical Systems will be paid for at the contract lump sum price. Payment for Electrical Systems will be under:

| Pay Item | | Pay Unit |
|---|---|---|
| DIV. 26 | Electrical Systems | Lump Sum |

**END OF SECTION**

# SECTION 26 05 19 - LOW-VOLTAGE ELECTRICAL POWER CONDUCTORS

All work and materials shall conform to the Contract Documents and the provisions of the State of Maine Department of Transportation Standard Specifications, Revision November 2014, with the following additions:

Add the following:

PART 1 – GENERAL:

1.01 SECTION INCLUDES:

A. Building wire and cable.

B. Metal clad cable

C. Wiring connectors and connections.

1.02 RELATED SECTIONS:

A. Section 26 05 33 – Raceway and Boxes for Electrical Systems.

1.03 REFERENCES:

A. ANSI/NFPA 70 - National Electrical Code.

1.04 REGULATORY REQUIREMENTS:

A. Conform to requirements of ANSI/NFPA 70.

B. Furnish products listed and classified by Underwriters Laboratories, Inc.

1.05 PROJECT CONDITIONS:

A. Verify that field measurements are as shown on Drawings.

B. Wire and cable routing shown on Drawings is approximate unless dimensioned. Route wire and cable as required to meet Project Conditions.

C. Where wire and cable routing is not shown, and destination only is indicated, determine exact routing and lengths required.

PART 2 – PRODUCTS:

2.01 BUILDING WIRE AND CABLE:

A. Wiring Manufacturers:
1. *Triangle PWC.*
2. Substitutions: Or Approved Equal.

B. Description: Single Conductor insulated wire.

C. Conductor: Copper only.

D. Insulation Voltage Rating: 600 volts.

E. Insulation Type: THW or XHHW.

F. Insulation Color: Color of all service, feeder, branch, motor control, and signaling circuit conductors shall be green for grounding conductors, and white for neutrals. The color of the ungrounded conductors in different voltage systems shall be as follows:
1. 120/208 volt, 3-phase
   a) Phase A – Black
   b) Phase B – Red
   c) Phase C – Blue

2.02 METAL CLAD CABLE:

A. Manufacturers:
1. *Triangle PWC*.
2. Substitutions: Or Approved Equal.

B. Description: ANSI/NFPA 70, Type MC.

C. Conductor: Copper only.

D. Insulation Voltage Rating: 600 volts.

E. Insulation Temperature Rating: 60 degrees C.

F. Insulation Material: Thermoplastic.

G. Armor material: Steel or aluminum.

H. Armor Design: Interlocked metal tape.

I. Jacket: None.

2.03 MANUFACTURERS - WIRING CONNECTORS:

A. Connector manufacturers:
*1. Burndy*
*2. 3M*
*3. Ideal*
*4. Thomas and Betts*

B. Description: Compression set or twist-on type with integral molded insulation and internal metallic compression ring or spiral screw-on connecting device.

PART 3 – EXECUTION:

3.01 PREPARATION:

A. Completely and thoroughly swab raceway before installing wire.

3.02 WIRING METHODS:

A. Concealed Interior Locations: Type MC cable.

B. Exposed Interior Locations: Building wire in conduit as specified in Section 26 05 33.

C. Panelboard Feeders: Building wire in conduit as specified in Section 26 05 33.

D. Exterior Locations: Building wire in conduit as specified in Section 26 05 33.

3.03 INSTALLATIONS:

A. Install products in accordance with manufacturers' instructions.

B. Use solid conductor for feeders and branch circuits 10 AWG and smaller.

C. Use stranded conductors for control circuits.

D. Use conductor not smaller than 12 AWG for power and lighting circuits.

E. Use conductor not smaller than 16 AWG for control circuits.

F. Use 10 AWG conductors for 20 ampere, 120-volt branch circuits longer than 75 feet.

G. Pull all conductors into raceway at same time.

H. Use suitable wire pulling lubricant for building wire 4 AWG and larger.

I. Protect exposed cable from damage.

J. Support cables above accessible ceiling, using spring metal clips or cable ties to support cables from structure. Do not rest cable on ceiling panels. Support Type MC cable at spacing as identified in NFPA 70.

K. Group cables together neatly and secure as bundles where practical. Route cables parallel and/or perpendicular to building framing members or adjacent walls.

L. Neatly train and lace wiring inside boxes, equipment, and panelboards.

M. Clean connector surfaces before installing lugs and connectors.

N. Make splices, taps, and terminations to carry full ampacity of conductors with no perceptible temperature rise.

O. Terminate aluminum conductors with tin-plated aluminum-bodied compression connectors only. Fill with anti-oxidant compound before installing conductor.

P. Use suitable reducing connectors or mechanical connector adapters for connecting aluminum conductors to copper conductors.

Q. Use split bolt connectors for copper conductor splices and taps, 6 AWG and larger. Tape uninsulated conductors and connector with electrical tape to 150 percent of insulation rating of conductor.

R. Use solderless pressure connectors with insulating covers for copper conductor splices and taps, 8 AWG and smaller.

S. Use insulated spring wire connectors with plastic caps for copper conductor splices and taps, 10 AWG and smaller.

3.04 FIELD QUALITY CONTROL:

A. Inspect wire and cable for physical damage and proper connection.

B. Measure tightness of bolted connections and compare torque measurements with manufacturer's recommended values.

C. Verify continuity of each branch circuit conductor.

END OF SECTION

# SECTION 26 05 26 - GROUNDING AND BONDING FOR ELECTRICAL SYSTEMS

All work and materials shall conform to the Contract Documents and the provisions of the State of Maine Department of Transportation Standard Specifications, Revision November 2014, with the following additions:

Add the following:

PART 1 – GENERAL:

1.01 SECTION INCLUDES:

A. Service ground system.

B. Feeder and branch circuit wiring grounding.

C. Electrical equipment and raceway grounding and bonding.

D. Telecommunications system grounding.

1.02 RELATED SECTIONS:

A. Section 26 05 19 – Low-Voltage Electrical Power Conductors.

1.03 REFERENCES:

A. NFPA 70 - National Electrical Code.

1.04 REGULATORY REQUIREMENTS:

A. Conform to requirements of NFPA 70.

1.05 SERVICE GROUND SYSTEM DESCRIPTION:

A. The Contractor shall provide a new service ground to meet all requirements in Article 250 of NFPA 70. Provide grounding service conductors and fittings as may be necessary for code conformance.

1.06 FEEDER AND BRANCH CIRCUIT GROUNDING DESCRIPTION:

A. All feeders and branch circuits shall include a separate insulated (green) grounding conductor.

1.07 TELECOMMUNICATIONS SYSTEM GROUNDING DESCRIPTION:

A. The telecommunications service termination board shall include a separate ground conductor connected to the main service ground system.

B. All network racks shall include a separate ground conductor connected to the system ground at the telecommunications service termination board.

PART 2 - PRODUCTS

2.01 MATERIALS:

A. Feeder and Branch Circuit Ground Conductors: Insulated conductors per Section 26 05 19.

B. Service Ground Conductor: Bare copper stranded wire, sized per NFPA 70, Article 250.

PART 3 – EXECUTION:

3.01 INSTALLATION:

A. Confirm that the existing service ground is connected to service ground electrodes as well as to the water service entrance pipe (attach ground ahead of water meter).

B. Install all ground system components in conformance with Article 250 of NFPA 70.

C. Inspect grounding and bonding system conductors and connections for tightness and proper installation.

D. Measure ground resistance from the existing system neutral connection at the service entrance to confirm that resistance does not exceed 10 ohms. Take corrective actions as may be required, including the provision of additional grounding electrodes, to achieve a maximum resistance to ground of 10 ohms

**END OF SECTION**

# SECTION 26 05 29 - SUPPORTING DEVICES

All work and materials shall conform to the Contract Documents and the provisions of the State of Maine Department of Transportation Standard Specifications, Revision November 2014, with the following additions:

Add the following:

PART 1 - GENERAL

1.01 SECTION INCLUDES:

A. Conduit and equipment supports.

B. Telecommunications cable supports.

C. Fastening hardware.

1.02 QUALITY ASSURANCE:

A. Support systems shall be adequate for weight of equipment and conduit, including wiring, which they carry.

PART 2 - PRODUCTS

2.01 SUPPORT CHANNELS:

A. Support Channel: Galvanized or painted steel.

2.02 TELECOMMUNICATIONS CABLE J-HOOKS:

A. Manufacturers:
1. *Panduit*.
2. *Caddy*
3. *Chatsworth*
4. Substitutions: Or Approved Equal.

B. Where telecommunications cables are routed above accessible ceilings, provide cable support J-hooks. J-Hooks shall be sized to correctly support the number of cables which pass through them. Under no circumstances shall cable quantity exceed 50 in any given support. Fill capacity shall be as required by code for conduit. That is to say that every J-Hook shall have a maximum of 40 percent fill capacity. Install additional supports as required.

PART 3 - EXECUTION

3.01 INSTALLATION:

A. Fasten hanger rods, conduit clamps, and outlet and junction boxes to building structure using expansion anchors or beam clamps.

B. Anchors and Fasteners:
1. Concrete Surfaces: Use expansion anchors.
2. Hollow Masonry, Plaster, and Gypsum Board Partitions: Use toggle bolts and hollow wall fasteners.
3. Wood Elements: Use wood screws.

C. Do not fasten supports to piping, ductwork, mechanical equipment, or conduit.

D. Do not use powder-actuated anchors.

E. Install surface-mounted cabinets and panelboards with minimum of four anchors.

F. Bridge studs top and bottom with horizontal members to support flush-mounted cabinets and panelboards in stud walls.

G. Install telecommunications J-hooks to support network and video cables above accessible ceilings only.

**END OF SECTION**

# SECTION 26 05 33 - RACEWAY & BOXES FOR ELECTRICAL SYSTEMS

All work and materials shall conform to the Contract Documents and the provisions of the State of Maine Department of Transportation Standard Specifications, Revision November 2014, with the following additions:

Add the following:

## PART 1 - GENERAL

### 1.01 SECTION INCLUDES:

A. Rigid metal conduit and fittings.

B. Electrical metallic tubing and fittings.

C. Flexible metal conduit and fittings.

D. Liquid-tight flexible metal conduit and fittings.

E. Non-metallic conduit and fittings.

F. Fire stopping.

G. Sealing of conduit penetrations through walls.

H. Wall and ceiling outlet boxes.

I. Interior pull and junction boxes.

J. Exterior in-grade wiring boxes

### 1.02 COORDINATION OF WORK PROVIDED UNDER OTHER SPECIFICATION DIVISIONS:

A. The Contractor shall coordinate requirements for conduit and boxes associated with the following:
1. Telecommunications – Section 27 10 00
2. Fire Alarm System – Section 28 31 13
3. Door Access Controls – Section 28 13 00

### 1.03 RELATED SECTIONS:

A. Section 26 27 26 - Wiring Devices

B. Section 27 10 00 – Structured Cabling System

C. Section 28 31 23 - Fire Alarm System.

### 1.04 REFERENCES:

A. ANSI C80.1 - Rigid Steel Conduit, Zinc-Coated.

B. ANSI C80.3 - Electrical Metallic Tubing, Zinc-Coated.

C. ANSI/NEMA FB 1 - Fittings and Supports for Conduit and Cable Assemblies.

D. NEMA TC-2 - Electrical Plastic Tubing (EPT) and Conduit (EPC-40 and EPC-80).

E. NEMA TC-3 - PVC Fittings for use with Rigid PVC Conduit and Tubing.

1.05 SUBMITTALS

A. Product Data: Provide dimensions, knockout sizes and locations, materials, fabrication details, finishes, and accessories, for junction and pull boxes greater than 36 sq. in size.

1.06 PROJECT RECORD DRAWINGS:

A. Submit documents under provisions of Section 26 00 00.

B. Record actual locations of underground conduits.

1.07 PROJECT CONDITIONS:

A. Verify field measurements are as shown on Drawings.

B. Electrical boxes are shown in approximate locations unless dimensioned. Install at location required for box to serve intended purpose. Include installation within 10 feet of location shown.

PART 2 - PRODUCTS

2.01 RIGID METAL CONDUIT AND FITTINGS:

A. Rigid Steel Conduit: ANSI C80.1.

B. Fittings and Conduit Bodies: ANSI/NEMA FB 1; threaded type, material to match conduit.

2.02 ELECTRICAL METALLIC TUBING (EMT) AND FITTINGS:

A. EMT: ANSI C80.3. galvanized tubing.

B. Fittings and Conduit Bodies: ANSI/NEMA FB 1; steel compression type.

2.03 FLEXIBLE METAL CONDUIT AND FITTINGS:

A. Conduit: steel.

B. Fittings and Conduit Bodies: ANSI/NEMA FB 1.

2.04 PLASTIC CONDUIT AND FITTINGS:

A. Conduit: NEMA TC-2 Schedule 40 PVC.

B. Fittings and Conduit Bodies: NEMA TC-3.

2.05 LIQUID-TIGHT FLEXIBLE CONDUIT AND FITTINGS:

A. Conduit: Flexible metal conduit with PVC jacket.

B. Fittings and Conduit Bodies: ANSI/NEMA FB 1.

2.06 CONDUIT SUPPORTS:

A. Conduit Clamps, Straps, and Supports: Steel or malleable iron.

2.07 FIRE STOP:

A. Fire stopping materials shall be NRTL listed to UL 1479 (ASTM E814). Installation methods shall conform to a UL fire stopping system. Submit specifications and installation drawings for the type of material to be used. Fire stopping materials shall be as manufactured by *3M, International Protective Coatings Corp., Specified Technologies, Inc., Carborundum Company, RayChem, Nelson Fire Stop* or approved equal.

2.08 OUTLET BOXES:

A. Sheet Metal Outlet Boxes: ANSI/NEMA OS 1, galvanized steel.
1. Luminaire and Equipment Supporting Boxes: Rated for weight of equipment supported; include ½ inch male fixture studs where required.

B. Cast Boxes: NEMA FB 1, Type FD. Provide gasketed cover by box manufacturer. Provide threaded hubs.

2.09 FLOOR BOXES

A. Floor Box (slab-on-grade locations)
1. Manufacturers:
a. Legrand
b. Hubbell
c. Substitutions: Or Approved equal.
2. Description: a. Recessed floor boxes shall be provided complete with all necessary fittings, trim covers, and wiring devices. Boxes shall be 4-gang each with two duplex 20ampere, 120-volt grounded receptacle outlets. Trim covers shall be black color with sliding or hinged dust-tight access plates for cord/cap access to outlets recessed within box. Boxes shall be listed as being suitable for installation in slab-on-grade locations. Boxes shall be dust and water tight

2.010 EXTERIOR IN-GROUND WIRING BOXES

A. In-Ground Wiring Box:
1. Manufacturers:
a. Oldcastle model H-Series #2436
b. Substitutions: Or Approved equal.
2. Description: 24” x 36” polymer concrete exterior, in-grade wiring boxes for telecommunications wiring as detailed on the drawings. Provide stainless steel hardware and custom label on cover.

2.011 INTERIOR PULL AND JUNCTION BOXES:

A. Sheet Metal Boxes: NEMA OS1, galvanized steel.

PART 3 - EXECUTION

3.01 CONDUIT SIZING, ARRANGEMENT, AND SUPPORT:

A. Size conduit for conductor type installed, 3/4-inch minimum.

B. Arrange conduit to maintain headroom and present a neat appearance.

C. Route conduit parallel and perpendicular to walls, ceiling joists, and adjacent piping. In spaces where exposed ceiling joists exist, route conduit at ceiling deck between joists where possible. Group conduits together where multiple conduits are installed along corridors. Do not drill through joists without prior permission from Architect.

D. Maintain minimum 6-inch clearance between conduit and heat sources such as flues, steam pipes and heating appliances.

E. Arrange conduit supports to prevent distortion of alignment by wire pulling operations. Fasten conduit using galvanized straps, lay-in adjustable hangers, clevis hangers, or bolted split stamped galvanized hangers.

F. Group conduit in parallel runs where practical and use conduit rack constructed of steel channel with conduit straps or clamps. Provide space for 25 percent additional conduit.

G. Do not fasten conduit with wire or perforated pipe straps. Remove all wire used for temporary conduit support during construction, before conductors are pulled.

H. Support conduit at spacing not to exceed limits stipulated in NFPA 70.

3.02 CONDUIT INSTALLATION:

A. Cut conduit square using a saw or a pipecutter; de-burr cut ends.

B. Bring conduit to the shoulder of fittings and couplings and fasten securely.

C. Use conduit hubs or sealing locknuts for fastening conduit to cast boxes, and for fastening conduit to sheet metal boxes in damp or wet locations.

D. Install no more than the equivalent of three 90-degree bends between boxes.

E. Use conduit bodies to make sharp changes in direction, as around beams.

F. Use hydraulic one-shot conduit bender or factory elbows for bends in conduit larger than 1-inch size.

G. Avoid moisture traps where possible; where unavoidable, provide junction box with drain fitting at conduit low point.

H. Use suitable conduit caps to protect installed conduit against entrance of dirt and moisture.

I. Provide No. 12 AWG insulated conductor or suitable nylon pull rope in empty conduit, except sleeves and nipples.

J. Install expansion joints where conduit crosses building expansion joints.

K. Where conduit penetrates walls or floors, seal opening around conduit. Use UL listed foamed silicone elastomer compound for fire rated walls.

L. Route conduit through roof openings for piping and ductwork where possible; otherwise, route through roof jack with pitch pocket.

M. Do not install conduits within the poured-in-place floor slabs above grade.

N. Where conduit(s) pass(es) from refrigerated or cooled atmosphere to warmer areas where condensation of water vapor may occur within raceways, conduit bodies sealed with “Duct Seal” type compound shall be provided after conductors are installed.

O. Flexible conduit shall not exceed three (3) feet in length.

P. Install top of underground conduit 30 inches (min.) below finished grade.

Q. Slope underground conduit away from building.

R. Use rigid galvanized steel conduit sweeps for underground elbows in conduit sizes 2 inch and larger.

3.03 CONDUIT INSTALLATION SCHEDULE:

A. Underground Installations: PVC Schedule 40.

B. Exposed Outdoor Locations: Rigid steel conduit.

C. Concealed Interior Locations: Electrical metallic tubing.

D. Exposed Interior Locations: Electrical metallic tubing.

E. Interior Motor Connections: Flexible metal conduit.

F. Exterior Motor Connections: Liquid-tight flexible conduit.

3.04 FIRE STOP INSTALLATION:

A. Provide fire stop for all cables and conduits and conduit sleeves that pass through fire-rated partitions, ceilings and/or floors.

3.05 BOX INSTALLATION:

A. Install electrical boxes as shown on Drawings, and as required for splices, taps, wire pulling, equipment connections and compliance with regulatory requirements.

B. Install electrical boxes to maintain headroom and to present neat mechanical appearance.

C. Install pull boxes and junction boxes above accessible ceilings and in unfinished areas only.

D. Inaccessible Ceiling Areas: Install outlet and junction boxes no more than 6 inches from ceiling access panel or from removable recessed luminaire.

E. Install boxes to preserve fire resistance rating of partitions and other elements.

F. Align adjacent wall-mounted outlet boxes for fire alarm devices, switches, receptacle outlets, intercom call stations, telecommunications outlets, thermostats, and similar devices with each other.

G. Use flush mounting outlet boxes in finished areas.

H. Do not install flush mounting boxes back-to-back in walls; provide minimum 6-inch separation. Provide minimum 24 inches separation in acoustic rated walls.

I. Where two (2) or more single-gang boxes are to be installed side-by-side, mount boxes a stud-width apart.

J. Secure flush mounting box to interior wall and partition studs. Accurately position to allow for surface finish thickness.

K. Use stamped steel bridges to fasten flush mounting outlet box between studs.

L. Install flush mounting box without damaging wall insulation or reducing its effectiveness.

M. Use adjustable steel channel fasteners for hung ceiling outlet box.

N. Do not fasten boxes to ceiling support wires.

O. Support boxes independently of conduit.

P. Use gang boxes where more than one device is mounted together. Do not use sectional box.

Q. Use gang box with plaster ring for single device outlets.

R. Use cast outlet box in exterior locations and wet locations.

S. Install knockout closure in unused box openings.

T. Obtain approval from Architect for exact locations of floor boxes prior to installation.

U. Coordinate installation of exterior, in-grade wiring boxes with final grade elevations as indicated on the civil site plans.

V. Verify exact locations of floor boxes with architect prior to installation.

3.06 INTERFACE WITH OTHER PRODUCTS:

A. Coordinate mounting heights and locations of outlets mounted above counters, benches, and backsplashes.

B. Position outlet boxes to locate luminaires as shown on Architectural Reflected Ceiling Plans.

3.07 ADJUSTING:

A. Adjust flush-mounting outlets to make front flush with finished wall material.

**END OF SECTION**

# SECTION 26 05 53 - ELECTRICAL IDENTIFICATION

All work and materials shall conform to the Contract Documents and the provisions of the State of Maine Department of Transportation Standard Specifications, Revision November 2014, with the following additions:

Add the following:

PART 1 - GENERAL

1.01 SECTION INCLUDES:

A. Nameplates and tape labels.

B. Panelboard directories.

C. Underground marker tape.

PART 2 - PRODUCTS

2.01 MATERIALS:

A. Nameplates: Engraved three-layer laminated plastic, black letters on a white background.

B. Underground Warning Tape: 6" wide plastic tape, colored red with suitable legend describing buried electrical lines: Model UT27737-6 as manufactured by *Emedco*, or equal.

PART 3 - EXECUTION

3.01 INSTALLATION:

A. Degrease and clean surfaces to receive nameplates.

B. Install nameplates parallel to equipment lines.

C. Secure nameplates to equipment fronts using screws, rivets, or adhesive. Secure nameplate to inside face of recessed panelboard doors in finished locations.

D. Install underground warning tapes at all buried lines 6" below finished grade.

3.02 NAMEPLATE ENGRAVING SCHEDULE:

A. Provide nameplates to identify all electrical distribution and control equipment, and loads served. Letter Height: ¼ inch.

B. Mount panelboard nameplates on inside of trim cover.

3.03 PANELBOARD DIRECTORIES:

A. Provide a typed directory of panel circuit load descriptions for all panelboards. Mount directory to inside of panel cover. Identify each branch circuit according to load served and room(s) where loads exist.

**END OF SECTION**

# SECTION 26 06 20.16 – PANELBOARD SCHEDULE

All work and materials shall conform to the Contract Documents and the provisions of the State of Maine Department of Transportation Standard Specifications, Revision November 2014, with the following additions:

Add the following:

PART 1 – GENERAL: Not Used

PART 2 – PRODUCTS:

PANELBOARD SCHEDULE

**SEE ATTACHED**

PART 3 – EXECUTION: Not Used

VOLTS: 120/208 AMPS 225 MAIN: MLO **PANEL: PANEL P1 (Section 1)**

MOUNT: SURFACE PHASE: 3 WIRES: 4 LOCATION: BREAK RM. 125

| BREAKER A | BREAKER P | DESCRIPTION | CKT VA | TYPE | CKT NO. | LOAD A | LOAD B | LOAD C | CKT NO. | TYPE | CKT VA | DESCRIPTION | BREAKER P | BREAKER A |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 20 | 1 | EXTERIOR RECEPTACLES | 1200 | R | 1 | 3600 | | | 2 | O | 2400 | DRYER | 2 | 30 |
| 20 | 1 | RECEPTACLES | 1200 | R | 3 | | 3600 | | 4 | O | 2400 | DRYER | 2 | 30 |
| 20 | 1 | RECEPTACLES | 1200 | R | 5 | | | 2200 | 6 | O | 1000 | WASHER | 1 | 20 |
| 20 | 1 | RECEPTACLES | 1000 | R | 7 | 2200 | | | 8 | R | 1200 | RECEPTACLES | 1 | 20 |
| 20 | 1 | RECEPTACLES | 800 | R | 9 | | 1800 | | 10 | R | 1000 | RECEPTACLES | 1 | 20 |
| 20 | 1 | BREAK RM CNTER RECEPTS | 400 | R | 11 | | | 1200 | 12 | R | 800 | RECEPTACLES | 1 | 20 |
| 20 | 1 | REFRIGERATOR | 1000 | O | 13 | 2200 | | | 14 | R | 1200 | RECEPTACLES | 1 | 20 |
| 20 | 1 | RECEPTACLES | 1000 | R | 15 | | 2200 | | 16 | R | 1200 | RECEPTACLES | 1 | 20 |
| 20 | 1 | RECEPTACLES | 1000 | R | 17 | | | 1800 | 18 | R | 800 | RECEPTACLES | 1 | 20 |
| 20 | 1 | COPY MACHINE | 1000 | O | 19 | 1800 | | | 20 | R | 800 | RECEPTACLES | 1 | 20 |
| 20 | 1 | COFFEE RM CNTER RECEPTS | 400 | R | 21 | | 1000 | | 22 | R | 600 | RECEPTACLES | 1 | 20 |
| 20 | 1 | RECEPTACLES | 1200 | R | 23 | | | 1800 | 24 | R | 600 | RECEPTACLES | 1 | 20 |
| 20 | 1 | RECEPTACLES | 1000 | R | 25 | 2000 | | | 26 | M | 1000 | GATE OPERATOR | 2 | 20 |
| 20 | 1 | RECEPTACLES | 1000 | R | 27 | | 2000 | | 28 | M | 1000 | GATE OPERATOR | 2 | 20 |
| 20 | 1 | IT RACK | 1500 | O | 29 | | | 2000 | 30 | S | 500 | SPARE | 1 | 20 |
| 20 | 1 | TELCOM BOARD RECEPTS | 400 | R | 31 | 900 | | | 32 | S | 500 | SPARE | 1 | 20 |
| 20 | 1 | RECEPTACLES | 1200 | R | 33 | | 1700 | | 34 | S | 500 | SPARE | 1 | 20 |
| 20 | 1 | SPARE | 500 | S | 35 | | | 1000 | 36 | S | 500 | SPARE | 1 | 20 |
| 100 | 3 | PANEL P1 (SECTION 2) | 14238.8 | | 37 | 14738.8 | | | 38 | S | 500 | SPARE | 1 | 20 |
| 100 | 3 | PANEL P1 (SECTION 2) | 14425.8 | | 39 | | 14925.8 | | 40 | S | 500 | SPARE | 1 | 20 |
| 100 | 3 | PANEL P1 (SECTION 2) | 13728.8 | | 41 | | | 14228.8 | 42 | S | 500 | SPARE | 1 | 20 |
| | | | | PHASE TOTALS | | 27438.8 | 27225.8 | 24228.8 | | | | | | |

CONNECTED VOLT-AMPERES= 78893

CONNECTED AMPERES= 219

DEMAND VOLT-AMPERES= 55505

DEMAND AMPERES= 154

| | CIRCUIT TYPE CODES | DEMAND FACTOR |
|---|---|---|
| L | LIGHTS | 1.0 |
| M | MOTORS | 1.0 |
| R | RECEPTACLES | 0.5 |
| H | HEAT | 1.0 |
| O | OTHER | 0.5 |
| S | SPARE | 0.5 |

PROJECT: **IMT Maintenance & Operations Bldg.**

PROJ. NO: 17-0017

DATE: 02/16/18

STATUS:

Bartlett Design

**LIGHTING & ELECTRICAL ENGINEERING**

5 PALMER STREET BATH, MAINE 04530

TEL (207) 443-5447 FAX (207) 443-5560

VOLTS: 120/208 AMPS 225 MAIN: MLO **PANEL: PANEL P1 (Section 2)**

MOUNT: SURFACE PHASE: 3 WIRES: 4 LOCATION: BREAK RM. 125

| BREAKER A | BREAKER P | DESCRIPTION | CKT VA | TYPE | CKT NO. | LOAD A | LOAD B | LOAD C | CKT NO. | TYPE | CKT VA | DESCRIPTION | BREAKER P | BREAKER A |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 50 | 3 | OVERHEAD DOOR | 3038 | M | 43 | 4034 | | | 44 | L | 996 | LIGHTS | 1 | 20 |
| 50 | 3 | OVERHEAD DOOR | 3038 | M | 45 | | 4005 | | 46 | L | 967 | LIGHTS | 1 | 20 |
| 50 | 3 | OVERHEAD DOOR | 3038 | M | 47 | | | 3777 | 48 | L | 739 | LIGHTS | 1 | 20 |
| 35 | 3 | OVERHEAD DOOR | 3038 | M | 49 | 4262 | | | 50 | L | 1224 | LIGHTS | 1 | 20 |
| 35 | 3 | OVERHEAD DOOR | 3038 | M | 51 | | 4109 | | 52 | L | 1071 | LIGHTS | 1 | 20 |
| 35 | 3 | OVERHEAD DOOR | 3038 | M | 53 | | | 4038 | 54 | O | 1000 | LIGHTING CONTROL PANEL | 1 | 20 |
| 35 | 3 | OVERHEAD DOOR | 2101 | M | 55 | 2512 | | | 56 | L | 411 | EXTERIOR BLDG. LIGHTS | 1 | 20 |
| 35 | 3 | OVERHEAD DOOR | 2101 | M | 57 | | 2277 | | 58 | L | 176 | EXTERIOR POLE LIGHTS | 1 | 20 |
| 35 | 3 | OVERHEAD DOOR | 2101 | M | 59 | | | 2601 | 60 | O | 500 | FIRE ALARM CONTROL PNL | 1 | 20 |
| 20 | 1 | SPARE | 490 | S | 61 | 990 | | | 62 | O | 500 | SECURITY CONTROL PNL | 1 | 20 |
| 20 | 1 | SPARE | 785 | S | 63 | | 1285 | | 64 | S | 500 | SPARE | 1 | 20 |
| 20 | 1 | SPARE | 249 | S | 65 | | | 749 | 66 | S | 500 | SPARE | 2 | 30 |
| 20 | 1 | SPARE | 249 | S | 67 | 749 | | | 68 | S | 500 | SPARE | 2 | 30 |
| 20 | 1 | SPARE | 249 | S | 69 | | 749 | | 70 | S | 500 | SPARE | 1 | 20 |
| 20 | 1 | SPARE | 63 | S | 71 | | | 563 | 72 | S | 500 | SPARE | 1 | 20 |
| 20 | 1 | SPARE | 191 | S | 73 | 691 | | | 74 | S | 500 | SPARE | 1 | 20 |
| 20 | 1 | SPARE | 500 | S | 75 | | 1000 | | 76 | S | 500 | SPARE | 1 | 20 |
| 20 | 1 | SPARE | 500 | S | 77 | | | 1000 | 78 | S | 500 | SPARE | 1 | 20 |
| 20 | 1 | SPARE | 500 | S | 79 | 1000 | | | 80 | S | 500 | SPARE | 1 | 20 |
| 20 | 1 | SPARE | 500 | S | 81 | | 1000 | | 82 | S | 500 | SPARE | 1 | 20 |
| 20 | 1 | SPARE | 500 | S | 83 | | | 1000 | 84 | S | 500 | SPARE | 1 | 20 |
| | | | | PHASE TOTALS | | 14239 | 14426 | 13729 | | | | | | |

CONNECTED VOLT-AMPERES= 42393

CONNECTED AMPERES= 118

DEMAND VOLT-AMPERES= 36255

DEMAND AMPERES= 101

| CIRCUIT TYPE CODES | | DEMAND FACTOR |
|---|---|---|
| L | LIGHTS | 1.0 |
| M | MOTORS | 1.0 |
| R | RECEPTACLES | 0.5 |
| H | HEAT | 1.0 |
| O | OTHER | 0.5 |
| S | SPARE | 0.5 |

PROJECT: **IMT Maintenance & Operations Bldg.**

PROJ. NO: 17-0017

DATE: 02/16/18

STATUS:

Bartlett Design

**LIGHTING & ELECTRICAL ENGINEERING**

5 PALMER STREET BATH, MAINE 04530

TEL (207) 443-5447 FAX (207) 443-5560

VOLTS: 120/208 AMPS 225 MAIN: MLO **PANEL: PANEL M1**

MOUNT: SURFACE PHASE: 3 WIRES: 4 LOCATION: MECHANICAL 114

| BREAKER A | BREAKER P | DESCRIPTION | CKT VA | TYPE | CKT NO. | LOAD A | LOAD B | LOAD C | CKT NO. | TYPE | CKT VA | DESCRIPTION | BREAKER P | BREAKER A |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 60 | 2 | SCU-1 | 3494 | M | 1 | 3994 | | | 2 | S | 500 | SPARE | 1 | 15 |
| 60 | 2 | SCU-1 | 3494 | M | 3 | | 3509 | | 4 | M | 14 | UH-1, UH-2 | 1 | 15 |
| 60 | 2 | SCU-2 | 3494 | M | 5 | | | 7361 | 6 | M | 3867 | AIR COMPRESSOR | 3 | 60 |
| 60 | 2 | SCU-2 | 3494 | M | 7 | 7361 | | | 8 | M | 3867 | AIR COMPRESSOR | 3 | 60 |
| 20 | 2 | SCU-3 | 915 | M | 9 | | 4782 | | 10 | M | 3867 | AIR COMPRESSOR | 3 | 60 |
| 20 | 2 | SCU-3 | 915 | M | 11 | | | 4782 | 12 | M | 3867 | O/H CRANE | 3 | 60 |
| 20 | 2 | SAC-1, SAC-2, SAC-3 | 250 | M | 13 | 4116 | | | 14 | M | 3867 | O/H CRANE | 3 | 60 |
| 20 | 2 | SAC-1, SAC-2, SAC-3 | 250 | M | 15 | | 4116 | | 16 | M | 3867 | O/H CRANE | 3 | 60 |
| 20 | 2 | SAC-4, SAC-5, SAC-6 | 250 | M | 17 | | | 1571 | 18 | M | 1321 | EF-1 | 3 | 20 |
| 20 | 2 | SAC-4, SAC-5, SAC-6 | 250 | M | 19 | 1571 | | | 20 | M | 1321 | EF-1 | 3 | 20 |
| 20 | 2 | SAC-7, SAC-8, SAC-9 | 250 | M | 21 | | 1571 | | 22 | M | 1321 | EF-1 | 3 | 20 |
| 20 | 2 | SAC-7, SAC-8, SAC-9 | 250 | M | 23 | | | 1571 | 24 | M | 1321 | EF-2 | 3 | 20 |
| 20 | 2 | SAC-10, SAC-11 | 250 | M | 25 | 1570.54 | | | 26 | M | 1321 | EF-2 | 3 | 20 |
| 20 | 2 | SAC-10, SAC-11 | 250 | M | 27 | | 1570.54 | | 28 | M | 1321 | EF-2 | 3 | 20 |
| 15 | 2 | ERV-1 | 300 | M | 29 | | | 799.52 | 30 | S | 500 | SPARE | 1 | 20 |
| 15 | 2 | ERV-1 | 300 | M | 31 | 799.52 | | | 32 | S | 500 | SPARE | 1 | 20 |
| 15 | 2 | ERV-2 | 258 | M | 33 | | 757.92 | | 34 | S | 500 | SPARE | 1 | 20 |
| 15 | 2 | ERV-2 | 258 | M | 35 | | | 757.92 | 36 | S | 500 | SPARE | 1 | 20 |
| 15 | 2 | ERV-3 | 300 | M | 37 | 799.52 | | | 38 | S | 500 | SPARE | 1 | 20 |
| 15 | 2 | ERV-3 | 300 | M | 39 | | 799.52 | | 40 | S | 500 | SPARE | 1 | 20 |
| 20 | 1 | SPARE | 500 | S | 41 | | | 1000 | 42 | S | 500 | SPARE | 1 | 20 |
| | | | | PHASE TOTALS | | 20212 | 17106 | 17842 | | | | | | |

CONNECTED VOLT-AMPERES= 55159

CONNECTED AMPERES= 153

DEMAND VOLT-AMPERES= 52909

DEMAND AMPERES= 147

| | CIRCUIT TYPE CODES | DEMAND FACTOR |
|---|---|---|
| L | LIGHTS | 1.0 |
| M | MOTORS | 1.0 |
| R | RECEPTACLES | 0.5 |
| H | HEAT | 1.0 |
| O | OTHER | 0.5 |
| S | SPARE | 0.5 |

PROJECT: **IMT Maintenance & Operations Bldg.**

PROJ. NO: 17-0017

DATE: 02/16/18

STATUS:

Bartlett Design

**LIGHTING & ELECTRICAL ENGINEERING**

5 PALMER STREET BATH, MAINE 04530

TEL (207) 443-5447 FAX (207) 443-5560

VOLTS: 120/208 AMPS 225 MAIN: MLO **PANEL: PANEL M2**

MOUNT: SURFACE PHASE: 3 WIRES: 4 LOCATION: MECHANICAL 114

| BREAKER A | BREAKER P | DESCRIPTION | CKT VA | TYPE | CKT NO. | LOAD A | LOAD B | LOAD C | CKT NO. | TYPE | CKT VA | DESCRIPTION | BREAKER P | BREAKER A |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 20 | 2 | WALL HEATER | 998 | H | 1 | 1997 | | | 2 | H | 998 | WALL HEATER | 2 | 20 |
| 20 | 2 | WALL HEATER | 998 | H | 3 | | 1997 | | 4 | H | 998 | WALL HEATER | 2 | 20 |
| 20 | 2 | WALL HEATER | 998 | H | 5 | | | 1937 | 6 | M | 939 | EF-3 | 3 | 15 |
| 20 | 2 | WALL HEATER | 998 | H | 7 | 1937 | | | 8 | M | 939 | EF-3 | 3 | 15 |
| 20 | 2 | WALL HEATER | 998 | H | 9 | | 1937 | | 10 | M | 939 | EF-3 | 3 | 15 |
| 20 | 2 | WALL HEATER | 998 | H | 11 | | | 2332 | 12 | H | 1333 | EDC-1 | 3 | 20 |
| 50 | 3 | EDC-3 | 4000 | H | 13 | 5333 | | | 14 | H | 1333 | EDC-1 | 3 | 20 |
| 50 | 3 | EDC-3 | 4000 | H | 15 | | 5333 | | 16 | H | 1333 | EDC-2 | 3 | 20 |
| 50 | 3 | EDC-3 | 4000 | H | 17 | | | 5333 | 18 | H | 1333 | EDC-2 | 3 | 20 |
| 20 | 1 | SPARE | 500 | S | 19 | 1833 | | | 20 | H | 1333 | EDC-2 | 3 | 20 |
| 20 | 1 | SPARE | 500 | S | 21 | | 1000 | | 22 | S | 500 | SPARE | 1 | 20 |
| 20 | 1 | SPARE | 500 | S | 23 | | | 1000 | 24 | S | 500 | SPARE | 1 | 20 |
| 20 | 1 | SPARE | 500 | S | 25 | 1000 | | | 26 | S | 500 | SPARE | 1 | 20 |
| 20 | 1 | SPARE | 500 | S | 27 | | 1000 | | 28 | S | 500 | SPARE | 1 | 20 |
| 20 | 1 | SPARE | 500 | S | 29 | | | 1000 | 30 | S | 500 | SPARE | 1 | 20 |
| | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | |
| | | PHASE TOTALS | | | | 12101 | 11268 | 11603 | | | | | | |

CONNECTED VOLT-AMPERES= 34971

CONNECTED AMPERES= 97

DEMAND VOLT-AMPERES= 32221

DEMAND AMPERES= 89

| CIRCUIT TYPE CODES | | DEMAND FACTOR |
|---|---|---|
| L | LIGHTS | 1.0 |
| M | MOTORS | 1.0 |
| R | RECEPTACLES | 0.5 |
| H | HEAT | 1.0 |
| O | OTHER | 0.5 |
| S | SPARE | 0.5 |

PROJECT: **IMT Maintenance & Operations Bldg.**

PROJ. NO: 17-0017

DATE: 02/16/18

STATUS:

Bartlett Design

**LIGHTING & ELECTRICAL ENGINEERING**

5 PALMER STREET BATH, MAINE 04530

TEL (207) 443-5447 FAX (207) 443-5560

# SECTION 26 06 50.16 – LIGHTING FIXTURE SCHEDULE

All work and materials shall conform to the Contract Documents and the provisions of the State of Maine Department of Transportation Standard Specifications, Revision November 2014, with the following additions:

Add the following:

PART 1 – GENERAL: Not Used

PART 2 – PRODUCTS:

LIGHTING FIXTURE SCHEDULE

**SEE ATTACHED**

PART 3 – EXECUTION: Not Used



**Dimensions: Length = 48” Width = 12” Recess Height = 1 1/2”**

Type: **A1**
Description: Recessed 1 x 4 troffer with linear prismatic diffuser. Fixture shall have flush frame for grid ceilings and integral dimming LED driver.
Lamps: LED 3500K
Manufacturers: *Columbia Lighting* # LZPT-14-35-ML-LSR-G-ED-U

---

**Dimensions: Length = 48” Width = 12” Recess Height = 1 1/2”**

Type: **A2**
Description: Similar to Type A1 except non-dimming and lesser light output.
Lamps: LED 3500K
Manufacturers: *Columbia Lighting* # LZPT-14-35-MW-LSR-E-U

---

**Dimensions: Length = 24” Width = 24” Recess Height = 1 1/2”**

Type: **A3**
Description: Similar to Type A1 except 2 ft. by 2 ft.
Lamps: LED 3500K
Manufacturers: *Columbia Lighting* # LZPT-22-35-MW-LSR-G-S-ED-U

---



**Dimensions: Trim Diameter = 5 1/2" Housing Recess Height = 4”**

Type: **B1**
Description: Recessed down-light with regressed white lens and white trim. Provide integral dimming LED driver.
Lamps: LED 3500K
Manufacturers: *USAI Lighting* # 3021-B1-S-10 (trim)
*USAI Lighting* # LRTD4-9024-35KS-50-FT-120-DIML2 (housing)

---

**Dimensions: Trim Diameter = 4" Housing Recess Height = 3”**

Type: **B2**
Description: Similar to Type B1 except smaller.
Lamps: LED 3500K
Manufacturers: *USAI Lighting* # 2221-B1-S-10 (trim)
*USAI Lighting* # LRTD3-9014-M2-35KS-35-FT-120-DIML2 (housing)

---



**Dimensions: Length = 8 1/2" Height = 5" Projection = 2 1/4"**

Type: **E1**
Description**:** Wall mounted emergency light with self-contained sealed nickel metal hydride battery. Battery shall be rated to operate fixture lamps for 90 minutes upon loss of normal power. Mount bottom of fixture at 7' - 0" AFF. Fixture housing shall be white.
Lamps**:** (2) By Manufacturer
Manufacturer**:** *Dual Lite* # EV-4-02L

---



**Dimensions: Length = 11" Height = 7" Projection = 3.1875"**

Type: **E2**
Description**:** Wall mounted emergency light with self-contained sealed nickel cadmium battery. Battery shall be rated to operate fixture lamps for 90 minutes upon loss of normal power. Mount bottom of fixture at 7' - 0" AFF. Fixture housing shall be white. Fixture shall be UL listed for wet locations.
Lamps**:** (2) By Manufacturer
Manufacturer**:** *Dual Lite* # PG-WH

---

Type: **J1** **NOT USED**

---



**Dimensions: Width = 4 7/16" Height = 1 13/16" Length = 8' – 0"**

Type: **J2**
Description: Surface ceiling open strip light. Provide integral non-dimming LED driver.
Lamps: LED 3500K
Manufacturers: *Columbia Lighting* # LCS-8-35-MW-E-U

---

**Dimensions: Width = 4 7/16" Height = 1 13/16" Length = 4' – 0"**

Type: **J3**
Description: Similar to Type J2 except 4 ft. in length.
Lamps: LED 3500K
Manufacturers: *Columbia Lighting* # LCS-4-35-MW-E-U

---



**Dimensions: Width = 1 1/4" Height = 0.8"**
**Overall Size = 4' – 0" square**

Type: **N1**
Description: Suspended indirect luminaire with white extruded aluminum housing. Luminaire shall be suspended with cables to follow ceiling slope with an 18" suspension length. Provide integral dimming LED driver.
Lamps: LED 3500K
Manufacturers: *Finelite* # E1-I-C-4X4-B-8-35-120-SC-C4

---

**Dimensions: Width = 1 1/4" Height = 0.8"**
**Overall Size = 4' – 0" square**

Type: **N2**
Description: Similar to Type N1 except higher light output.
Lamps: LED 3500K
Manufacturers: *Finelite* # E1-I-C-4X4-H-8-35-120-SC-C4

---

**Dimensions: Width = 1 1/4" Height = 0.8"**
**Overall Size = 4' – 0" square**

Type: **N3**
Description: Similar to Type N1 except higher light output.
Lamps: LED 3500K
Manufacturers: *Finelite* # E1-I-C-4X4-V-8-35-120-SC-C4

---



**Dimensions: Width = 1 1/4" Height = 0.8" Length = 20' – 0"**

Type: **N4**
Description: Suspended indirect luminaire with white extruded aluminum housing. Luminaire shall be suspended with an 18" suspension length. Provide integral dimming LED driver.
Lamps: LED 3500K
Manufacturers: *Finelite* # E1-L-C-20'-V-8-35-120-SC-FA-C4

---



**Dimensions: Diameter = 21.22" Height = 23.42"**

Type: **R1**
Description: Suspended direct luminaire with aluminum housing and frosted borosilicate glass diffuser. Luminaire shall be suspended from ceiling deck with aluminum strut frame as required. Provide integral dimming LED driver, integral motion sensor, and wire guard. Luminaire shall be IP65 rated.
Lamps: LED 3500K
Manufacturers: *Holophane* # PHZ-18L-35K-80CRI-AS-Q-G-W-MSE10NWL-WG-FR

---



**Dimensions: Height = 7.8" Width = 6.61" Projection = 4.19"**

Type: **S1**
Description: Exterior surface wall mounted luminaire with die-cast aluminum housing and with full cutoff, forward throw lighting distribution optics. Luminaire shall include clear flat bottom glass lens. Luminaire finish shall be gray. Luminaire shall be UL listed for wet locations. Coordinate exact mounting height with Architect prior to rough-in.
Lamps: LED 4000K
Manufacturers: *Hubbell* # SG1-20-4K7-FT-UNV-GYS

---



**Dimensions: Height = 1 1/4" Length/Width = 7 1/4"**

Type: **S2**
Description: Surface ceiling mounted luminaire with white painted finish. Provide integral non-dimming LED driver. Luminaire shall be UL listed for damp locations.
Lamps: LED 3500K
Manufacturers: *Prescolite* # LBSQLEDA-35K-8-WH

---



**Dimensions: Height = 8.39 Width = 17.2" Projection = 10.5"**

Type: **S3**
Description: Exterior surface wall mounted luminaire with die-cast aluminum housing and with IES Type III lighting distribution optics. Luminaire shall include clear flat bottom glass lens. Luminaire finish shall be gray. Luminaire shall be UL listed for wet locations. Luminaire shall include an integral motion sensor. Coordinate exact mounting height with Architect prior to rough-in.
Lamps: LED 4000K
Manufacturers: *Hubbell* # LNC4-36L-4K-105-3-U-GR-SCP

---

Type: **S4** **NOT USED**

---

**Dimensions: Height = 8.3" Width = 13" Projection = 10.5"**

Type: **S5**
Description:
Description: Similar to type S3 except smaller and lesser light output.
Lamps: LED 4000K
Manufacturers: *Hubbell* # LNC3-24L-4K-035-3-U-GR-SCP

---



**Luminaire Dimensions: Height = 5" Length = 31" Width = 14"**

Type: **S6**
Description: Pole mounted LED area light with die-cast aluminum housing and IESNA Type IV optical distribution. Provide integral non-dimming LED driver. Luminaire shall be UL listed for wet locations. Provide 20 foot tall round straight aluminum pole.
Lamps: LED 4000K
Manufacturers: *American Electric Lighting* # ATB-40BLED70-MVOLT-R4

---

**Luminaire Dimensions: Height = 5" Length = 31" Width = 14"**

Type: **S7**
Description: Identical luminaire to Type S6. Install on an existing lighting pole as a replacement luminaire.
Lamps: LED 4000K
Manufacturers: *American Electric Lighting* # ATB-40BLED70-MVOLT-R4

---



**Dimensions: Height = 10” Length/Width = 19”**

Type: **W1**
Description: Surface wall mounted luminaire white acrylic diffuser. Provide integral non-dimming LED driver. Coordinate exact mounting height with Architect prior to rough-in.
Lamps: LED 3500K
Manufacturers: *Beta-Calco* # 44 5211-35-OA

---




**Dimensions: Length = 11” Height = 7” Projection = 3.1875”**

Type: **X1**
Description**:** Wall mounted exit sign with white housing and red letters. Exit sign shall have a self-contained sealed nickel cadmium battery. Battery shall be rated to operate fixture lamps for 90 minutes upon loss of normal power. Mount bottom of fixture at top of door frame head height.
Lamps**:** (2) By Manufacturer
Manufacturer**:** *Dual Lite* # LX-U-R-W-E

---

# SECTION 26 09 43 - LIGHTING CONTROLS

All work and materials shall conform to the Contract Documents and the provisions of the State of Maine Department of Transportation Standard Specifications, Revision November 2014, with the following additions:

Add the following:

## PART 1 - GENERAL:

### 1.01 SECTION INCLUDES:

A. This extent of lighting control system work is indicated by drawings and by the requirements of this section. It is the intent of this section to provide an integrated, energy saving lighting control system for interior lighting including occupancy sensors. Also included are lighting controls for exterior lighting including a digital, programmable lighting control panel.

### 1.02 REGULATORY REQUIREMENTS:

A. National Fire Protection Association (NFPA): NFPA 70 – National Electrical Code

B. Underwriters Laboratories Incorporated (UL):
   1. UL 916 - Energy Management Equipment
   2. UL 508 – Industrial Control Panels

### 1.03 SUBMITTALS:

A. Product Data: For control panels, low-voltage switches and plates, occupancy sensors, and conductors and cables.

B. Shop Drawings: Detail assemblies of standard components, custom assembled for specific application on this Project.
   1. Outline Drawings: Indicate dimensions, weights, arrangement of components, and clearance and access requirements.
   2. Block Diagram: Show interconnections between components specified in this Section and devices furnished with power distribution system components. Indicate data communication paths and identify networks, data buses, data gateways, concentrators, and other devices to be used. Describe characteristics of network and other data communication lines.
   3. Wiring Diagrams: Power, signal, and control wiring. Coordinate nomenclature and presentation with a block diagram.

C. Coordination Drawings: Submit evidence that lighting controls are compatible with connected control devices and systems specified in other Sections.
   1. Show interconnecting signal and control wiring and interfacing devices that prove compatibility of inputs and outputs.
   2. For networked controls, list network protocols and provide statements from manufacturers that input and output devices meet interoperability requirements of the network protocol.

D. Programming Documentation:
   1. Program instruction manuals.
   2. Device address list.

E. Field quality-control test reports.

F. Software licenses and upgrades required by and installed for operation and programming of digital and analog devices.

G. Operation and Maintenance Data: For lighting controls to include in emergency, operation, and maintenance manuals.

H. Warranty: Special warranty specified in this Section.

1.04 QUALITY ASSURANCE:

A. Source Limitations: Obtain lighting system components through one source from a single manufacturer.

B. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.

C. Comply with 47 CFR, Subparts A and B, for Class A digital devices.

D. Comply with NFPA 70.

1.05 PROJECT RECORD DRAWINGS:

A. Submit documents under provisions of Section 26 00 00.

B. Record actual locations and devices.

1.06 OPERATING AND MAINTENANCE INSTRUCTIONS:

A. Provide written operating and maintenance instructions as specified in Section 26 00 00. Include product data and operation/maintenance information for all system components

B. The Owner may assign personnel to participate with the Contractor during installation. Without delaying work, familiarize the Owner's personnel with the installation, equipment, and maintenance.

C. During tests and adjustments, permit the Owner's personnel to observe. When feasible, explain the significance of each test.

D. Provide sufficient training to personnel selected by the Owner on operation and basic maintenance of all systems and equipment.

E. Employ manufacturer's field representative to demonstrate system operation to designated Owner personnel.

F. Conduct walking tour of project and briefly describe function, operation, and maintenance of each component.

G. Use submitted operation and maintenance manual as reference during demonstration and training.

H. Provide the owner with a training program designed to make all users familiar with the operation of the Lighting Control System.

1.07 WARRANTY:

A. Special Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace components of lighting controls that fail in materials or workmanship or from transient voltage surges within specified warranty period.
   1. Failures include, but are not limited to, the following:
      a. Failure of program input/output to execute switching or dimming commands.
      b. Failure of modular relays to operate under manual or program commands.
      c. Damage of electronic components due to transient voltage surges.
   2. Warranty Period: Two years from date of Substantial Completion.
   3. Extended Warranty Period Failure Due to Transient Voltage Surges: Eight years.
   4. Extended Warranty Period for Electrically Held Relays: 10 years from date of Substantial Completion.

PART 2 - PRODUCTS:

2.01 MANUFACTURERS:

A. Lighting systems equipment shown on the Drawings and specified herein is based on equipment as manufactured by *Hubbell Building Automation*.

2.02 NETWORK LIGHTING CONTROL SYSTEM:

A. Manufacturers: Lighting systems equipment shown on the Drawings and specified herein is based on equipment as manufactured by *Hubbell Building Automation*. Equivalent products by other manufacturers will be considered.

B. The Lighting Control panel shall be *Hubbell Building Automation* model CX-04-2-S-04-2N-N, or approved equal.

C. Lighting Control Panel Features:
   1. Relays: Four (4) 20-ampere, 1-pole electrically held, N.O. 120-277V
   2. User Interface: LCD with keypad
   3. Programming: 365 day programming with 64 schedules
   4. Time Clock: Astronomic and real time
   5. Contacts: six (6) programmable dry contacts
   6. Inputs: Accept low voltage switches, photocells, or motion sensors
   7. Cabinet: NEMA 1 recessed
   8. Electrical Input: 120-277 volts
   9. Listing: UL916, UL924

D. Relays shall be controlled by a building mounted photocell.

| LIGHTING CONTROL PANEL RELAY SCHEDULE | | | |
|---|---|---|---|
| Lighting Control Panel | Relay Number | Lights Controlled | Ltg. Ckt. Numbers Controlled |
| LC1 | 1 | Exterior Building Lights | P1 #56 |
| LC1 | 2 | Exterior Pole Lights | P1 #58 |
| LC1 | 3 | Spare | |
| LC1 | 3 | Spare | |

2.03 OCCUPANCY SENSORS:

A. Ceiling mounted passive-infrared sensors shall be *Hubbell* model OMNIIR.
1. Sensor shall use a micro-processor for motion signal analysis and internal self-adjustment. Sensor shall adapt automatically to changing room conditions. Sensor micro-processor shall monitor PIR background levels and automatically make corresponding adjustments. Sensor shall recognize any motion detected within 15 seconds of turning off the lighting as a false off. Sensor shall recognize as a false on, the failure to detect motion 6 seconds after motion is detected initially.
a. Test Setting: 8 second timeout.
b. Timer Adjustability: 8 to 40 minutes (factory set at 15 minutes).
c. Sensitivity: Adjustable from 0 to 100%.
d. Indicator Light: LED.
e. Detection Field: 360 degrees.
f. Coverage: 450 square feet.
g. Voltage: 24 volts DC.

B. Ceiling mounted dual technology sensors shall be *Hubbell* model OMNIDT2000.
1. Sensor shall use a micro-processor for motion signal analysis and internal self-adjustment. Sensor shall adapt automatically to changing room conditions. Sensor micro-processor shall monitor PIR background levels as well as utilize Doppler shift technology with a micro-processor for motion signal analysis and automatically make corresponding adjustments. Sensor shall recognize any motion detected within 15 seconds of turning off the lighting as a false off. Sensor shall recognize as a false on, the failure to detect motion 6 seconds after motion is detected initially.
a. Test Setting: 8 second timeout.
b. Timer Adjustability: 8 to 30 minutes (factory set at 15 minutes).
c. Sensitivity: Adjustable from 0 to 100%.
d. Indicator Light: LED.
e. Detection Field: 360 degrees.
f. Coverage: 2000 square feet.
g. Voltage: 24 volts DC.

C. Occupancy sensor power packs shall be *Hubbell* model UVPP.
1. Power packs shall include an integral transformer and relay designed for switching 20-ampere loads. Power packs shall be capable of being installed within a standard 4-inch square electrical box.
a. Input Voltage: 100-277VAC
b. Output Rating: 24VDC, 150 mA

2.04 CONDUCTORS AND CABLES:

A. Classes 2 Control Cables: Multi-conductor cable with copper conductors not smaller than No.18 AWG.

PART 3 - EXECUTION:

3.01 WIRING INSTALLATION:

A. Wire exterior lighting circuits through relays in the relay control panels as indicated in the Lighting Control Panel Schedule included in this specification.

B. Comply with NECA 1.

C. Wiring within Enclosures: Bundle, lace, and train conductors to terminal points. Separate power-limited and non-power-limited conductors according to conductor manufacturer's written instructions.

D. Install field-mounting transient voltage suppressors for lighting control devices in Category A locations that do not have integral line-voltage surge protection.

E. Size conductors according to lighting control device manufacturer's written instructions, unless otherwise indicated.

F. Splices, Taps, and Terminations: Make connections only on numbered terminal strips in terminal cabinets, equipment enclosures, and in junction, pull, and outlet boxes.

G. Identify components and power and control wiring according to Division 26 Section "Identification for Electrical Systems."

1.02 OCCUPANCY SENSOR INSTALLATION:

A. Provide ceiling mounted dual technology occupancy sensors in the following spaces:
1. Women 107
2. Men 108
3. Training 112
4. Mechanical 114
5. Toilet/Shower 120
6. Toilet/Shower 121

B. Provide ceiling mounted passive infrared occupancy sensors in the following spaces:
7. J.C. 103
8. Storage 113
9. Changing Room 124
10. Utility 126
11. Closet 128

3.03 FIELD QUALITY CONTROL

A. Manufacturer's Field Service: Engage a factory-authorized service representative to provide full commissioning services including the inspection, testing, field-assembled components adjustments and system start-up. Report results in writing.

B. Perform the following field tests and inspections and prepare test reports:
1. Test for circuit continuity.
2. Verify that the control panel features are operational.
3. Check operation of local override controls.
4. Test system diagnostics by simulating improper operation of several components selected by Architect.

3.04 ADJUSTING

A. Occupancy Adjustments: When requested within 2 months of date of Substantial Completion, provide on-site assistance in adjusting sensors and to assist Owner's personnel in making program changes to suit actual occupied conditions.

3.05 DEMONSTRATION

A. Engage a factory-authorized service representative to train Owner's maintenance personnel to adjust, operate, and maintain lighting controls. Refer to Division 01 Section "Demonstration and Training."

**END OF SECTION**

# SECTION 26 27 26 - WIRING DEVICES

All work and materials shall conform to the Contract Documents and the provisions of the State of Maine Department of Transportation Standard Specifications, Revision November 2014, with the following additions:

Add the following:

PART 1 – GENERAL:

1.01 SECTION INCLUDES:

A. Wall switches.

B. Receptacles.

C. Device plates.

1.02 RELATED SECTIONS:

A. Section 26 05 33 – Raceway and Boxes for Electrical Systems.

B. Section 26 09 43 – Lighting Controls.

1.03 REFERENCES:

A. NEMA WD 1 - General Purpose Wiring Devices.

B. NEMA WD 6 - Wiring Device Configurations.

1.04 SUBMITTALS:

A. Submit under provisions of Division 01 and Section 26 00 00.

B. Product Data: Provide manufacturer's catalog information showing dimensions, colors, and configurations for all wiring devices.

1.05 REGULATORY REQUIREMENTS:

A. Conform to requirements of ANSI/NFPA 70.

B. Furnish products listed and classified by Underwriters Laboratories, Inc. as suitable for purpose specified and shown.

PART 2 – PRODUCTS:

2.01 WIRING DEVICES:

A. *Leviton* model numbers are listed below to establish configuration and type. Equal devices by other manufacturers listed herein will be accepted.
   1. *Hubbell*
   2. *Pass & Seymour*
   3. *Bryant*
   4. Substitutions: None permitted.

B. Wall Switches
1. Description: style NEMA WD 1, heavy-duty, AC only general-use switch.
2. Device Body: White plastic with "*Decora*" series.
3. Voltage Rating: 120-277 volts, AC.
4. Current Rating: 20 amperes.
5. Model Number: *Leviton* 5621-2-W (SPST).
6. Model Number: *Leviton* 5623-2-W (3-way)

C. General Use Receptacles
1. Description: NEMA WD 1; heavy-duty type, 125-volt grounded duplex receptacle.
2. Device Body: Thermoplastic, "*Decora*" series.
3. Configuration: NEMA 5-20.
4. Model number: *Leviton* 16352-W.

D. Ground Fault Receptacles
1. Description: UL 498, 544, 943; 125 volt, ground fault interrupt type duplex receptacle with TEST and RESET.
2. Device Body: Thermoplastic, *"Decora"* series.
3. Configuration: NEMA 5-20.
4. Model Number: *Leviton* 8899-W.

E. Welding Receptacle
1. Description: 150A, 3P +N=G receptacle with integral safety switch and dead-front construction.
2. Model Number*: Meltric* Decontactor DNS Series

F. Wall Plates
1. Decorative Cover Plate: "*Decora*" series.
a. Standard Devices: White color.
b. Boiler Cut-Off Switches: Red color, engraved: "EMERGENCY."

PART 3 – EXECUTION:

3.01 EXAMINATION:

A. Verify outlet boxes are installed at proper height.

B. Verify wall openings are neatly cut and will be completely covered by wall plates.

C. Verify branch circuit wiring installation is completed, tested, and ready for connection to wiring devices.

3.02 PREPARATION:

A. Provide extension rings to bring outlet boxes flush with finished surface.

B. Clean debris from outlet boxes.

3.03 WIRING DEVICE INSTALLATION:

A. Install products in accordance with manufacturer's instructions.

B. Install devices plumb and level.

C. Install switches with OFF position down.

D. Install receptacles with grounding pole on top.

E. Connect wiring device grounding terminal to branch circuit equipment grounding conductor.

F. Install decorative plates on switch, receptacle, and blank outlets in finished areas.

G. Install galvanized steel plates on outlet boxes and junction boxes in unfinished areas.

H. Provide ground fault GFCI receptacles where receptacles are located within six (6) feet of a sink.

3.04 INTERFACE WITH OTHER PRODUCTS:

A. Install wall switches 48 inches above finished floor.

B. Install convenience receptacles 18 inches above floor, or as noted on the Drawings.

3.05 FIELD QUALITY CONTROL:

A. Inspect each wiring device for defects.

B. Operate each wall switch with circuit energized and verify proper operation.

C. Verify that each receptacle device is energized.

D. Test each receptacle device for proper polarity.

E. Test each GFCI receptacle device for proper operation.

3.06 ADJUSTING:

A. Adjust devices and wall plates to be flush and level.

**END OF SECTION**

# SECTION 26 28 16 - ENCLOSED SWITCHES AND CIRCUIT BREAKERS

All work and materials shall conform to the Contract Documents and the provisions of the State of Maine Department of Transportation Standard Specifications, Revision November 2014, with the following additions:

Add the following:

PART 1 – GENERAL:

1.01 SECTION INCLUDES:

A. Service and General Disconnect Switches.

B. Fuses.

1.02 REFERENCES:

A. NEMA KS 1 - Enclosed Switches.

B. ANSI/NFPA 70 - National Electrical Code.

1.03 SUBMITTALS:

A. Include outline drawings with dimensions, and equipment ratings for voltage, capacity, horsepower, and short circuit.

PART 2 – PRODUCTS:

2.01 SERVICE AND GENERAL DISCONNECT SWITCHES

A. Acceptable manufacturers:
1. *Square D*.
2. *General Electric*.
3. Substitutions: None permitted

B. Non-fusible General Disconnect Switch Assemblies: NEMA KS 1; Type HD; quick-make, quick-break, load interrupter enclosed knife switch with externally operable handle interlocked to prevent opening front with switch in ON position. Handle lockable in OFF position.
1. Enclosures: NEMA KS 1; Type 1. For indoor locations; Type 3R for outdoor locations.

PART 3 – EXECUTION:

3.01 INSTALLATION:

A. Provide unfused disconnect switches for general motors, except where packaged equipment is supplied by the manufacturer with integral means of disconnect.

B. Mount disconnect switch handle 60 inches (maximum) above adjacent working surface, with not less than 36 inches clearance in front of switch (floor to ceiling).

**END OF SECTION**

# SECTION 26 29 13 - ENCLOSED MOTOR CONTROLLERS

All work and materials shall conform to the Contract Documents and the provisions of the State of Maine Department of Transportation Standard Specifications, Revision November 2014, with the following additions:

Add the following:

PART 1 – GENERAL:

1.01 SECTION INCLUDES:

A. Manual motor starters.

B. Combination motor starters.

1.02 RELATED SECTIONS:

A. Section 26 00 00 – General Electrical Requirements.

1.03 REFERENCES

A. ANSI/NEMA ICS 6 - Enclosures for Industrial Controls and Systems.

B. NEMA AB 1 - Molded Case Circuit Breakers.

C. NEMA ICS 1 - Industrial Control Devices, Controllers, and Assemblies.

1.04 SUBMITTALS:

A. Submit shop drawings and product data under provisions of Division 01 and Section 26 00 00.

B. Provide product data on motor starters and combination motor starters, relays, pilot devices, and switching and overcurrent protective devices.

1.05 OPERATION AND MAINTENANCE DATA:

A. Submit operation and maintenance data under provisions of Division 01 and Section 26 00 00.

B. Include spare parts data listing; source and current prices of replacement parts and supplies; and recommended maintenance procedures and intervals.

PART 2 – PRODUCTS:

2.01 MOTOR STARTERS:

A. Acceptable Manufacturers
   1. *Cerus Industrial*
   2. Substitutions: Or approved equal.

B. Manual Motor Starters:
   1. Single-Phase Motor Starter Control: The single-phase motor starter shall consist of a manually operated quick-make toggle mechanism lockable in the “Off” position which shall also function as the starter disconnect. Additionally, the starter shall provide thermal overload protection, run status

pilot light and fault pilot light. The starter must include the capability to operate in both manual and automatic control modes. In automatic mode, the starter shall have the capability to integrate with a building automation system by provided terminals for fun input, run status output and fault output. All control terminals shall be integrated in the starter. At a minimum, each single-phase starter shall include an interposing run relay and current sensing status output relay. Single-phase motor starter shall be in a surface mount enclosure.

2. Approved Manufacturer: *Cerus Industrial*, Model BAS-1P, or approved equal.

C. Combination Motor Starters

1. Motor Starter shall be enclosed in a Type 1 or Type 4 UL rated enclosure. Type 1 enclosure shall include pre-cut holes for conduits with removable plugs.
2. Motor Starter shall be rated for NEMA class B motors for AC-3 switching and AC-4 switching. Starter shall be sized to equivalent NEMA rating for AC-3 switching.
3. Controls and annunciation shall include Hand- OFF- Auto keypad with 20 mm snap dome actuation. Keypad shall be water tight and liquid tight. LED indication shall include Hand, Off, Auto, Run and Overload. Overload reset shall be available by holding Hand and Off for five seconds.
4. Control inputs shall include: Auto Wet input, Auto Dry input, Permissive Auto input, Damper Status Input and Override Input. Automatic control inputs shall be capable of accepting a transistorized input without the need for interposing relays. Wet control inputs shall accept AC or DC inputs from 10 to 138VACor DC.
5. Damper control shall be built into the starter to provide 24VAC or 120VAC damper control and monitoring.
6. Override input shall disable the starter from operating in either Hand or Auto mode.
7. Protective Functions-
   a. Electronic Overload shall provide phase failure and phase loss protection, stall, and class 1 - 30 selectable overload protection. Phase failure protection shall initiate when phase loss is greater than 70% for 3 seconds or phase unbalance is greater than 50% for more than 5 seconds.
   b. Cycling fault protection shall be integral to the starter. Cycling fault shall be enabled whenever the starter is cycled more than 1000 times in a one hour period. This feature shall be selectable to be disabled. Cycling fault shall cause overload LED to blink rapidly.
8. Motor Starters shall be equipped with an integral Motor Circuit that is UL listed 508. The breaker and shall carry a UL 508F rating (up to 100A frame size) which provides for coordinated short circuit rating for use with the motor contactor and provides an interrupting rating for the breaker and contactor combination.
9. Approved Manufacturer: *Cerus Industrial*, Model BAS, or approved equal.

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PART 3 – EXECUTION:

3.01 INSTALLATION:

A. Install motor control equipment in accordance with manufacturer's instructions.

B. Provide motor controllers at equipment as specified under Section 26 00 00.

C. Motor Data: Provide neatly typed label inside each motor starter enclosure door identifying motor served, nameplate horsepower, full load amperes, code letter, service factor, and voltage/phase rating.

D. Mount combination type motor starters locally to equipment being served, with top at 60 inches (maximum) above adjacent floor, with not less than 36 inches clearance in front of starter (floor to ceiling).

**END OF SECTION**

# SECTION 26 51 00 - INTERIOR LIGHTING

All work and materials shall conform to the Contract Documents and the provisions of the State of Maine Department of Transportation Standard Specifications, Revision November 2014, with the following additions:

Add the following:

PART 1 – GENERAL:

1.01 SECTION INCLUDES:

A. Interior lighting fixtures, lamps, and ballasts.

B. Lighting fixture supports.

1.02 REFERENCES:

A. Section 26 05 50.16 – Lighting Fixture Schedule

1.03 DEFINITIONS:

A. BF: Ballast factor.

B. CRI: Color-rendering index.

C. CU: Coefficient of utilization.

D. LER: Luminaire efficacy rating.

E. Luminaire: Complete lighting fixture, including ballast housing if provided.

1.04 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. Ballast.
   3. Energy-efficiency data.

B. Operation and Maintenance Data: For lighting equipment.

C. Warranties: Special warranties specified in this Section.

1.05 QUALITY ASSURANCE:

A. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.

B. Comply with NFPA 70.

1.06 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.

1.07 WARRANTY:

A. Special Warranty for Emergency Lighting Batteries: Manufacturer's standard form in which manufacturer of battery-powered emergency lighting unit agrees to repair or replace components of rechargeable batteries that fail in materials or workmanship within specified warranty period.
1. Warranty Period for Emergency Lighting Unit Batteries: 10 years from date of Substantial Completion. Full warranty shall apply for first year, and prorated warranty for the remaining nine years.

B. Special Warranty for LED lamps and drivers: Manufacturer's standard form in which luminaire manufacturer agrees to repair or replace LED lamps or drivers that fail in materials or workmanship within specified warranty period.
1. Warranty Period: Five years from date of Substantial Completion.

PART 2 – PRODUCTS:

2.01 MANUFACTURERS:

A. Luminaires:
1. Provide products as specified in Interior Lighting Fixture Schedule.

B. Luminaires and LED lamps shall have been tested according to *IESNA* LM-79 and LM-80. Test results shall be provided if requested.

C. Luminaire LED lamp assemblies and LED drivers shall be wired within luminaires with modular wiring connectors for separate removal/replacement.

D. Exit Signs
1. Description: Comply with UL 924; for sign colors, visibility, luminance, and lettering size, comply with authorities having jurisdiction.
2. Internally Lighted Signs:
a. Lamps for AC Operation: LEDs, 70,000 hours minimum rated lamp life.

E. Emergency Lighting Units
1. Description: Self-contained units complying with UL 924.
2. Battery: Sealed, maintenance-free, lead-acid type.
3. Charger: Fully automatic, solid-state type with sealed transfer relay.
4. 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.
5. Test Push Button: Push-to-test type, in unit housing, simulates loss of normal power and demonstrates unit operability.
6. LED Indicator Light: Indicates normal power on. Normal glow indicates trickle charge; bright glow indicates charging at end of discharge cycle.

F. Lighting Fixtures And Components, General Requirements
1. Recessed Fixtures: Comply with NEMA LE 4 for ceiling compatibility for recessed fixtures.
2. Metal Parts: Free of burrs and sharp corners and edges.
3. Sheet Metal Components: Steel, unless otherwise indicated. Form and support to prevent warping and sagging.
4. 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 when secured in operating position.

5. Reflecting surfaces shall have minimum reflectance as follows, unless otherwise indicated:
a. White Surfaces: 85 percent.
b. Specular Surfaces: 83 percent.
c. Diffusing Specular Surfaces: 75 percent.
d. Laminated Silver Metallized Film: 90 percent.

6. Plastic Diffusers, Covers, and Globes:
a. Acrylic Lighting Diffusers: 100 percent virgin acrylic plastic. High resistance to yellowing and other changes due to aging, exposure to heat, and UV radiation.
b. Polycarbonate Lighting Diffusers: UV stabilized.

G. Lighting Fixture Support Components
1. Comply with Division 26 Section 260529 for channel- and angle-iron supports and nonmetallic channel and angle supports.
2. Single-Stem Hangers: 1/2-inch (13-mm) steel tubing with swivel ball fittings and ceiling canopy. Finish same as fixture.
3. Twin-Stem Hangers: Two, 1/2-inch (13-mm) steel tubes with single canopy designed to mount a single fixture. Finish same as fixture.
4. Wires: ASTM A 641/A 641M, Class 3, soft temper, zinc-coated steel, 12 gage (2.68 mm).
5. Rod Hangers: 3/16-inch (5-mm) minimum diameter, cadmium-plated, threaded steel rod.

2.02 LIGHTING FIXTURE SUPPORT COMPONENTS:

A. Comply with Section 26 05 29 "Supporting Devices" for channel- and angle-iron supports and nonmetallic channel and angle supports.

B. Wires: ASTM A 641/A 641M, Class 3, soft temper, zinc-coated steel, 12 gauge.

PART 3 – EXECUTION:

3.01 INSTALLATION:

A. Lighting fixtures: Set level, plumb, and square with ceilings and walls. Install lamps in each fixture.

B. Support for Lighting Fixtures in or on Grid-Type Suspended Ceilings: Do not use grid as a sole support element.
1. Install a minimum of four ceiling support system rods or wires for each fixture. Locate not more than 6 inches from lighting fixture corners.
2. Support Clips: Fasten to lighting fixtures and to ceiling grid members at or near each fixture corner with clips that are UL listed for the application.
3. Fixtures of Sizes Less Than Ceiling Grid: Install as indicated on reflected ceiling plans or center in acoustical panel, and support fixtures independently with at least two 3/4-inch (20-mm) metal channels spanning and secured to ceiling tees.

4. Install at least one independent support rod or wire from structure to a tab on lighting fixture. Wire or rod shall have breaking strength of the weight of fixture at a safety factor of 3.

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.

D. Aim adjustable accent lighting fixtures as directed by the Engineer.

E. Install fixtures in full conformance with manufacturers' instructions.

**END OF SECTION**

# SECTION 27 00 00 - GENERAL COMMUNICATIONS REQUIREMENTS

All work and materials shall conform to the Contract Documents and the provisions of the State of Maine Department of Transportation Standard Specifications, Revision November 2014, with the following additions:

Add the following:

PART 1 – GENERAL:

1.01 SECTION INCLUDES:

A. Furnish all materials, labor, tools, transportation, incidentals, and appurtenances to complete in every detail and leave in working order all items of work called for herein or shown on the accompanying drawings, including work related to:
1. Voice/data network system including wiring, equipment racks, outlets and wiring.

B. Include any minor items of work necessary to provide a complete and fully operative electrical system.

C. The Contractor for this work is referred to Bidding Requirements, General Conditions, Special Conditions, Temporary Services and other pertinent Sections of these Specifications.

1.02 RELATED SECTIONS:

A. Section 27 10 00 – Structured Cabling System

1.03 REFERENCES:

A. ANSI/NFPA 70 - National Electrical Code.

B. OSHA 1910 - Occupational Safety and Health Act.

1.04 GENERAL REQUIREMENTS:

A. Contractor shall read the entire specifications covering other branches of work. He is responsible for coordination of his work with work performed by other trades.

B. Consult all Contract drawings which may affect the location of any equipment or apparatus furnished under this work and make minor adjustments in location as necessary to secure coordination. Contractor shall consult architectural interior elevations for mounting heights of telecommunications outlets and clocks.

C. System layout is schematic and exact locations shall be determined by structural and other conditions. This shall not be construed to mean that the design of the system may be arbitrarily changed. The equipment layout is to fit into the building as constructed and to coordinate with equipment included under other Divisions of work.

D. Contractor shall contact the Owner's Representative immediately if he notices any discrepancies or omissions in either the drawings or the specifications, or if there are any questions regarding the meaning or intent thereof.

E. Submit all changes, other than minor adjustments, to the Architect for approval before proceeding with the work.

1.05 SUBMITTALS:

A. Submit under provisions of the following:

B. Submittal shall include complete Specifications, including type of materials, electrical characteristics, capacities, performance and power requirements to determine compliance with Contract Documents. All data submitted shall be complete and shall apply only to this specific project. All extraneous material shall be deleted or marked out. Items to be supplied shall be specifically indicated using a method that will be visible after photocopying.

C. Regardless of any information included in the submittal submitted for review, the requirements of the Drawings and Specifications shall not be superseded in any way by the review. Review by the Architect-Engineer does not relieve responsibility for submittal errors or from meeting the requirements of the Contract Documents.

D. It is intended that Submittal data be complete and accurate at the first submission. If the Submittal is returned marked "Resubmit" only one additional submission will be permitted.

E. Submit related Submittal at one time. SUBMIT ALL ITEMS IN A SPECIFICATION SECTION AT THE SAME TIME. Incomplete submittal will be held until a complete submittal is accumulated or may be rejected without further review and returned to the applicable parties. Include a copy of the Specification Paragraphs pertaining to the items submitted.

F. If proposed equipment deviates from the Specifications or Drawings, indicate in writing on Company letterhead those differences and provide sufficient data to justify acceptance. FAILURE TO INDICATE DEVIATIONS OR SUBSTITUTIONS IMPLIES FULL COMPLIANCE WITH DRAWINGS AND SPECIFICATIONS.

G. The term "by others" or similar wording shall not be used on Submittal. Submittal shall state by whom related items of work are to be provided. Where not indicated, it is implied that the work or item is provided under this Section.

H. Shop Drawings: Provide shop drawings as required by the individual Specification Sections. Submit shop drawings indicating physical size and arrangement, (plans and elevations) construction details, provisions for conduits, access requirements for installation and maintenance, finishes, and materials used in fabrication for all equipment. Supplement shop drawings with wiring diagrams for all systems with wiring connections for multiple components.

I. Submittals shall be made as paper copies. Submittals transmitted only by electronic email shall not be accepted.

1.06 REGULATORY REQUIREMENTS:

A. Complete installation shall conform with all applicable Federal, State and Local laws, Codes and Ordinances, included but not limited to latest approved editions of the following:
1. State Building Codes.
2. Specific Construction Safety Requirements, State Industrial Commission.
3. National Electrical Code - NFPA 70.
4. Occupational Safety and Health Act (OSHA) of 1971 and all amendments thereto.

B. Nothing contained in the drawings and specifications shall be construed to conflict with these laws, codes and ordinances, and they are thereby included in these specifications. All work shall comply with the 2008 edition of NFPA 70, The National Electrical Code. It shall be the Contractor’s responsibility to assure that electrical work is in full compliance with the NEC.

C. The Contractor shall visit the site to become familiar with all existing conditions affecting this work. No claim will be recognized for extra compensation due to failure of contractor to familiarize himself/herself with the conditions and extent of proposed work.

D. Obtain and pay for all necessary permits. Request inspections from authority having jurisdiction.

1.07 RECORD DRAWINGS:

A. Record any changes in location of equipment items, telecommunications outlets, and similar construction items on a set of prints and deliver them to the Owner's Representative upon completion of the work.

1.08 OPERATING AND MAINTENANCE INSTRUCTIONS:

A. Provide a Complete Instruction and Maintenance Manual: Prepare in the form of an instructional manual for use by Owner's personnel. Provide one (1) draft copy and two (2) final copies.
   1. Format:
      a. Size: 8-1/2" x 11", 20 lb. minimum weight white paper for typed pages, either manufacturer's printed data, or neatly typewritten.
      b. Drawings: Provide reinforced punched binder tab, bind in with text. Fold larger drawings to size of text pages. Clear plastic "binding tape" (not "Scotch" tape) applied to edge of sheet and then punched is acceptable.
      c. Single-sheet product literature and contractor-prepared pages: Provide reinforced punched binder tab. Clear plastic "binding tape" (not "Scotch" tape) applied to edge of page and then punched is acceptable.
      d. Provide indexed tabs and flyleaf for each separate product, or each piece of operating equipment. Include typed description of product, and major component parts of equipment.
      e. Cover: Identify each volume with typed or printed title "OPERATING AND MAINTENANCE INSTRUCTIONS".
      f. Binders:
         1) Commercial quality three-ring binders with durable and cleanable plastic covers, 1" minimum, 2" maximum ring size.
         2) When multiple binders are used, collate the data into related consistent groupings and provide a spine label that includes the volume number and contents of the binder.

B. Provide content as listed in separate Sections of Division 27 of these specifications.

1.09 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 Architect/Engineer before proceeding.

1.10 COORDINATION WITH WORK PROVIDED UNDER DIVISION 26:

A. Telecommunications work shall be coordinated with associated work being provided under Division 26. Work provided under Division 26 shall include the following:
   1. Raceway and boxes for wiring.
   2. Wiring support means.
   3. 120-volt power circuits.

1.11 COORDINATION WITH WORK PROVIDED UNDER OTHER DIVISIONS:

A. Division 28 – Alarms: Provide communications wiring and connections to the fire alarm control panel as specified under Section 28 31 13.

B. Division 28 – Door Access Control: Provide communications wiring and connections to the door access control system as specified under Section 28 13 00.

1.12 COORDINATION WITH OWNER FURNISHED ITEMS:

A. Provide structured cable wiring and connections to owner furnished network switches.

1.13 SUBSTANTIAL AND FINAL COMPLETION:

A. Refer to General Conditions and Supplementary Conditions.

B. Substantial Completion shall not be considered unless all systems are tested and verified for adherence with Contract Documents and any work remaining is less than one percent of the total Contract Value of this Section.
   1. Record Drawings, Operation and Maintenance Manuals, Acceptance Demonstrations, Owner personnel training, spare parts or extra materials required, test reports, warranties and certifications of installation inspections shall be submitted and accepted prior to Substantial Completion.

C. Final Completion shall be when all work under this Section is completed as defined by the Contract Documents and accepted by the Architect-Engineer.

D. When Architect-Engineer determines Work is complete, close out submittals will be considered.

PART 2 – PRODUCTS:

2.01 MATERIALS:

A. Furnish new and undeteriorated materials and of a quality not less than what is specified.

B. The selection of materials and equipment to be furnished shall be governed by the following:
   1. Where single trade name, brand of manufacturer or material is listed in the specification, the exact equipment listed shall be used in the bid.
   2. Where more than one name is listed, Contractor may select any one of the several brands specified.
   3. Where trade name, brand of manufacturer of equipment or material is listed in the specification followed by the word “or approved equal,” the Contractor may substitute product of equal quality from another manufacturer for consideration by the Engineer.

C. Conduit shall be as specified under Section 26 05 33.

PART 3 – EXECUTION:

3.01 PROTECTION AND CLEANING:

A. Protect all telecommunications work and products against damage during construction and pay the cost of repair or replacement of telecommunications products made necessary by failure to provide suitable safeguards or protection. After all work has been inspected and approved, thoroughly clean all equipment, provided under this work.

PART 4 – BASIS OF PAYMENT

4.01 METHOD OF MEASUREMENT

A. Communications Systems will be measured by the lump sum, complete and accepted. The Communications Systems limits shall be as shown or described in the Contract Documents.

4.02 BASIS OF PAYMENT

A. The Communications Systems limits shall be as shown or described in the Contract Documents, including all Division 27 Sections. Communications Systems will be paid for at the contract lump sum price. Payment for Electrical Systems will be under:

| Pay Item | | Pay Unit |
|---|---|---|
| DIV. 27 | Communications Systems | Lump Sum |

**END OF SECTION**

# SECTION 27 10 00 - STRUCTURED CABLING SYSTEM

All work and materials shall conform to the Contract Documents and the provisions of the State of Maine Department of Transportation Standard Specifications, Revision November 2014, with the following additions:

Add the following:

PART 1 – GENERAL:

1.01 SECTION INCLUDES:

A. This section of the specification includes the furnishing, installation, connection and testing of a complete Structured Cabling System (SCS). The SCS is defined as all required equipment and cabling including hardware, termination blocks, cross connect wire, patch panels, patch cords, telecommunication outlets, UTP fiber optic cable, and video cable installed and configured to provide a computer data, voice and video connectivity from each data, voice or video device to the network file server or voice network/switch designated as the service point of the local area network. Provide all equipment required to form a complete, operative, and coordinated system as shown on the drawings and specified herein. Components of the SCS shall include, but are not limited to, the following:
   1. Optical fiber cable.
   2. Optical fiber connectors.
   3. Optical fiber patch panels
   4. Telecommunications data network racks.
   5. Network patch panels.
   6. Telecommunications data network outlet jacks.
   7. Intra-building telecommunications cable.
   8. Network patch cords.

1.02 RELATED SECTIONS:

A. Section 27 00 00 – General Communications Requirements.

B. Section 26 05 26 – Grounding.

C. Section 26 05 29 – Supporting Devices.

D. Section 26 05 33 – Raceway and Boxes for Electrical Systems.

1.03 REFERENCES:

A. ANSI/TIA/EIA 568A - Electronic Industries Association Telecommunications Industry Association - Commercial Building Telecommunications Wiring Standards.

B. ANSI/TIA/EIA 568-A1 - Propagation Delay and Delay Skew specifications.

C. ANSI/TIA/EIA 569 - Commercial Building Standard for Telecommunications Pathways and Spaces.

D. ANSI/TIA/EIA TSB-67 - Transmission Performance Specifications for Field Testing of Unshielded. Twisted Pair Cabling Systems, October 1995.

E. ANSI/TIA/EIA TSB-72 - Centralized Optical Fiber Cabling Guidelines, October 1995.

F. ANSI/TIA/EIA TSB-75 - Additional Horizontal Cabling Practices for Open Offices.

G. ANSI/TIA/EIA 607 - Grounding and Bonding Requirements for Telecommunications in Commercial Buildings.

H. ANSI/TIA/EIA 606 - Administration Standard for the Telecommunications Infrastructure of Commercial Buildings.

I. Institute of Electrical and Electronics Engineers (IEEE)

1.04 QUALIFICATIONS:

A. Installer: Company specializing in the installation of telecommunications systems, including installation and certification of "Category 5e" cabling and optical fiber cable. Company shall have five (5) years (minimum) documented experience on completed projects. All work shall be performed and supervised by telecommunications technicians who are qualified to install voice, data and image cabling systems and to perform related tests. The telecommunications technicians employed shall be fully trained and qualified by the manufacturer of the test equipment for the installation. Evidence that the Contractor is a current certified installer of the manufacturer must be provided in writing prior to commencing work.

B. System: The cabling system shall conform to the current of industry standard ANSI/TIA/EIA 568A. Certification shall be provided that the system will support applications for which it is designed including Category 6 intra-building telecommunications cable performance.

1.05 QUALITY ASSURANCE:

A. Contractor Quality Assurance:
1. Provision of all manufactured components, installation, wiring, and testing shall be the responsibility of a single contractor.
2. Maintain the same person in charge of work throughout installation.
3. Supply and install any incidental equipment needed in order to result in a complete and operable system.
4. Verify correctness of parts lists and equipment model numbers and conformance of each component with manufacturer's specifications.
5. Unless otherwise specified, supply only new equipment, parts and material, and operate only as required for testing as part of installation procedure.

B. Manufacturer Quality Control for Telecommunications Data Network Systems
1. All systems components and products specified shall be supplied by a single manufacturer, with the exception data racks and other hardware that is not defined as part of the channel test configuration by TIA/EIA TSB67, Transmission Performance Specifications for Field Testing of unshielded Twisted-Pair Cabling Systems and shall be as specified herein. Unless the words "Or Approved Equal" are included, only the manufacturers listed will be considered.
2. Each system is to be fully tested upon completion of installation in accordance with PART 3 - EXECUTION of this specification.

1.06 SUBMITTALS:

A. Submit shop drawings and product data under provisions of Section 27 00 00.

B. Submit for review prior to the submission of any Submittal, an itemized list of manufacturers of material and equipment and of Subcontractors proposed to be used under this Section. Include a Schedule of anticipated submittal and anticipated lead times after release of reviewed Submittal.

C. Provide a Submittal Index, with column headings, that clearly identifies the information requested herein, for each and every item submitted. Each and every specification sheet submitted shall include a page number in the lower outside corner of the sheet, double sided specification sheets shall be identified by two ( 2 ) separate page numbers. The Submittal Index Column Headings shall identify the following minimum information:

Submittal *Page Number(s)* of specification sheet(s) for each item, *Description* of each item, *Manufacturer's* Name for each item, Manufacturer's *Model Number* for each item, *Quantity* of each item being provided.

1. Any submittal which does not include a submittal index that provides a minimum of the information requested herein shall be rejected without further review and returned to the applicable parties.

D. Equipment shall be of proper size for its allotted space. Equipment may be disassembled as required, where it does not invalidate the manufacturers' warranty, so that it can be installed through available window, door, or louver openings.

E. Indicate clearly all equipment, components or assemblies that are not Nationally Recognized Testing Laboratory (NRTL) listed or labeled. Failure to indicate otherwise implies NRTL listing or labeling. Products found not to be NRTL listed or labeled where such listing or labeling is available shall be replaced.

F. Product Data: Submit catalog data sheets or other published materials showing appearances, electrical ratings characteristics and connection requirements, performance characteristics, dimensions, weights, installation methods, and space requirements of equipment and their accessories, as listed below and required by the individual paragraphs:

1. Identification Methods
2. Grounding and Bonding
3. Test Report Formats
4. Test Equipment
5. Test Procedures

1.07 TRAINING:

A. Give detailed instructions, prior to the Substantial Completion of the work, to the responsible personnel designated by the Owner in the operation and maintenance of all work installed under this Section. A letter with two copies containing the name of the person or persons to whom the instructions were given and the dates of the instruction period shall be submitted to the Architect-Engineer at the completion of the project.

1.08 PROJECT RECORD DOCUMENTS:

A. Submit record documents under provisions of Section 27 00 00.

B. Accurately record location of telecommunications outlets.

1.09 PROJECT CONDITIONS:

A. Verify that field measurements are as shown on Drawings.

B. Wire and cable routing shown on Drawings is approximate unless dimensioned. Route wire and cable as required to meet Project Conditions. Include wire and cable lengths within 10 feet of length shown for all local data outlets.

C. Where wire and cable routing is not shown, and destination only is indicated, determine exact routing and lengths required.

D. PRIOR TO BEGINNING ANY WORK the Contractor shall coordinate the proposed layout of each IDF Closet and the MDF room as well as intended wiring layouts to confirm maximum allowable wiring drop distances as specified herein.

1.10 OPERATION AND MAINTENANCE DATA:

A. Submit data under provisions of Section 27 00 00 and Division 01.

B. Provide name, address and telephone number of the manufacturer's representative and Service Company for all items supplied so that the source of replacement parts and service can be readily obtained.
1. Include copies of manufacturer's and Installer's warranties and maintenance contracts and performance bonds properly executed and signed by an authorized representative.

C. Include copies of all test reports and certifications.

PART 2 – PRODUCTS:

2.01 UNSHIELDED TWISTED PAIR (UTP) CABLING SYSTEM:

A. Approved Manufacturers:
1. *Belden*
2. *CommScope*
3. *Berk-Tek*
4. *General Cable*
5. *Mohawk*
6. Substitutions: Or Approved Equal.

B. UTP Pin/pair Termination Assignment: The UTP cabling systems shall have TIA/EIA T568B pin/pair termination assignment. All conductors provided shall be properly and consistently terminated at both ends throughout the entire systems.

C. Horizontal Cable -Voice & Data:
1. Voice Cable shall be TIA/EIA Category 6 Unshielded Twisted Pair (UTP) cable, as specified.
2. Electrical Characteristics for 24 AWG Extended Frequency Category 5e cable:
a. DC Resistance (max) 8.9
b. DC Resistance Unbalanced (max) 3.0
c. Input Impedance, 1.0 to 100 MHz =100 +/- 15, 100 to 350MHz = 100 +/- 22
d. Characteristics Impedance, 1 to 350 MHz = 100 +/- 15%
e. ACR @ 100KHz, db (min) of 21
f. PS-ACR @ 100MHz, db (min) of 19
g. Delay Skew (max) ns/100m is 25
h. Nominal Velocity of Propagation (NVP), % speed of Light, 70
3. Electrical Characteristics:

| Frequency | Max. Atten. Db/100m | ELFEXT bd (min) | PS-ELFEXT bd (min) | PS-NEXT bd (min) | NEXT bd (min) | SLR db (min) | Return Loss db (min) |
|---|---|---|---|---|---|---|---|
| 772kHz | 1.8 | 66 | 63 | 70 | 72 | - | - |
| 1MHz | 2.0 | 64 | 61 | 68 | 70 | 24.5 | 20.0 |
| 4MHz | 4.1 | 52 | 49 | 59 | 61 | 24.5 | 23.0 |
| 8MHz | 5.8 | 46 | 43 | 54 | 56 | 24.5 | 24.5 |
| 10MHz | 6.5 | 44 | 41 | 53 | 55 | 24.5 | 25 |
| 16MHz | 8.2 | 40 | 37 | 50 | 52 | 24.5 | 25.0 |
| 20MHz | 9.3 | 38 | 35 | 48 | 50 | 24.5 | 25.0 |
| 25MHz | 10.4 | 36 | 33 | 47 | 49 | 24.0 | 24.3 |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| 31.25MHz | 11.7 | 34 | 31 | 45 | 47 | 23.5 | 23.6 |
| 62.5MHz | 17.0 | 28 | 25 | 41 | 43 | 22.0 | 21.5 |
| 100MHz | 22.0 | 24 | 21 | 38 | 40 | 21.0 | 20.1 |
| 155MHz | 28.1 | 20 | 17 | 35 | 37 | 20.1 | 18.8 |
| 200MHz | 32.4 | 18 | 15 | 33 | 35 | 19.5 | 18.0 |
| 300MHz | 41.0 | 14 | 11 | 31 | 33 | 18.6 | 16.8 |
| 350MHz | 44.9 | 13 | 10 | 30 | 32 | 18.3 | 16.3 |

4. Compliance of 24 AWG Extended Frequency Category 5e cable:
   a. ISO/IEC 11801
   b. ANSI/TIA/EIA 586-5 (Category 5E)
   c. ANSI/ICEAA S-90-661 (Category 5X-100)
   d. NEWA WC 63.1 (Category 5)
   e. UL Listed Type MPR/CMR
   f. (UL) CMG
5. Plenum rated cable - CMP rated jacket for Plenum applications.

D. Patch Panels
1. Patch panels shall be EIA nineteen inch (518mm), rack mounted, TIA/EIA Category 5e, UL Category 5e type patch panels with integral printed circuit board, color-coded, high density, IDC type terminations and 8 position modular jacks. Keyed jacks are not allowed. Jacks shall be able to withstand at least a minimum of 2000 mating cycles without any transmission degradation.

2.02 OPTICAL FIBER CABLE SYSTEM:

A. Approved Manufacturers:
1. *Belden*
2. *CommScope*
3. *Berk-Tek*
4. *Siecor*
5. *Optical Cable Corp.*
6. Substitutions: Or Approved Equal.

B. Fiber Optic Backbone Cable
1. Multimode fiber optic cable: Cable shall be NRTL certified to TIA/EIA 492CAAA, 492AAAA EIA/TIA 568B Series standard, TSB72 and ANSI X3T9.5 fiber optic specifications, 62.5/125 micron, 1300 nm, graded video, dual window 6 pair (12 strand) tight buffer, multimode distribution cable.
   a. Riser-rated multi-mode cable - OFNR jacket, distribution cable for Riser applications.
   b. The maximum attenuation measured at 23 degrees C. shall be 3.75 dB/km @ 850 nm and 1.5 dB/km @ 1300 nm. The minimum bandwidth shall be 160 MHZ @ 850 nm and 500 MHZ @ 1300 nm.
2. Modular Connectors and Couplers
   a. Fiber optic modular connectors/couplings shall be NRTL listed and TIA/EIA compliant, type "SC" terminations. Connectors and couplings shall be able to withstand at least a minimum of 2000 mating cycles without any transmission degradation. Maximum optical loss budget shall not exceed .75 dB per termination and 1.5 dB per mated pair.
   b. The connectors and couplings shall be compatible with the installed fiber optics: multi mode 62.5/125 micron optics.
   c. Fiber optic connectors shall be terminated by the following methods:
      1) Hot Melt
      2) Heat Cured Epoxy

3) Ultra Violet Cured Epoxy
4) Anaerobic
5) Mechanical Splice with Index Matching Gel

d. Fiber optic connectors and couplers shall be provided by a single Manufacturer.
e. Multimode connectors shall be beige in color.

3. Fiber Optic Patch Panels
   a. Patch panels shall be capable of terminating 12 pair (24 strands) of a fiber optic cable.
   b. Patch panels shall be rack mounted 1.75 inch (44mm) high EIA nineteen inch (518mm) wide, rack mounted, drawer type with integral cable management, patch panels pre-loaded with duplex SC couplings.
4. Fiber Optic Patch Cables
   a. Provide NRTL certified EIA/TIA 492AAAA, EIA/TIA 568B Series standard performance tested patch cables as required for a complete operational system. Patch cables shall be factory pre-connectorized, two strand, "SC" type connectors, tight buffer. Patch cables connectors shall be provided by the same manufacturers as the fiber optic connectors and couplings.
   b. Patch cables shall match the fiber optic system installed, multimode 62.5/125 micron.
   c. One strand of the patch cable shall have a distinguishing mark throughout its entire length to simplify the distinction between Transmitting (Tx) and Receiving (Rx) at the patching area. Color coded factory marked (Tx-Rx) connectors are preferred.
5. Fiber Optic Cable Management
   a. Each equipment rack shall have horizontal and vertical cable management panels and brackets.

D. Horizontal cable management shall be EIA nineteen inch (482mm) rack mounted 1.75 inch (44mm) high drawer panel with integral cable management and shall be provided for each fiber optic patch panel. This cable management drawer panel is for the fiber optic patch cables and is separate from the fiber optic patch panel drawer.

## 2.04 TELECOMMUNICATIONS DATA NETWORK RACKS:

A. Description: EIA/TIA 19-inch wide telecommunications rack, enclosure and accessories. Provide a complete assembly for mounting all telecommunications equipment within enclosures.

B. Floor Rack Manufacturers (Maintenance Building):
1. *Chatsworth* – F-Series Treaframe #F-D-1-A-1-1-2-C-C-2-1
2. Substitutions: Or Approved equal

C. Floor Rack Description: Enclosed rack with hinged front door.
1. Height: 80 in.
2. Width: 23.6 in.
3. Depth: 35.3 in.
4. Rail Style: Square punched
5. Front Door: Single, perforated metal
6. Rear Door: Single, perforated metal
7. Door Latches: Two-point cam latches with lock
8. Color: Black
9. Top Panel: 4 network cable openings
10. Side Panels: Solid, 1-each

## 2.05 SURGE PROTECTED POWER STRIP:

A. Manufacturers:
1. *Wiremold*
2. *Sentrex*
3. *TrippLite*
4. *S.L. Weber*

5. Substitutions: Or approved equal

B. Surge protected power strip shall be rack mount type.

C. Surge protected power strip with six NEMA 5-15R outlets 15 amp capacity, 120 volts, UL 1449 listed, maximum surge current of 33,000 amps, clamping voltage of 260 volts, maximum 5 picosecond response time, resettable overload circuit breaker, surge suppression warning light, surge protection for line to neutral, line to ground, neutral to ground, EMI/RFI filters. One required for each load up to 1200 watts (total of individual equipment loads).

2.10 FLOOR MOUNTED UPS:

A. Manufacturers:
1. *APC* Model SUA1000RM2U.
2. Substitutions: Or approved equal.

D. Description: Floor mounted uninterruptible power supply unit rated to operate 330 watts for 10.
1. Output Capacity: 330 watts/550 VA.
2. Nominal Output Voltage: 120 volts.
3. Output Connections: (4) NEMA 5-15R (battery).
4. Input Voltage: 120 volts.
5. Input Connections: NEMA 5-15P (6 foot cord).
6. Battery Type: Maintenance-free sealed lead acid.
7. Battery Recharge Time: 24 hours.

2.11 TELECOMMUNICATIONS DATA NETWORK OUTLET JACKS:

A. Manufacturers:
1. *Leviton* "Quickport" Series
2. *AMP*
3. *Hubbell*
4. *Ortronics*
5. *Panduit*
6. Substitutions: Or approved equal.

B. Each Outlet shall consist of the following:
1. Single gang or dual gang face plate shall be thermoplastic (nylon) with number of voice, data, video and sound jacks as indicated in the Specifications and Drawings.
2. Electrical Subcontractor shall provide 4" square backboxes for all Single gang and Dual gang outlet face plates. Provide single gang and dual gang plaster rings for the specified Single gang and Dual gang outlet face plates.
3. Refer to Electrical drawings for placement of Work Area Outlets.
4. Outlets:
a. Data Outlet - shall consist of two (2) white color modular Category 6 RJ-45 8-position connectors mounted on single gang faceplate, with the capabilities listed below. Provide blanks for faceplate
1) Two (2) RJ45 connectors shall be used for data and cabled to relevant IDF/MDF patch panel with two (2) 4-pair Category 6 unshielded twisted pair cables.

2.11 BONDING AND GROUNDING JUMPER CABLE:

A. Manufacturer: Provide products meeting the requirements of the Drawings and Specifications from one of the following manufacturers:
1. *Belden* (No. 8669)

B. Jumper cable shall be hollow braided, 60 amp capacity, copper.

C. Provide equal conduct of as described in "B" above for aluminum equipment.

D. Jumpers shall have compression or exothermic type terminals on both ends of cables. Terminals shall be compatible with jumper cable material and equipment material in order to not have any degenerative reaction.

2.12 EQUIPMENT/CABLE IDENTIFICATION

A. All equipment and cabling shall be properly identified by means of clear and concise labels. All identification shall meet or exceed the minimum requirements of EIA/TIA568A, 606 and BICSI standards.

B. Permanently label, using pre-printed labels, all cables and terminations. Handwritten or embossed type labels are specifically prohibited
1. Label all equipment racks, panels and cross connect blocks uniquely.
2. Label patch panels and cross connect blocks numerically, top-to-bottom.
3. Label cable segments by designated incoming cable.

C. Labels
1. Provide color-coded labels with CODED identifiers as follows:
a. Conduits and other pathways shall be labeled at all end points including equipment rooms, telecommunications closets, pull boxes and the like. Provide adhesive labels on the conduit with at least one label within each space that the conduit passes through. Labels shall be attached by means of the label adhesive and color-coded pressure-sensitive tape wrapped around conduit at least one and one half times.
b. Cables shall have double lapped adhesive labels at all end points including Work Area Outlets, telecommunication closets and equipment rooms. Cables shall also have factory imprinted manufacturer's name, part number and the NRTL certified UL EIA/TIA category rating designation at a minimum of two foot (610mm) intervals along the entire length of the cable.
c. Termination hardware shall have adhesive labels on both the front and rear (if accessible) of the hardware.
d. Insert Labels shall be provided in each Work Area Outlet patch panel termination hardware (top of jack) cross connect blocks (edge of block) and the like.
e. Outlet boxes, junction boxes and the like shall have adhesive labels attached on the inside and located where visible from the outlet opening.
f. Grounding and bonding system shall have engraved labels at each ground bar and backbone grounding cable as it passes through each room. Each bonding jumper shall have heat shrink labels at all end points.
2. Labels shall be constructed of approved material in order to meet the legibility, defacement, adhesion (adhesive labels only), and exposure requirements of UL 969. All labels shall be mounted horizontally in order to be read from left to right.
a. Adhesive Labels shall be constructed of color-coded paper with a clear polyester over laminate, Brady USA, Inc. PermaShield, RayChem TMS or approved equal. Adhesive material used shall be approved for material being attached to, typeface shall be medium density, Helvetica, 1/8 inch (3mm) high black characters unless indicated otherwise.
b. Heat-Shrink Labels shall be constructed of color-coded flame retardant, heat shrinkable polyolefin, Brady USA, Inc, RayChem TMS or approved equal. Typeface shall be medium density, Helvetica 1/8 inch (3mm) high black characters unless indicated otherwise.
c. Insert Labels shall be constructed of color-coded paper inserted behind clear plastic label holder. Work Area Outlets shall have white color labels inserted behind a flush mounted (recessed) plastic window. Patch panels and cross connect block may have continuous clear plastic insertion strips label holders with label strips. Label strips shall have distinct markings to indicate where one jack or cross connect ends and the adjacent one starts. Typeface shall be medium density, Helvetica 1/8 inch (3mm) high black characters unless indicated otherwise.

d. Each Network Interface Outlet shall have each of its eight-position modular jacks provided with a color-coded, embossed modular ICON. The telephone jack icon shall be red and shall have either the word "VOICE" or a telephone logo. The data jack icon shall be blue and shall have either the word "DATA" or a computer logo. The Network Interface Outlet jack provided shall also be able to have additional ICON types such as but not limited to "LAN1 " or "LAN2" and the like available for use. Coordinate with the Owner through the Architect-Engineer, the specific icon's required for this project.

e. Handwritten or embossed labels are not allowed.

2.13 CABLE SUPPORTS

A. Wiring cable supports shall be as specified under Section 26 05 29.

2.14 PATCH CORDS

A. Patch cords shall match the characteristics of UTP cable and shall be in lengths as required. Provide terminations at each cable end.
   1. Test each cord according to the requirements listed under paragraph 3.04.
   2. Provide one patch cord for each switch service cable.

PART 3 – EXECUTION:

3.01 EXAMINATION:

A. Verify that surfaces are ready to receive work.

B. Verify that field measurements are as shown on Drawings.

C. Beginning of installation means installer accepts existing conditions.

3.02 TELECOMMUNICATIONS DATA NETWORK OUTLET JACKS:

A. Install and connect data outlet jacks in boxes at locations indicated on Drawings.

B. Install outlet jacks in accordance with manufacturer’s instructions.

3.03 TELECOMMUNICATIONS DATA NETWORK WIRING:

A. Provide continuous, unspliced, UTP horizontal drop cable from data/voice outlets to owner-furnished network switches located above the first floor ceiling. Also provide continuous, unspliced UTP cables from the owner-furnished network switches to wiring patch panels in equipment racks.

B. Optical fiber cable and intra-building telecommunications cable shall be handled, installed, and supported in conformance with manufacturer’s recommendation and EIA/TIA 569. During the laying of cable, the Contractor shall take care not to over stress the cable. After cables are installed, the Contractor shall make sure that all parts of the cable are supported properly and are stress-free at both ends and throughput their length.

C. The Contractor shall insure that the installed bending radius of optical fiber cable and intra-building telecommunications conforms to the manufacturer’s requirements. At no location shall a cable’s static or dynamic bending radius be exceeded.

D. Conceal intra-building telecommunications cable, above accessible ceilings or in walls. All telecommunications cables shall be run in conduit.

E. Do not make splices in optical fiber cable or intra-building telecommunications cable.

F. All 4 pairs of each unshielded twisted pair (UTP) intra-building telecommunications cable shall be terminated on a single port. The splitting of cable pairs between different jacks is not permitted.

G. Terminating intra-building telecommunications cable pairs (Category 6) shall have a maximum of 13mm (0.5 inches) of cable untwisted before termination.

3.04 CABLE TESTING:

A. Sub-contract with a independent testing company to test and certify all intra-building telecommunications cabling to identify pair reversal, crossed pairs, opens and shorts. Testing shall comply with ANSI/TIA/EIA 568A, TSB67. Perform test using a network analyzer, Microtest Penta scanner, or approved equal. Test results shall be documented, corrections implemented and re-testing conducted and documented. In addition, documentation shall be presented to show the length of the cable between outlet jack and the telecommunications rack. Submit written test results for review and acceptance.

B. Attenuation testing for optical fiber cable shall be performed after the fiber is installed. Provide documentation of test results.

3.05 GROUNDING

A. Each equipment rack shall be connected to the telecommunications ground as specified in Section 26 05 26 and in accordance with applicable code requirements as per EIA/TIA 607. Communication bonding and grounding shall be in accordance with the NEC® and NFPA. Horizontal cables shall be grounded in compliance with ANSI/NFPA 70 and local requirements and practices. Horizontal equipment includes cross connect frames, patch panels and racks, active telecommunication equipment and test apparatus and equipment. Provide a Telecommunications Bonding Backbone utilizing a #6-AWG or larger bonding conductor that provides direct bonding between equipment rooms and telecommunications closets. This is part of the grounding and bonding infrastructure (part of the telecommunications pathways and spaces in the building structure), and is independent of equipment or cable. All data equipment shall be properly grounded in the Telecommunications Rooms per manufacturers requirements.

**END OF SECTION**

# SECTION 28 00 00 - GENERAL ELECTRONIC SAFETY AND SECURITY REQUIREMENTS

All work and materials shall conform to the Contract Documents and the provisions of the State of Maine Department of Transportation Standard Specifications, Revision November 2014, with the following additions:

Add the following:

PART 1 – GENERAL:

1.01 SECTION INCLUDES:

A. Provide wiring to facilitate the installation of door access control equipment and surveillance cameras being provided under a separate contract by the owner with others.

B. Provide a complete fire alarm system including all materials, labor, tools, transportation, incidentals, and appurtenances to complete in every detail and leave in working order all items of work called for herein or shown on the accompanying drawings.

C. The Contractor for this work is referred to Bidding Requirements, General Conditions, Special Conditions, Temporary Services and other pertinent Sections of these Specifications.

1.02 RELATED SECTIONS:

A. Section 28 13 00 – Door Access Control Systems.

B. Section 28 23 00 – Surveillance System.

C. Section 28 32 13 – Fire Alarm and Detection Systems.

1.03 REFERENCES:

A. ANSI/NFPA 70 - National Electrical Code.

B. ANSI/NFPA 72 - National Fire Code.

C. ANSI/NFPA 101 - Life Safety Code.

D. OSHA 1910 - Occupational Safety and Health Act.

E. ADA - Americans with Disabilities Act.

1.04 GENERAL REQUIREMENTS:

A. Contractor shall read the entire specifications covering other branches of work. He is responsible for coordination of his work with work performed by other trades.

B. Consult all Contract drawings which may affect the location of any equipment or apparatus furnished under this work and make minor adjustments in location as necessary to secure coordination. Contractor shall consult architectural interior elevations for mounting heights of fire alarm devices.

C. System layout is schematic and exact locations shall be determined by structural and other conditions. This shall not be construed to mean that the design of the system may be arbitrarily changed. The equipment layout is to fit into the building as constructed and to coordinate with equipment included under other Divisions of work.

D. Contractor shall contact the Owner's Representative immediately if he notices any discrepancies or omissions in either the drawings or the specifications, or if there are any questions regarding the meaning or intent thereof.

E. Submit all changes, other than minor adjustments, to the Architect for approval before proceeding with the work.

1.05 SUBMITTALS:

A. Submit under provisions of the following.

B. Submittal shall include complete Specifications, including type of materials, electrical characteristics, capacities, performance and power requirements to determine compliance with Contract Documents. All data submitted shall be complete and shall apply only to this specific project. All extraneous material shall be deleted or marked out. Items to be supplied shall be specifically indicated using a method that will be visible after photocopying.

C. Regardless of any information included in the submittal submitted for review, the requirements of the Drawings and Specifications shall not be superseded in any way by the review. Review by the Architect-Engineer does not relieve responsibility for submittal errors or from meeting the requirements of the Contract Documents.

D. It is intended that Submittal data be complete and accurate at the first submission. If the Submittal is returned marked "Resubmit" only one additional submission will be permitted.

E. Submit related Submittal at one time. SUBMIT ALL ITEMS IN A SPECIFICATION SECTION AT THE SAME TIME. Incomplete submittal will be held until a complete submittal is accumulated or may be rejected without further review and returned to the applicable parties. Include a copy of the Specification Paragraphs pertaining to the items submitted.

F. If proposed equipment deviates from the Specifications or Drawings, indicate in writing on Company letterhead those differences and provide sufficient data to justify acceptance. FAILURE TO INDICATE DEVIATIONS OR SUBSTITUTIONS IMPLIES FULL COMPLIANCE WITH DRAWINGS AND SPECIFICATIONS.

G. The term "by others" or similar wording shall not be used on Submittal. Submittal shall state by whom related items of work are to be provided. Where not indicated, it is implied that the work or item is provided under this Section.

H. Shop Drawings: Provide shop drawings as required by the individual Specification Sections. Submit shop drawings indicating physical size and arrangement, (plans and elevations) construction details, provisions for conduits, access requirements for installation and maintenance, finishes, and materials used in fabrication for all equipment. Supplement shop drawings with wiring diagrams for all systems with wiring connections for multiple components.

I. Submittals shall be made as paper copies. Submittals transmitted only by electronic email shall not be accepted.

1.06 REGULATORY REQUIREMENTS:

A. Complete installation shall conform with all applicable Federal, State and Local laws, Codes and Ordinances, included but not limited to latest approved editions of the following:
   1. State Building Codes.
   2. Specific Construction Safety Requirements, State Industrial Commission.
   3. National Electrical Code - NFPA 70.
   4. National Fire Code - NFPA 72.

5. Life Safety Code - NFPA 101.
6. Occupational Safety and Health Act (OSHA) of 1971 and all amendments thereto.
7. ADA - Handicap Accessibility Requirements.
8. City of Portland Fire Department Regulations.

B. Nothing contained in the drawings and specifications shall be construed to conflict with these laws, codes and ordinances, and they are thereby included in these specifications. All work shall comply with the 2011 edition of NFPA 70, The National Electrical Code, and with the 2010 edition of NFPA 72, The National Fire Alarm Code. It shall be the Contractor's responsibility to assure that all work is in full compliance with applicable codes.

C. The Contractor shall visit the site to become familiar with all existing conditions affecting this work. No claim will be recognized for extra compensation due to failure of contractor to familiarize himself/herself with the conditions and extent of proposed work.

D. Obtain and pay for all necessary permits. Request inspections from authority having jurisdiction.

1.07 RECORD DRAWINGS:

A. Record any changes in location of equipment items, system devices, and similar construction items on a set of prints and deliver them to the Owner's Representative upon completion of the work.

1.08 OPERATING AND MAINTENANCE INSTRUCTIONS

A. Provide a Complete Instruction and Maintenance Manual: Prepare in the form of an instructional manual for use by Owner's personnel. Provide one (1) draft copy and two (2) final copies.
   1. Format:
      a. Size: 8-1/2" x 11", 20 lb. minimum weight white paper for typed pages, either manufacturer's printed data, or neatly typewritten.
      b. Drawings: Provide reinforced punched binder tab, bind in with text. Fold larger drawings to size of text pages. Clear plastic "binding tape" (not "Scotch" tape) applied to edge of sheet and then punched is acceptable.
      c. Single-sheet product literature and contractor-prepared pages: Provide reinforced punched binder tab. Clear plastic "binding tape" (not "Scotch" tape) applied to edge of page and then punched is acceptable.
      d. Provide indexed tabs and flyleaf for each separate product, or each piece of operating equipment. Include typed description of product, and major component parts of equipment.
      e. Cover: Identify each volume with typed or printed title "OPERATING AND MAINTENANCE INSTRUCTIONS".
      f. Binders:
         1) Commercial quality three-ring binders with durable and cleanable plastic covers, 1" minimum, 2" maximum ring size.
         2) When multiple binders are used, collate the data into related consistent groupings and provide a spine label that includes the volume number and contents of the binder.

B. Provide content as listed in separate Sections of Division 28 of these specifications.

1.09 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 Architect/Engineer before proceeding.

1.10 COORDINATION WITH WORK PROVIDED UNDER DIVISION 26:

A. Work shall be coordinated with associated work being provided under Division 26. Work provided under Division 26 shall include the following:
   1. Raceway and Boxes for wiring.
   2. 120-volt power circuits.

1.11 COORDINATION WITH WORK PROVIDED UNDER OTHER DIVISIONS:

A. Division 27 - Telecommunications: Provide telephone wiring and connections to the fire alarm control panel as specified under Section 27 10 00.

1.12 SUBSTANTIAL AND FINAL COMPLETION

A. Refer to General Conditions and Supplementary Conditions.

B. Substantial Completion shall not be considered unless all systems are tested and verified for adherence with Contract Documents and any work remaining is less than one percent of the total Contract Value of this Section.
   1. Record Drawings, Operation and Maintenance Manuals, Acceptance Demonstrations, Owner personnel training, spare parts or extra materials required, test reports, warranties and certifications of installation inspections shall be submitted and accepted prior to Substantial Completion.

C. Final Completion shall be when all work under this Section is completed as defined by the Contract Documents and accepted by the Architect-Engineer.

D. When Architect-Engineer determines Work is complete, close out submittals will be considered.

PART 2 - PRODUCTS

2.01 MATERIALS

A. Furnish new and undeteriorated materials and of a quality not less than what is specified.

B. The selection of materials and equipment to be furnished shall be governed by the following:
   1. Where single trade name, brand of manufacturer or material is listed in the specification, the exact equipment listed shall be used in the bid.
   2. Where more than one name is listed, Contractor may select any one of the several brands specified.
   3. Where trade name, brand of manufacturer of equipment or material is listed in the specification followed by the word “or approved equal,” the Contractor may substitute product of equal quality from another manufacturer for consideration by the Engineer.

C. Conduit shall be as specified under Section 26 05 33.

PART 3 – EXECUTION:

3.01 PROTECTION AND CLEANING:

A. Protect all electrical work and products against damage during construction and pay the cost of repair or replacement of electrical products made necessary by failure to provide suitable safeguards or protection.

B. After all work has been inspected and approved, thoroughly clean all equipment, provided under this work.

PART 4 – BASIS OF PAYMENT

4.01 METHOD OF MEASUREMENT

A. Safety and Security Systems will be measured by the lump sum, complete and accepted. The Safety and Security Systems limits shall be as shown or described in the Contract Documents.

4.02 BASIS OF PAYMENT

A. The Safety and Security System limits shall be as shown or described in the Contract Documents, including all Division 28 Sections. Safety and Security Systems will be paid for at the contract lump sum price. Payment for Safety and Security Systems will be under:

| Pay Item | | Pay Unit |
|---|---|---|
| DIV. 28 | Safety and Security Systems | Lump Sum |

**END OF SECTION**

# SECTION 28 13 00 - DOOR ACCESS CONTROL SYSTEM

All work and materials shall conform to the Contract Documents and the provisions of the State of Maine Department of Transportation Standard Specifications, Revision November 2014, with the following additions:

Add the following:

PART 1 – GENERAL:

1.01 SECTION INCLUDES:

A. The Owner will contract separately with others to provide a complete, fully distributed, solid state IP network system consisting of a network controller with web based user interface, network connection cards for device termination, door access card readers, request-to-exit devices, door position switches, and door release control station.

B. Contractor shall provide wiring for all system components.

1.02 WORK PROVIDED UNDER OTHER DIVISIONS:

A. Power circuits, including 120VAC outlets and wiring, shall be provided under Division 26.

B. Raceway and boxes shall be provided under Division 26.

1.03 RELATED SECTIONS:

A. Section 26 05 33 – Raceway and Boxes.

B. Section 26 05 19 - Building Wire and Cable.

C. Section 27 10 00 – Structured Cabling System.

1.04 REFERENCES:

A. National Fire Protection Association (NFPA): NFPA 70 - National Electrical Code.

B. Underwriters Laboratories Incorporated (UL):

1.05 REGULATORY REQUIREMENTS:

A. Comply with requirements of NFPA 70.

B. Comply with applicable UL Standards.

1.06 SUBMITTALS:

A. Submit product data for system wiring under provisions of Section 28 00 00.

1.07 PROJECT RECORD DRAWINGS

A. Submit documents under provisions of Section 28 00 00.

B. Record actual locations and devices, and routing of access control wiring.

1.08 COORDINATION:

A. The Contractor shall be responsible for coordinating all wiring methods with the Owner's system supplier/installer prior to installation.

PART 2 - PRODUCTS

2.01 SYSTEM WIRING:

A. Low voltage cable shall consist of 4C/#22 and 4C/#18 cables.

PART 3 – EXECUTION:

3.01 EXAMINATION:

A. Verify that field measurements, surfaces, substrates and conditions are as required, and ready to receive Work.

B. 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.

C. By beginning Work, Contractor accepts conditions and assumes responsibility for correcting unsuitable conditions encountered at no additional cost.

3.02 INSTALLATION:

A. Install system according to Owner's system supplier/installer's instructions.

B. Splices, Taps, and Terminations: Make splices, taps, and terminations on numbered terminal strips in junction, pull and outlet boxes, terminal cabinets, and equipment enclosures.

C. Identification of Conductors and Cables: Color-code conductors and apply wire and cable marking tape to designate wires and cables so media are identified and coordinated with system wiring diagrams.

D. Extend low voltage system cables from the location of the control equipment in the Office Building Security Office 105 to serve card readers, door locks, electric hinges, door position switches, and request-to-exit devices at each door as indicated on the plans. Consult Owner's system supplier/installer for exact locations of system components. Leave six feet of slack cable at each end for terminations by Owner's system supplier/installer.

3.03 FIELD QUALITY CONTROL:

A. Inspection: test all conductors for proper continuity.

**END OF SECTION**

# SECTION 28 31 13 - FIRE DETECTION AND ALARM SYSTEM

All work and materials shall conform to the Contract Documents and the provisions of the State of Maine Department of Transportation Standard Specifications, Revision November 2014, with the following additions:

Add the following:

PART 1 - GENERAL

1.01 RELATED SECTIONS

B. Section 21 00 00 - Fire Suppression.

1.02 DESCRIPTION:

A. The system shall conform to all requirements listed in the latest edition of the City of Portland Standard for Signaling Systems for the Protection of Life and Property. The Contractor shall be responsible for assuring that all operational features of the fire alarm system meet the City's listed standards.

B. The Contractor shall be responsible for obtaining and paying for the City of Portland Fire Alarm Permit. All work associated with the fire alarm system shall be provided in full conformance with the latest edition of the City of Portland Fire Alarm Standards.

C. This section of the specification includes the furnishing, installation, connection and testing of the microprocessor controlled, intelligent reporting fire alarm equipment required to form complete, operative, coordinated systems. They shall include, but not be limited to, alarm initiating devices, alarm notification appliances, Fire Alarm Control Panels (FACP), auxiliary control devices, annunciators, and wiring as shown on the drawings and specified herein.

D. The fire alarm systems shall comply with requirements of NFPA Standard 72 for Protected Premises Signaling Systems except as modified and supplemented by this specification. The systems shall be electrically supervised and monitor the integrity of all conductors.

E. The fire alarm systems shall be manufactured by an ISO 9001 certified company and meet the requirements of BS EN9001: ANSI/ASQC Q9001-1994.

F. The FACPs and peripheral devices shall be manufactured 100% by a single U.S. manufacturer (or division thereof).

G. The systems and its components shall be Underwriters Laboratories, Inc. listed under the appropriate UL testing standard as listed herein for fire alarm applications and the installation shall be in compliance with the UL listing.

H. The installing company shall employ NICET (minimum Level II Fire Alarm Technology) technicians on site to guide the final checkout and to ensure the systems integrity.

1.03 SCOPE:

A. A new intelligent reporting, microprocessor controlled fire detection system shall be installed in accordance to the project specifications and drawings at the existing Maintenance Building, and at the new Office Building.

B. Basic Performance:
1. Alarm, trouble and supervisory signals from all intelligent reporting devices shall be encoded on NFPA Style 4 (Class B) Signaling Line Circuits (SLC).
2. Initiation Device Circuits (IDC) shall be wired Class A (NFPA Style D) as part of an addressable device connected by the SLC Circuit.
3. Notification Appliance Circuits (NAC) shall be wired Class A (NFPA Style Z) as part of an addressable device connected by the SLC Circuit.
4. On Style 6 or 7 (Class A) configurations a single ground fault or open circuit on the system Signaling Line Circuit shall not cause system malfunction, loss of operating power or the ability to report an alarm.
5. Alarm signals arriving at the FACP shall not be lost following a primary power failure (or outage) until the alarm signal is processed and recorded.
6. NAC speaker circuits shall be arranged such that there is a minimum of one speaker circuit per floor of the building or smoke zone which ever is greater.
7. NAC speaker circuits and control equipment shall be arranged such that loss of any one (1) speaker circuit will not cause the loss of any other speaker circuit in the system.

1.04. BASIC SYSTEM FUNCTIONAL OPERATION

A. When a fire alarm condition is detected and reported by one of the system initiating devices, the following functions shall immediately occur:
1. The system alarm LED on the system display shall flash at the respective control panel.
2. A local piezo electric signal in the respective control panel shall sound.
3. A backlit LCD display shall indicate all information associated with the fire alarm condition, including the type of alarm point and its location within the protected premises, at the respective control panel.
4. All system output programs assigned via control-by-event interlock programming to be activated by the particular point in alarm shall be executed, and the associated system outputs (notification appliances and/or relays) shall be activated.

1.05 SUBMITTALS

A. General:
1. Submittals shall be made in accordance with Section 28 00 00.
2. All references to manufacturer's model numbers and other pertinent information herein is intended to establish minimum standards of performance, function and quality. Equivalent compatible UL-listed equipment from other manufacturers may be substituted for the specified equipment as long as the minimum standards are met.
3. For equipment other than that specified, the contractor shall supply proof that such substitute equipment equals or exceeds the features, functions, performance, and quality of the specified equipment.

B. Shop Drawings:
1. Sufficient information, clearly presented, shall be included to determine compliance with drawings and specifications.
2. Include manufacturer's name(s), model numbers, ratings, power requirements, equipment layout, device arrangement, complete wiring point-to-point diagrams, and conduit layouts.
3. Show annunciator layout, configurations, and terminations.

C. Manuals:
1. Submit simultaneously with the shop drawings, complete operating and maintenance manuals listing the manufacturer's name(s), including technical data sheets.
2. Wiring diagrams shall indicate internal wiring for each device and the interconnections between the items of equipment.
3. Provide a clear and concise description of operation that gives, in detail, the information required to properly operate the equipment and system.

D. Software Modifications:
1. Provide the services of a factory trained and authorized technician to perform all system software modifications, upgrades or changes. Response time of the technician to the site shall not exceed 4 hours.
2. Provide all hardware, software, programming tools and documentation necessary to modify the fire alarm system on site. Modification includes addition and deletion of devices, circuits, zones and changes to system operation and custom label changes for devices or zones. The system structure and software shall place no limit on the type or extent of software modifications on-site.

E. Certifications:
1. Together with the shop drawing submittal, submit a certification from the major equipment manufacturer indicating that the proposed supervisor of the installation and the proposed performer of contract maintenance is an authorized representative of the major equipment manufacturer. Include names and addresses in the certification.

1.06 WARANTY:

A. All work performed and all material and equipment furnished under this contract shall be free from defects and shall remain so for a period of at least one (1) year from the date of acceptance. The full cost of maintenance, labor and materials required to correct any defect during this one year period shall be included in the submittal bid.

1.07 POST CONTRACT MAINTENANCE:

A. Complete maintenance and repair service for the fire alarm system shall be available from a factory trained authorized representative of the manufacturer of the major equipment for a period of five (5) years after expiration of the guaranty.

1.08 POST CONTRACT EXPANSIONS:

A. The contractor shall have the ability to provide parts and labor to expand the system specified, if so requested, for a period of five (5) years from the date of acceptance.

B. As part of the submittal, include a quotation for all parts and material, and all installation and test labor as needed to increase the number of intelligent or addressable devices by ten percent (10%). This quotation shall include intelligent smoke detectors, intelligent heat detectors, addressable manual stations, addressable monitor modules and addressable modules equal in number to one tenth of the number required to meet this specification (list actual quantity of each type).

C. The quotation shall include installation, test labor, and labor to reprogram the systems for this 10% expansion. If additional FACP hardware is required, include the material and labor necessary to install this hardware.

D. Do not include cost of conduit or wire or the cost to install conduit or wire except for labor to make final connections at the FACPs and at each intelligent addressable device. Do not include the cost of conventional peripherals or the cost of initiating devices or notification appliances connected to the addressable monitor/control modules.

1.09 APPLICABLE STANDARDS AND SPECIFICATIONS:

A. The specifications and standards listed below form a part of this specification. The system shall fully comply with the latest issue of these standards, if applicable.
1. NFPA 13 Sprinkler Systems
2. NFPA 70 National Electrical Code
3. NFPA 72 National Fire Alarm Code

4. NFPA 101 Life Safety Code

B. Underwriters Laboratories Inc. (UL) - USA:
1. No. 268 Smoke Detectors for Fire Protective Signaling Systems
2. No. 864 Control Units for Fire Protective Signaling Systems
3. No. 268A Smoke Detectors for Duct Applications
4. No. 521 Heat Detectors for Fire Protective Signaling Systems
5. No. 464 Audible Signaling Appliances
6. No. 38 Manually Actuated Signaling Boxes
7. No. 346 Waterflow Indicators for Fire Protective Signaling Systems
8. No. 1076 Control Units for Burglar Alarm Proprietary Protective Signaling Systems
9. No. 1971 Visual Notification Appliances

C. Local and State Building Codes.

D. All requirements of the Authority Having Jurisdiction (AHJ).

1.10 APPROVALS:

A. The system shall have proper listing and/or approval from the following nationally recognized agencies:
1. UL Underwriters Laboratories Inc

B. The fire alarm control panel shall meet UL Standard 864 (Control Units) and UL Standard 1076 (Proprietary Burglar Alarm Systems).

PART 2 - PRODUCTS

2.01 EQUIPMENT AND MATERIAL, GENERAL:

A. All equipment and components shall be new, and the manufacturer's current model. The materials, appliances, equipment and devices shall be tested and listed by a nationally recognized approvals agency for use as part of a protective signaling system, meeting the National Fire Alarm Code.

B. All equipment and components shall be installed in strict compliance with manufacturers' recommendations. Consult the manufacturer's installation manuals for all wiring diagrams, schematics, physical equipment sizes, etc., before beginning system installation.

C. All equipment shall be attached to walls and ceiling/floor assemblies and shall be held firmly in place (e.g., detectors shall not be supported solely by suspended ceilings). Fasteners and supports shall be adequate to support the required load.

2.02 CONDUIT AND WIRE:

A. Conduit:
1. Conduit shall be in accordance with The National Electrical Code (NEC), local and state requirements.
2. All wiring within the Maintenance Building, where there are no suspended ceilings, shall be installed in conduit or raceway. Conduit fill shall not exceed 40 percent of interior cross sectional area where three or more cables are contained within a single conduit.
3. Cable must be separated from any open conductors of power, or Class 1 circuits, and shall not be placed in any conduit, junction box or raceway containing these conductors, per NEC Article 760-55.
4. Wiring for 24 volt DC control, alarm notification, emergency communication and similar power-limited auxiliary functions may be run in the same conduit as initiating and signaling line circuits. All circuits shall be provided with transient suppression devices and the system shall be designed

to permit simultaneous operation of all circuits without interference or loss of signals.

5. Conduit shall not enter the fire alarm control panel, or any other remotely mounted control panel equipment or backboxes, except where conduit entry is specified by the FACP manufacturer.
6. Conduit shall be 3/4-inch (19.1 mm) minimum.

B. Wire:

1. All fire alarm system wiring shall be new.
2. Wiring shall be in accordance with local, state and national codes (e.g., NEC Article 760) and as recommended by the manufacturer of the fire alarm system. Number and size of conductors shall be as recommended by the fire alarm system manufacturer, but not less than 18 AWG (1.02 mm) for Initiating Device Circuits and Signaling Line Circuits, and 14 AWG (1.63 mm) for Notification Appliance Circuits.
3. All wire and cable shall be listed and/or approved by a recognized testing agency for use with a protective signaling system.
4. Wire and cable not installed in conduit shall have a fire resistance rating suitable for the installation as indicated in NFPA 70 (e.g., FPLR).
5. Wiring used for the multiplex communication circuit (SLC) shall be twisted and unshielded and support a minimum wiring distance of 12,500 feet. The design of the system shall permit use of IDC and NAC wiring in the same conduit with the SLC communication circuit.
6. All field wiring shall be electrically supervised for open circuit and ground fault.
7. The fire alarm control panel shall be capable of t-tapping Class B (NFPA Style 4) Signaling Line Circuits (SLCs). Systems that do not allow or have restrictions in, for example, the amount of t-taps, length of t-taps etc., are not acceptable.

C. Terminal Boxes, Junction Boxes and Cabinets: All boxes and cabinets shall be UL listed for their use and purpose.

D. Initiating circuits shall be arranged to serve like categories (manual, smoke, waterflow). Mixed category circuitry shall not be permitted except on signaling line circuits connected to intelligent reporting devices.

E. The fire alarm control panels shall be connected to a separate dedicated branch circuit, maximum 20 amperes. This circuit shall be labeled at the main power distribution panel as FIRE ALARM. Fire alarm control panel primary power wiring shall be 12 AWG. The control panel cabinets shall be grounded securely to either a cold water pipe or grounding rod.

## 2.03 MAIN FIRE ALARM CONTROL PANELS

A. Main FACPs shall be a *Notifier* Model NFS-320, or approved equal, and shall contain a microprocessor based Central Processing Unit (CPU) and power supply in an economical space saving single board design. The CPU shall communicate with and control the following types of equipment used to make up the system: intelligent addressable smoke and thermal (heat) detectors, addressable modules, printer, annunciators, and other system controlled devices.

B. Operator Control:

1. Acknowledge Switch:
   a. Activation of the control panel acknowledge switch in response to new alarms and/or troubles shall silence the local panel piezo electric signal and change the alarm and trouble LEDs from flashing mode to steady-ON mode. If multiple alarm or trouble conditions exist, depression of this switch shall advance the LCD display to the next alarm or trouble condition.
   b. Depression of the Acknowledge switch shall also silence all remote annunciator piezo sounders.
2. Alarm Silence Switch: Activation of the alarm silence switch shall cause all programmed alarm notification appliances and relays to return to the normal condition after an alarm condition. The selection of notification circuits and relays that are silenceable by this switch shall be fully field programmable within the confines of all applicable standards. The FACP software shall include

silence inhibit and auto-silence timers.

3. Alarm Activate (Drill) Switch: The Alarm Activate switch shall activate all notification appliance circuits. The drill function shall latch until the panel is silenced or reset.
4. System Reset Switch: Activation of the System Reset switch shall cause all electronically-latched initiating devices, appliances or software zones, as well as all associated output devices and circuits, to return to their normal condition.
5. Lamp Test: The Lamp Test switch shall activate all local system LEDs, light each segment of the liquid crystal display and display the panel software revision for service personal.

C. System Capacity and General Operation

1. The control panel or each network node shall provide, or be capable of 318 intelligent/addressable devices.
2. The control panel or each network node shall include Form-C alarm, trouble, supervisory, and security relays rated at a minimum of 2.0 amps @ 30 VDC.
3. It shall also include four Class B (NFPA Style Y) or Class A (NFPA Style Z) programmable Notification Appliance Circuits.
4. The Notification Appliance Circuits shall be programmable to Syncronize with System Sensor, *Gentex* and *Wheelock* Notification Appliances.
5. The system shall include a full featured operator interface control and annunciation panel that shall include a backlit Liquid Crystal Display (LCD), individual color coded system status LEDs, and an alphanumeric keypad with easy touch rubber keys for the field programming and control of the fire alarm system.
6. The system shall be programmable, configurable, and expandable in the field without the need for special tools, PROM programmers or PC based programmers. It shall not require replacement of memory ICs to facilitate programming changes.
7. The system shall allow the programming of any input to activate any output or group of outputs. Systems that have limited programming (such as general alarm), have complicated programming (such as a diode matrix), or require a laptop personal computer are not considered suitable substitutes.
8. The FACPs shall support up to 20 logic equations, including "and," "or," and "not," or time delay equations to be used for advanced programming. Logic equations shall require the use of a PC with a software utility designed for programming.
9. The FACPs or each network node shall provide the following features:
    a. Drift compensation to extend detector accuracy over life. Drift compensation shall also include a smoothing feature, allowing transient noise signals to be filtered out.
    b. Detector sensitivity test, meeting requirements of NFPA 72, Chapter 7.
    c. Maintenance alert, with two levels (maintenance alert/maintenance urgent), to warn of excessive smoke detector dirt or dust accumulation.
    d. Nine sensitivity levels for alarm, selected by detector. The alarm level range shall be .5 to 2.35 percent per foot for photoelectric detectors and 0.5 to 2.5 percent per foot for ionization detectors. The system shall also support sensitive advanced detection laser detectors with an alarm level range of .03 percent per foot to 1.0 percent per foot. The system shall also include up to nine levels of Pre-alarm, selected by detector, to indicate impending alarms to maintenance personnel.
    e. The ability to display or print system reports.
    f. Alarm verification, with counters and a trouble indication to alert maintenance personnel when a detector enters verification 20 times.
    g. PAS pre-signal, meeting NFPA 72 3-8.3 requirements.
    h. Rapid manual station reporting (under 3 seconds) and shall meet NFPA 72 Chapter 1 requirements for activation of notification circuits within 10 seconds of initiating device activation.
    i. Periodic detector test, conducted automatically by the software.
    j. Self-optimizing pre-alarm for advanced fire warning, which allows each detector to learn its particular environment and set its pre-alarm level to just above normal peaks.
    k. Cross zoning with the capability of counting: two detectors in alarm, two software zones in alarm, or one smoke detector and one thermal detector.

l. Walk test, with a check for two detectors set to same address.
m. Control-by-time for non-fire operations, with holiday schedules.
n. Day/night automatic adjustment of detector sensitivity.

10. The FACPs shall be capable of coding main panel node notification circuits in March Time (120 PPM), Temporal (NFPA 72 A-2-2.2.2), and California Code. Panel notification circuits (NAC 1,2,3 and 4) shall also support Two-Stage operation, Canadian Dual Stage (3 minutes) and Canadian Dual Stage (5 minutes). Two stage operation shall allow 20 Pulses Per Minute (PPM) on alarm and 120 PPM after 5 minutes or when a second device activates. Canadian Dual stage is the same as Two-Stage except will only switch to second stage by activation of Drill Switch 3 or 5 minute timer. The panel shall also provide a coding option that will synchronize specific strobe lights designed to accept a specific "sync pulse."
11. Network Communication: The FACPs shall be capable of communicating on a Local Area Network (LAN), a firmware package that utilizes a peer-to-peer, inherently regenerative communication format and protocol.

D. Central Microprocessor

1. The microprocessor shall be a state-of-the-art, high speed, 16-bit RISC device and it shall communicate with, monitor and control all external interfaces. It shall include an EPROM for system program storage, Flash memory for building-specific program storage, and a "watch dog" timer circuit to detect and report microprocessor failure.
2. The microprocessor shall contain and execute all control-by-event programs for specific action to be taken if an alarm condition is detected by the system. Control-by-event equations shall be held in non-volatile programmable memory, and shall not be lost even if system primary and secondary power failure occurs.
3. The microprocessor shall also provide a real-time clock for time annotation of system displays, printer, and history file. The time-of-day and date shall not be lost if system primary and secondary power supplies fail. The real time clock may also be used to control non-fire functions at programmed time-of-day, day-of-week, and day-of-year.
4. A special program check function shall be provided to detect common operator errors.
5. An auto-program (self-learn) function shall be provided to quickly install initial functions and make the system operational.
6. For flexibility and to ensure program validity, an optional Windows(TM) based program utility shall be available. This program shall be used to off-line program the system with batch upload/download, and have the ability to upgrade the manufacturers (FLASH) system code changes. This program shall also have a verification utility, which scans the program files, identifying possible errors. It shall also have the ability to compare old program files to new ones, identifying differences in the two files to allow complete testing of any system operating changes. This shall be in incompliance with the NFPA 72 requirements for testing after system modification.

E. System Display

1. The system shall support an 80 character display. The display shall include an 80-character backlit alphanumeric Liquid Crystal Display (LCD) and a full PC style QWERTY keypad.
2. The display shall provide all the controls and indicators used by the system operator:
   a. The 80-character display shall include the following operator control switches: ACKNOWLEDGE, ALARM SILENCE, ALARM ACTIVATE (drill), SYSTEM RESET, and LAMP TEST.
3. The display shall annunciate status information and custom alphanumeric labels for all intelligent detectors, addressable modules, internal panel circuits, and software zones.
4. The display shall also provide Light-Emitting Diodes.
   a. The 80-character display shall provide 12 Light-Emitting-Diodes (LEDs) that indicate the status of the following system parameters: AC POWER, FIRE ALARM, PREALARM WARNING, SECURITY ALARM, SUPERVISORY SIGNAL, SYSTEM TROUBLE, DISABLED POINTS, ALARM SILENCED, Controls Active, Pre-Discharge, Discharge and Abort.
5. The display shall provide a QWERTY type keypad

a. The 80-character display keypad shall be an easy to use QWERTY type keypad, similar to a PC keyboard. This shall be part of the standard system and have the capability to command all system functions, entry of any alphabetic or numeric information, and field programming. Two different password levels shall be provided to prevent unauthorized system control or programming.

6. The system shall support the display of battery charging current and voltage on the 80-character LCD display.

F. Signaling Line Circuits (SLC)

1. Each FACP or FACP network node shall support one SLC. Each SLC interface shall provide power to and communicate with up to 159 intelligent detectors (ionization, photoelectric or thermal) and 159 intelligent modules (monitor or control) for a loop capacity of 318 devices. SLC shall be capable of NFPA 72 Style 4, Style 6, or Style 7 (Class A or B) wiring.
2. CPU shall receive analog information from all intelligent detectors to be processed to determine whether normal, alarm, prealarm, or trouble conditions exist for each detector. The software shall automatically maintain the detector's desired sensitivity level by adjusting for the effects of environmental factors, including the accumulation of dust in each detector. The analog information shall also be used for automatic detector testing and for the automatic determination of detector maintenance requirements.

G. Serial Interfaces

1. The system shall include two serial EIA-232 interfaces. Each interface shall be a means of connecting UL Listed Information Technology Equipment (ITE) peripherals.
   a. One EIA-232 interface shall be used to connect an UL-Listed 40 or 80 column printer. Printers that are not UL-Listed are not considered acceptable substitutes.
   b. One EIA-232 interface shall be used to connect an UL-Listed 40 or 80 column printer. Printers that are not UL-Listed are not considered acceptable substitutes.
   c. One EIA-232 interface shall be used to connect a UL-listed CRT terminal. This interface shall include special protocol methods that allow off-site monitoring of the FACP over standard dial-up phone lines. This ancillary capability shall allow remote readout of all status information, including analog values, and shall not interfere with or degrade FACP operations when used. It shall allow remote FACP Acknowledge, Reset, or Signal Silence in this mode. It shall also allow adjustment of detector sensitivity and readout of the history file.
   d. The system shall include an EIA-485 port for the serial connection of optional annunciators and remote LCD displays.
   e. The EIA-485 interface may be used for network connection to a proprietary-receiving unit.

H. Enclosures:

1. The control panel shall be housed in a UL-listed cabinet suitable for surface or semi-flush mounting. The cabinet and front shall be corrosion protected, given a rust-resistant prime coat, and manufacturer's standard finish.
2. The back box and door shall be constructed of 0.060 steel with provisions for electrical conduit connections into the sides and top.
3. The door shall provide a key lock and shall include a glass or other transparent opening for viewing of all indicators. For convenience, the door may be site configured for either right or left hand hinging.

I. Power Supply:

1. A high tech off-line switching power supply shall be available for the fire alarm control panel or network node and provide 6.0 amps of available power for the control panel and peripheral devices.
2. Provisions will be made to allow the audio-visual power to be increased as required by adding modular expansion audio-visual power supplies.
3. Positive-Temperature-Coefficient (PTC) thermistors, circuit breakers, or other over-current

protection shall be provided on all power outputs. The power supply shall provide an integral battery charger for use with batteries up to 55 AH or may be used with an external battery and charger system. Battery arrangement may be configured in the field.

4. The power supply shall continuously monitor all field wires for earth ground conditions, and shall have the following LED indicators:
   Ground Fault LED
   AC Power Fail LED
   NAC on LED (4)
5. The main power supply shall operate on 120 VAC, 60 Hz, and shall provide all necessary power for the FACP.
6. The main power supply shall provide a battery charger using dual-rate charging techniques for fast battery recharge and be capable of charging batteries up to 200 AH.
7. All circuits shall be power-limited, per UL864 requirements.

J. Auxiliary Field Power Supply - Addressable

1. The auxiliary addressable power supply is a remote 24 VDC power supply used to power Notification Devices and field devices that require regulated 24VDC power. The power supply shall also include and charge backup batteries.
2. The addressable power supply for the fire alarm system shall provide up a minimum of 6.0 amps of 24 volt DC regulated power for Notification Appliance Circuit (NAC) power or 5 amps of 24 volt DC general power. The power supply shall have an additional .5 amp of 24 VDC auxiliary power for use within the same cabinet as the power supply. It shall include an integral charger designed to charge 7.0 - 25.0 amp hour batteries.
3. The addressable power supply shall provide four individually addressable Notification Appliance Circuits that may be configured as two Class "A" and two Class "B" or four Class "B" only circuits. All circuits shall be power-limited per UL 864 requirements.
4. The addressable power supply shall provide built-in synchronization for certain Notification Appliances on each circuit without the need for additional synchronization modules. The power supply's output circuits shall be individually selected for synchronization. A single addressable power supply shall be capable of supporting both synchronized and non-synchronized Notification Devices at the same time.
5. The addressable power supply shall operate on 120 or 240 VAC, 50/60 Hz.
6. The interface to the power supply from the Fire Alarm Control Panel (FACP) shall be via the Signaling Line Circuit (SLC) or other multiplexed means Power supplies that do not use an intelligent interface are not suitable substitutes. The required wiring from the FACP to the addressable power supply shall be a single unshielded twisted pair wire. Data on the SLC shall be transmitted between 24 VDC, 5 VDC and 0 VDC at approximately 3.33k baud.
7. The addressable power supply shall supervise for battery charging failure, AC power loss, power brownout, battery failure, NAC loss, and optional ground fault detection. In the event of a trouble condition, the addressable power supply shall report the incident and the applicable address to the FACP via the SLC.
8. The addressable power supply shall have an AC Power Loss Delay option. If this option is utilized and the addressable power supply experiences an AC power loss, reporting of the incident to the FACP will be delayed. A delay time of eight or sixteen hours shall be Dip-switch selected.
9. The addressable power supply shall have an option for Canadian Trouble Reporting and this option shall be Dip-switch selectable.
10. The addressable power supply mounts in either the FACP backbox or it's own dedicated surface mounted backbox with cover.
11. Each of the power supply's four output circuits shall be DIP-switch selected for Notification Appliance Circuit or General Purpose 24 VDC power. Any output circuit shall be able to provide up to 2.5 amps of 24 VDC power.
12. The addressable power supply's output circuits shall be individually supervised when they are selected to be either a Notification Appliance Circuit when wired Class "A" or by the use of and end-of-line resistor. When the power supply's output circuit is selected as General 24VDC power, the circuit shall be individually supervised when an end-of-line relay is used.
13. When selected for Notification Appliance Circuits, the output circuits shall be individually DIP-

switch selectable for Steady, March Time, Dual Stage or Temporal.

14. When selected as a Notification Appliance Circuit, the output circuits of the addressable power supply shall have the option to be coded by the use of a universal zone coder.
15. The addressable power supply shall interface and synchronize with other power supplies of the same type. The required wiring to interface multiple addressable power supplies shall be a single unshielded, twisted pair wire.
16. An individual or multiple interfaced addressable power supplies shall have the option to use an external charger for battery charging. Interfaced power supplies shall have the option to share backup battery power.

K. Field Charging Power Supply (FCPS). The FCPS is a device designed for use as either a remote 24 volt power supply or used to power Notification Appliances.

1. The FCPS shall offer up to 6.0 amps (4.0 amps continuous) of regulated 24 volt power. It shall include an integral charger designed to charge 7.0 amp hour batteries and to support 60 hour standby.
2. The Field Charging Power Supply shall have two input triggers. The input trigger shall be a Notification Appliance Circuit (from the fire alarm control panel) or a relay. Four outputs (two Style Y or Z and two style Y) shall be available for connection to the Notification devices.
3. The FCPS shall include an attractive surface mount backbox.
4. The Field Charging Power Supply shall include the ability to delay the AC fail delay per NFPA requirements.
5. The FCPS include power limited circuitry, per 1995 UL standards.

L. Specific System Operations

1. Smoke Detector Sensitivity Adjust: A means shall be provided for adjusting the sensitivity of any or all addressable intelligent detectors in the system from the system keypad. Sensitivity range shall be within the allowed UL window and have a minimum of 9 levels.
2. Alarm Verification: Each of the intelligent addressable smoke detectors in the system may be independently selected and enabled to be an alarm verified detector. The alarm verification delay shall be programmable from 5 to 30 seconds and each detector shall be able to be selected for verification. The FACP shall keep a count of the number of times that each detector has entered the verification cycle. These counters may be displayed and reset by the proper operator commands.
3. Point Disable: Any addressable device or conventional circuit in the system may be enabled or disabled through the system keypad.
4. Point Read: The system shall be able to display or print the following point status diagnostic functions:
    a. Device status
    b. Device type
    c. Custom device label
    d. View analog detector values
    e. Device zone assignments
    f. All program parameters
5. System Status Reports: Upon command from an operator of the system, a status report will be generated and printed, listing all system status.
6. System History Recording and Reporting: The fire alarm control panel shall contain a history buffer that will be capable of storing up to 800 events. Up to 200 events shall be dedicated to alarm and the remaining events are general purpose. Systems that do not have dedicated alarm storage, where events are overridden by non-alarm type events, are not suitable substitutes. Each of these activations will be stored and time and date stamped with the actual time of the activation. The contents of the history buffer may be manually reviewed, one event at a time, or printed in its entirety. The history buffer shall use non-volatile memory. Systems that use volatile memory for history storage are not acceptable substitutes.
7. Automatic Detector Maintenance Alert: The fire alarm control panel shall automatically interrogate each intelligent detector and shall analyze the detector responses over a period of time. If any intelligent detector in the system responds with a reading that is above or below normal

limits, then the system will enter the trouble mode, and the particular detector will be annunciated on the system display, and printed on the optional printer. This feature shall in no way inhibit the receipt of alarm conditions in the system, nor shall it require any special hardware, special tools or computer expertise to perform.

8. Pre-Alarm Function: The system shall provide two levels of pre-alarm warning to give advance notice of a possible fire situation. Both pre-alarm levels shall be fully field adjustable. The first level shall give an audible indication at the panel. The second level shall give an audible indication and may also activate control relays. The system shall also have the ability to activate local detector sounder bases at the pre-alarm level, to assist in avoiding nuisance alarms.
9. Software Zones: The FACP shall provide 100 software zones, 10 additional special function zones, 10 releasing zones, and 20 logic zones.
10. The fire alarm control panels shall include a walk test feature. It shall include the ability to test initiating device circuits and notification appliance circuits from the field without returning to the panel to reset the system. Operation shall be as follows:
    a. Alarming an initiating device shall activate programmed outputs, which are selected to participate in walk test, for 3 seconds.
    b. Introducing a trouble into the initiating device shall activate the programmed outputs for 8 seconds.
    c. All devices tested in walk test shall be recorded in the history buffer.
11. Waterflow Operation: An alarm from a waterflow detection device shall activate the appropriate alarm message on the main panel display, turn on all programmed notification appliance circuits and shall not be affected by the signal silence switch.
12. Supervisory Operation: An alarm from a supervisory device shall cause the appropriate indication on the system display, light a common supervisory LED, but will not cause the system to enter the trouble mode.
13. Signal Silence Operation: The FACP shall have the ability to program each output circuit (notification, relay, speaker etc) to deactivate upon depression of the signal silence switch.
14. Non-Alarm Input Operation: Any addressable initiating device in the system may be used as a non-alarm input to monitor normally open contact type devices. Non-alarm functions are a lower priority than fire alarm initiating devices.
15. Combo Zone: A special type code shall be available to allow waterflow and supervisory devices to share a common addressable module. Waterflow devices shall be wired in parallel, supervisory devices in series.

2.04 SYSTEM COMPONENTS:

A. Programmable Electronic Sounders:
   1. Electronic sounders shall operate on 24 VDC nominal.
   2. Electronic sounders shall be field programmable without the use of special tools, at a sound level of at least 90 dBA measured at 10 feet from the device.
   3. Shall be flush or surface mounted as shown on plans.

B. Strobe lights shall meet the requirements of the ADA, UL Standard 1971, be fully synchronized, and shall meet the following criteria:
   1. The maximum pulse duration shall be 2/10 of one second.
   2. Strobe intensity shall meet the requirements of UL 1971.
   3. The flash rate shall meet the requirements of UL 1971.

C. Waterflow Indicator:
   1. Waterflow Switches shall be an integral, mechanical, non-coded, non-accumulative retard type.
   2. Waterflow Switches shall have an alarm transmission delay time which is conveniently adjustable from 0 to 60 seconds. Initial settings shall be 30-45 seconds.
   3. All waterflow switches shall come from a single manufacturer and series.
   4. Waterflow switches shall be provided and connected under this section but installed by the mechanical contractor.
   5. Where possible, locate waterflow switches a minimum of one (1) foot from a fitting which

changes the direction of the flow and a minimum of three (3) feet from a valve.

D. Sprinkler and Standpipe Valve Supervisory Switches:
1. Each sprinkler system water supply control valve riser, zone control valve, and standpipe system riser control valve shall be equipped with a supervisory switch. Standpipe hose valves, and test and drain valves shall not be equipped with supervisory switches.
2. PIV (post indicator valve) or main gate valves shall be equipped with a supervisory switch.
3. The switch shall be mounted so as not to interfere with the normal operation of the valve and adjusted to operate within two revolutions toward the closed position of the valve control, or when the stem has moved no more than one-fifth of the distance from its normal position.
4. The supervisory switch shall be contained in a weatherproof aluminum housing, which shall provide a 3/4 inch (19 mm) conduit entrance and incorporate the necessary facilities for attachment to the valves.
5. The switch housing shall be finished in red baked enamel.
6. The entire installed assembly shall be tamper proof and arranged to cause a switch operation if the housing cover is removed, or if the unit is removed from its mounting.
7. Valve supervisory switches shall be provided and connected under this section and installed by mechanical contractor.
   a. This unit shall provide for each zone: alarm indications, using a red alarm an yellow trouble long-life LEDs and control switches for the control of fire alarm control panel functions. The annunciator will also have an ON-LINE LED, local piezo electric signal, local acknowledge/lamp test switch, and custom slide-in zone/function identification labels.
   b. Switches shall be available for remote annunciation and control of output points in the system, system acknowledge, telephone zone select, speaker select, global signal silence, and global system reset within the confines of all applicable standards.

E. Alphanumeric LCD Type Annunciator:
1. The alphanumeric display annunciator shall be a supervised, remotely located back-lit LCD display containing a minimum of eighty (80) characters for alarm annunciation in clear English text.
2. The LCD annunciator shall display all alarm and trouble conditions in the system.
3. An audible indication of alarm shall be integral to the alphanumeric display.
4. The display shall be UL listed for fire alarm application.
5. It shall be possible to connect up to 32 LCD displays and be capable of wiring distances up to 6,000 feet from the control panel.
6. The annunciator shall connect to a separate, dedicated "terminal mode" EIA-485 interface. This is a two-wire loop connection and shall be capable of distances to 6,000 feet. Each terminal mode LCD display shall mimic the main control panel.
7. The system shall allow a minimum of 32 terminal mode LCD annunciators. Up to 10 LCD annunciators shall be capable of the following system functions: Acknowledge, Signal Silence and Reset, which shall be protected from unauthorized use by a keyswitch or password.
8. The LED annunciator shall offer an interface to a graphic style annunciator and provide each of the features listed above.

F. All interfaces and associated equipment are to be protected so that they will not be affected by voltage surges or line transients consistent with UL standard 864.

G. Universal Digital Alarm Communicator Transmitter (UDACT). The UDACT is an interface for communicating digital information between a fire alarm control panel and an UL-Listed central station.
1. The UDACT shall be compact in size, mounting in a standard module position of the fire alarm control cabinet. Optionally, the UDACT shall have the ability for remote mounting, up to 6,000 feet from the fire alarm control panel. The wire connections between the UDACT and the control panel shall be supervised with one pair for power and one pair for multiplexed communication of overall system status. Systems that utilize relay contact closures are not acceptable.
2. The UDACT shall include connections for dual telephone lines (with voltage detect), per

UL/NFPA/FCC requirements. It shall include the ability for split reporting of panel events up to three different telephone numbers.

3. The UDACT shall be completely field programmable from a built-in keypad and 4 character red, seven segment display.
4. The UDACT shall be capable of transmitting events in at least 15 different formats. This ensures compatibility with existing and future transmission formats.
5. Communication shall include vital system status such as:
   a. Independent Zone (Alarm, trouble, non-alarm, supervisory)
   b. Independent Addressable Device Status
   c. AC (Mains) Power Loss
   d. Low Battery and Earth Fault
   e. System Off Normal
   f. 12 and 24 Hour Test Signal
   g. Abnormal Test Signal (per UL requirements)
   h. EIA-485 Communications Failure
   i. Phone Line Failure
6. The UDACT shall support independent zone/point reporting when used in the Contact ID format. In this format the UDACT shall support transmission of up to 2,040 points. This enables the central station to have exact details concerning the origin of the fire or response emergency.

H. Field Wiring Terminal Blocks: For ease of service all panel I/O wiring terminal blocks shall be removable, plug-in types and have sufficient capacity for #18 to #12 AWG wire. Terminal blocks that are permanently fixed are not acceptable.

## 2.05 SYSTEM COMPONENTS - ADDRESSABLE DEVICES

A. Addressable Devices - General
1. Addressable devices shall use simple to install and maintain decade, decimal address switches. Devices shall be capable of being set to an address in a range of 001 to 159.
2. Addressable devices, which use a binary-coded address setting method, such as a DIP-switch, are not an allowable substitute.
3. Detectors shall be intelligent (analog) and addressable, and shall connect with two wires to the fire alarm control panel Signaling Line Circuits.
4. Addressable smoke and thermal detectors shall provide dual alarm and power/polling LEDs. Both LEDs shall flash green under normal conditions, indicating that the detector is operational and in regular communication with the control panel, and both LEDs shall be placed into steady red illumination by the control panel, indicating that an alarm condition has been detected. If required, the LED flash shall have the ability to be removed from the system program. An output connection shall also be provided in the base to connect an external remote alarm LED.
5. The fire alarm control panel shall permit detector sensitivity adjustment through field programming of the system. The panel on a time-of-day basis shall automatically adjust sensitivity.
6. Using software in the FACP, detectors shall automatically compensate for dust accumulation and other slow environmental changes that may affect their performance. The detectors shall be listed by UL as meeting the calibrated sensitivity test requirements of NFPA Standard 72, Chapter 7.
7. The detectors shall be ceiling-mount and shall include a separate twist-lock base with tamper proof feature. Bases shall include a sounder base with a built-in (local) sounder rated at 85 DBA minimum, a relay base and an isolator base designed for Style 7 applications.
8. The detectors shall provide a test means whereby they will simulate an alarm condition and report that condition to the control panel. Such a test may be initiated at the detector itself (by activating a magnetic switch) or initiated remotely on command from the control panel.
9. Detectors shall also store an internal identifying type code that the control panel shall use to identify the type of device (ION, PHOTO, THERMAL).
10. Detectors will operate in an analog fashion, where the detector simply measures its designed environment variable and transmits an analog value to the FACP based on real-time measured

values. The FACP software, not the detector, shall make the alarm/normal decision, thereby allowing the sensitivity of each detector to be set in the FACP program and allowing the system operator to view the current analog value of each detector.

11. Addressable devices shall store an internal identifying code that the control panel shall use to identify the type of device.
12. A magnetic test switch shall be provided to test detectors and modules. Detectors shall report an indication of an analog value reaching 100% of the alarm threshold.
13. Addressable modules shall mount in a 4-inch square (101.6 mm square), 2-1/8 inch (54 mm) deep electrical box. An optional surface mount Lexan enclosure shall be available.

B. Addressable Manual Fire Alarm Box (manual station)
1. *Notifier* model FST-851R, or approved equal. Addressable manual fire alarm boxes shall, on command from the control panel, send data to the panel representing the state of the manual switch and the addressable communication module status. They shall use a key operated test-reset lock, and shall be designed so that after actual emergency operation, they cannot be restored to normal use except by the use of a key.
2. All operated stations shall have a positive, visual indication of operation and utilize a key type reset.
3. Manual fire alarm boxes shall be constructed of Lexan with clearly visible operating instructions provided on the cover. The word FIRE shall appear on the front of the stations in raised letters, 1.75 inches (44 mm) or larger.

C. Intelligent Photoelectric Smoke Detector: *Notifier* model FSP-851, or approved equal. The detectors shall use the photoelectric (light-scattering) principal to measure smoke density and shall, on command from the control panel, send data to the panel representing the analog level of smoke density.

D. Intelligent Thermal Detectors: *Notifier* model FST-851R, or approved equal. Thermal detectors shall be intelligent addressable devices rated at 135 degrees Fahrenheit (58 degrees Celsius) and have a rate-of-rise element rated at 15 degrees F (9.4 degrees C) per minute. It shall connect via two wires to the fire alarm control panel signaling line circuit.

E. Addressable Dry Contact Monitor Module:
1. Addressable monitor modules shall be provided to connect one supervised IDC zone of conventional alarm initiating devices (any N.O. dry contact device) to one of the fire alarm control panel SLCs.
2. The IDC zone shall be suitable for Style D or Style B operation. An LED shall be provided that shall flash under normal conditions, indicating that the monitor module is operational and in regular communication with the control panel.
3. For difficult to reach areas, the monitor module shall be available in a miniature package and shall be no larger than 2-3/4 inch (70 mm) x 1-1/4 inch (31.7 mm) x 1/2 inch (12.7 mm). This version need not include Style D or an LED.

F. Two Wire Detector Monitor Module:
1. Addressable monitor modules shall be provided to connect one supervised IDC zone of conventional 2-wire smoke detectors or alarm initiating devices (any N.O. dry contact device).
2. The IDC zone may be wired for Class A or B (Style D or Style B) operation. An LED shall be provided that shall flash under normal conditions, indicating that the monitor module is operational and in regular communication with the control panel.

G. Addressable Control Module:
1. Addressable control modules shall be provided to supervise and control the operation of one conventional NACs of compatible, 24 VDC powered, polarized audio/visual notification appliances.
2. The control module NAC may be wired for Style Z or Style Y (Class A/B) with up to 1 amp of inductive A/V signal, or 2 amps of resistive A/V signal operation.
3. Audio/visual power shall be provided by a separate supervised power circuit from the main fire

alarm control panel or from a supervised UL listed remote power supply.

4. The control module shall be suitable for pilot duty applications and rated for a minimum of 0.6 amps at 30 VDC.

H. Addressable Relay Module: Addressable Relay Modules shall be available for HVAC control and other building functions. The relay shall be form C and rated for a minimum of 2.0 Amps resistive or 1.0 Amps inductive. The relay coil shall be magnetically latched to reduce wiring connection requirements, and to insure that 100% of all auxiliary relay or NACs may be energized at the same time on the same pair of wires.

I. Isolator Module:

1. Isolator modules shall be provided to automatically isolate wire-to-wire short circuits on an SLC Class A or Class B branch. The isolator module shall limit the number of modules or detectors that may be rendered inoperative by a short circuit fault on the SLC loop segment or branch. At least one isolator module shall be provided for each floor or protected zone of the building.
2. If a wire-to-wire short occurs, the isolator module shall automatically open-circuit (disconnect) the SLC. When the short circuit condition is corrected, the isolator module shall automatically reconnect the isolated section.
3. The isolator module shall not require address-setting, and its operations shall be totally automatic. It shall not be necessary to replace or reset an isolator module after its normal operation.
4. The isolator module shall provide a single LED that shall flash to indicate that the isolator is operational and shall illuminate steadily to indicate that a short circuit condition has been detected and isolated.

2.06 BATTERIES:

A. The battery shall have sufficient capacity to power the fire alarm system for not less than twenty-four hours plus 5 minutes of alarm upon a normal AC power failure.

B. The batteries are to be completely maintenance free. No liquids are required. Fluid level checks for refilling, spills, and leakage shall not be required.

C. If necessary to meet standby requirements, external battery and charger systems may be used.

2.07 MUNICIPAL FIRE ALARM MASTER BOX:

A. Provide radio operated municipal fire alarm master transmittal box as directed by the City Fire Department to match the City's standard.

2.08 FIRE ALARM DOCUMENTS AND SIGNAGE:

A. Provide a lockable fire alarm records cabinet next to the fire alarm control panel, keyed alike with the control panel. Label the cabinet "FIRE ALRM DOCUMENTS" A record of System Installation (#14 of the Fire Alarm Emergency Communication System Record of Completion) shall be laminated and affixed to the inside of the cabinet.

B. Provide a laminated sign to be affixed to the outside of the door of the main electrical room where the fire alarm control panel is located reading: "FIRE ALARM CONTROL PANEL".

PART 3 – EXECUTION

3.01 INSTALLATION:

A. Installation shall be in accordance with the NEC, NFPA 72, local and state codes, as shown on the drawings, and as recommended by the major equipment manufacturer.

B. All conduit, junction boxes, conduit supports and hangers shall be concealed in finished areas and may be exposed in unfinished areas. Smoke detectors shall not be installed prior to the system programming and test period. If construction is ongoing during this period, measures shall be taken to protect smoke detectors from contamination and physical damage.

C. All fire detection and alarm system devices, control panels and remote annunciators shall be flush mounted when located in finished areas and may be surface mounted when located in unfinished areas.

D. Manual fire alarm boxes shall be suitable for surface mounting or semi-flush mounting as shown on the plans, and shall be installed not less than 42 inches (1067 mm), nor more than 48 inches (122 mm) above the finished floor.

3.02 TEST:

A. The service of a competent, factory-trained engineer or technician authorized by the manufacturer of the fire alarm equipment shall be provided to technically supervise and participate during all of the adjustments and tests for the system. All testing shall be in accordance with NFPA 72, Chapter 7.

B. Before energizing the cables and wires, check for correct connections and test for short circuits, ground faults, continuity, and insulation.

C. Close each sprinkler system flow valve and verify proper supervisory alarm at the FACP.

D. Verify activation of all waterflow switches.

E. Open initiating device circuits and verify that the trouble signal actuates.

F. Open and short signaling line circuits and verify that the trouble signal actuates.

G. Open and short notification appliance circuits and verify that trouble signal actuates.

H. Ground all circuits and verify response of trouble signals.

I. Check presence and audibility of tone at all alarm notification devices.

J. Check installation, supervision, and operation of all intelligent smoke detectors using the walk test.

K. Each of the alarm conditions that the system is required to detect should be introduced on the system. Verify the proper receipt and the proper processing of the signal at the FACP and the correct activation of the control points.

L. When the system is equipped with optional features, the manufacturer's manual shall be consulted to determine the proper testing procedures. This is intended to address such items as verifying controls performed by individually addressed or grouped devices, sensitivity monitoring, verification functionality and similar.

M. When the system is equipped with a Voice Evacuation Control panel, the manufacturer's manual shall be consulted to determine the proper testing procedures. This is intended to address such items as verifying voice messages.

3.03 FINAL INSPECTION:

A. At the final inspection, a factory-trained representative of the manufacturer of the major equipment shall demonstrate that the system functions properly in every respect.

3.04 INSTRUCTION:

A. Instruction shall be provided as required for operating the system. Hands-on demonstrations of the operation of all system components and the entire system including program changes and functions shall be provided.

B. The contractor and/or the systems manufacturer's representatives shall provide a typewritten "Sequence of Operation."

**END OF SECTION**

# SECTION 28 23 00 - SURVEILLANCE SYSTEM

All work and materials shall conform to the Contract Documents and the provisions of the State of Maine Department of Transportation Standard Specifications, Revision November 2014, with the following additions:

Add the following:

PART 1 – GENERAL:

1.01 SECTION INCLUDES:

A. The Owner will contract separately with others to provide a complete, fully distributed, solid state IP surveillance system consisting of a cameras with web based user interface.

B. Contractor shall provide wiring for all system components.

1.02 WORK PROVIDED UNDER OTHER DIVISIONS:

A. Raceway and boxes shall be provided under Division 26.

1.03 RELATED SECTIONS:

A. Section 26 05 33 – Raceway and Boxes.

B. Section 26 05 19 - Building Wire and Cable.

C. Section 27 10 00 – Structured Cabling System.

1.04 REFERENCES:

A. National Fire Protection Association (NFPA): NFPA 70 - National Electrical Code.

B. Underwriters Laboratories Incorporated (UL):

1.05 REGULATORY REQUIREMENTS:

A. Comply with requirements of NFPA 70.

B. Comply with applicable UL Standards.

1.06 SUBMITTALS:

A. Submit product data for system wiring under provisions of Section 28 00 00.

1.07 PROJECT RECORD DRAWINGS

A. Submit documents under provisions of Section 28 00 00.

B. Record actual locations and devices, and routing of camera wiring.

1.08 COORDINATION:

A. The Contractor shall be responsible for coordinating all wiring methods with the Owner's system supplier/installer prior to installation.

## PART 2 - PRODUCTS

2.01 SYSTEM WIRING:

A. Voice Cable shall be TIA/EIA Category 6 Unshielded Twisted Pair (UTP) cable, as specified.

B. Electrical Characteristics for 24 AWG Extended Frequency Category 6 cable:
   a. DC Resistance (max) 8.9
   b. DC Resistance Unbalanced (max) 3.0
   c. Input Impedance, 1.0 to 100 MHz =100 +/- 15, 100 to 350MHz = 100 +/- 22
   d. Characteristics Impedance, 1 to 350 MHz = 100 +/- 15%
   e. ACR @ 100KHz, db (min) of 21
   f. PS-ACR @ 100MHz, db (min) of 19
   g. Delay Skew (max) ns/100m is 25
   h. Nominal Velocity of Propagation (NVP), % speed of Light, 70

C. Electrical Characteristics:

| Frequency | Max. Atten. Db/100m | ELFEXT bd (min) | PS-ELFEXT bd (min) | PS-NEXT bd (min) | NEXT bd (min) | SLR db (min) | Return Loss db (min) |
|---|---|---|---|---|---|---|---|
| 772kHz | 1.8 | 66 | 63 | 70 | 72 | - | - |
| 1MHz | 2.0 | 64 | 61 | 68 | 70 | 24.5 | 20.0 |
| 4MHz | 4.1 | 52 | 49 | 59 | 61 | 24.5 | 23.0 |
| 8MHz | 5.8 | 46 | 43 | 54 | 56 | 24.5 | 24.5 |
| 10MHz | 6.5 | 44 | 41 | 53 | 55 | 24.5 | 25 |
| 16MHz | 8.2 | 40 | 37 | 50 | 52 | 24.5 | 25.0 |
| 20MHz | 9.3 | 38 | 35 | 48 | 50 | 24.5 | 25.0 |
| 25MHz | 10.4 | 36 | 33 | 47 | 49 | 24.0 | 24.3 |
| 31.25MHz | 11.7 | 34 | 31 | 45 | 47 | 23.5 | 23.6 |
| 62.5MHz | 17.0 | 28 | 25 | 41 | 43 | 22.0 | 21.5 |
| 100MHz | 22.0 | 24 | 21 | 38 | 40 | 21.0 | 20.1 |
| 155MHz | 28.1 | 20 | 17 | 35 | 37 | 20.1 | 18.8 |
| 200MHz | 32.4 | 18 | 15 | 33 | 35 | 19.5 | 18.0 |
| 300MHz | 41.0 | 14 | 11 | 31 | 33 | 18.6 | 16.8 |
| 350MHz | 44.9 | 13 | 10 | 30 | 32 | 18.3 | 16.3 |

D. Compliance of 24 AWG Extended Frequency Category 6 cable:
   a. ISO/IEC 11801
   b. ANSI/TIA/EIA 586-5 (Category 5E)
   c. ANSI/ICEAA S-90-661 (Category 5X-100)

d. NEWA WC 63.1 (Category 5)
e. UL Listed Type MPR/CMR
f. (UL) CMG

E. Plenum rated cable - CMP rated jacket for Plenum applications.

PART 3 – EXECUTION:

3.01 EXAMINATION:

A. Verify that field measurements, surfaces, substrates and conditions are as required, and ready to receive Work.

B. By beginning Work, Contractor accepts conditions and assumes responsibility for correcting unsuitable conditions encountered at no additional cost.

3.02 INSTALLATION:

A. Install system according to Owner's system supplier/installer's instructions.

B. Identification of Conductors and Cables: Color-code conductors and apply wire and cable marking tape to designate wires and cables so media are identified and coordinated with system wiring diagrams.

C. Extend CAT 6 cables from the location of each camera to the closest network equipment rack. Consult Owner's system supplier/installer for exact locations of cameras. Leave six feet of slack cable at each end for terminations by Owner's system supplier/installer.

3.03 FIELD QUALITY CONTROL:

A. Inspection: test all conductors for proper continuity.

**END OF SECTION**

# SECTION 31 00 00 – EARTHWORK

All work and materials shall conform to the Contract Documents and the provisions of the State of Maine Department of Transportation Standard Specifications, Revision November 2014, with the following additions:

Add the following:

PART 1 – GENERAL

1.1 RELATED DOCUMENTS

A. The drawings and general conditions of the Contract, including General and Supplementary Conditions and MaineDOT Division 100, General Conditions, apply to this section.

1.2 SUMMARY

A. Section Includes

1. Excavating, filling, backfilling, stockpiling, bedding, compacting, grading, hauling, disposal of on-Site soils, processing of on-Site soils for reuse, testing of soils, engaging an independent Geotechnical Testing Agency to perform required quality assurance/quality control inspection and testing, protection and other Work necessary for construction of pipelines, structures, subsurface structures, foundations, pavements, earthen embankments and appurtenant Work in accordance with this Section and applicable reference standards listed in Article 1.03.

B. Related Requirements

1. Section 31 25 00 – Erosion and Sedimentation Controls
2. Section 31 50 00 – Excavation Support and Protection

1.3 REFERENCES

A. Reference Standards

1. American Association of State Highway and Transportation Officials (AASHTO)
   a. AASHTO M 85 Standard Specification for Portland Cement
   b. AASHTO M 295 Standard Specification for Coal Fly Ash and Raw or Calcined Natural Pozzolan for Use in Concrete
   c. AASHTO T 11 Standard Specification for Materials Finer Than 75-Micrometer (No. 200) Sieve in Mineral Aggregates by Washing
   d. AASHTO T 27 Standard Method of Test for Sieve Analysis of Fine and Coarse Aggregates
   e. AASHTO T 96 Standard Method of Test for Resistance to Degradation of Small-Size Coarse Aggregate by Abrasion and Impact in the Los Angeles Machine
2. ASTM International (ASTM)
   a. ASTM C131 Standard Test Method for Resistance to Degradation of Small-Size Coarse Aggregate by Abrasion and Impact in the Los Angeles Machine
   b. ASTM D422 Standard Test Method for Particle-Size Analysis of Soils
   c. ASTM D698 Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Standard Effort (12 400 ft-lbf/ft$^3$ (600 kN-m/m$^3$))
   d. ASTM D1556 Density and Unit Weight of Soil in Place by the Sand-Cone Method
   e. ASTM D1557 Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Modified Effort
   f. ASTM D2167 Standard Test Method for Density and Unit Weight of Soil in Place by the Rubber Balloon Method

g. ASTM D2487 Standard Practice for Classification of Soils for Engineering Purposes (Unified Soil Classification System)

h. ASTM D2922 Density of Soil and Soil Aggregate in Place by Nuclear Methods (Shallow Depth)

i. ASTM D2937 Standard Test Method for Density of Soil in Place by the Drive-Cylinder Method

j. ASTM D3017 Standard Test Method for Water Content of Soil and Rock in Place by Nuclear Methods (Shallow Depth)

k. ASTM D3740 Standard Practice for Minimum Requirements for Agencies Engaged in Testing and/or Inspection of Soil and Rock as Used in Engineering Design and Construction.

l. ASTM D6938 Standard Test Method for In-Place Density and Water Content of Soil and Soil-Aggregate by Nuclear Methods (Shallow Depth).

m. ASTM E329 Standard Specification for Agencies Engaged in Construction Inspection, Testing, or Special Inspection

n. ASTM C131 / AASHTO T-96 (Los Angeles Abrasion Test)

3. MaineDOT Standard Specifications

4. Geotechnical Design Report titled "Proposed Maintenance and Operations Building MaineDOT WIN 021942.02 International Marine Terminal Commercial Street, Portland, Maine" Dated August 2017, Prepared by Haley & Aldrich, Inc. (Appendix B)

B. Definitions

1. Unsuitable material: soft clay or silt, organic clays or silts, peats, debris, concrete, pavement, stones or boulders over 6 inches in diameter, wet or frozen material, and material deemed unsuitable by Owner or Engineer that will not provide suitable foundation or structural support for pipe and associated drainage structures, buildings, or other structures, and is unsuitable for use in backfill.

2. On-Site material: suitable material from on-Site excavation.

1.4 ADMINISTRATIVE REQUIREMENTS

A. Coordination, Sequencing, and Scheduling: per Division 01 General Requirements.

1. Pre-installation conference: conduct at Project Site at least 30 days prior to start of Work.

a. Required attendees: Owner and Engineer, Owner's independent testing firm and geotechnical consultant, Contractor's Superintendent, Support of Excavation (SOE) Installer, Dewatering Installer and Contractor's independent testing firm

b. Review methods and procedures related to earthmoving including, but not limited to, the following.

1) Work hours

2) Personnel and equipment needed to maintain proposed construction schedule and avoid delays

3) Work procedures

4) Establishing and maintaining Site access

5) Coordination of Work with utility locator service

6) Stockpiling area and temporary access points

7) Site logistics for hauling and stockpiling

8) Coordination of Work and equipment movement with support of excavation systems installation

9) Construction phasing, anticipated daily and weekly progress and conformance to construction schedule

10) Methodology for field quality control

2. Make provisions for observations and testing of Work by Owner's independent testing and inspection agency and geotechnical consultant.

1.5 SUBMITTALS

A. Product Data

1. Provide for each on-Site and borrow soil material or aggregate

a. Name of each material Supplier, specific type and source of each material

b. Bills of Lading documenting materials source, including Supplier name and relationship to source, location where materials were obtained; including street, town, lot and block, country and state. Include present and past usage of source Site.

c. Supplier's statement that material is not contaminated and is free of extraneous debris or solid waste, and description of steps taken to confirm

d. Product weight shipping tickets certified by Supplier

B. Samples and Mockups: as specified in Article 1.06.

C. Certificates

1. Certification stating materials are virgin materials from a commercial or non-commercial source.

D. Design Data/Submittals

1. Materials gradation

E. Source and Field Quality Control Submittals

1. Field compaction testing

2. Material testing reports for each on-Site and borrow soil material proposed for fill and backfill in accordance with ASTM D2487

3. Laboratory compaction curve in accordance with ASTM D1557

4. Backfill moisture-density relationships

5. Submit daily field reports documenting earthwork activity and field-testing for each day. At minimum, reports shall include

a. Description of day's activities

b. Results of in-place density testing including in-place dry density, moisture content, percent compaction, elevation of test and description of soil

c. Sketch indicating extent of each day's Work and location of testing

6. Daily records of over-excavated volumes including

a. Beginning and end station of over-excavation

b. Proposed elevation of subgrade

c. Actual elevation of subgrade

d. Calculated volume of additional excavation in bank cubic yards (BCY)

F. Qualification Statements

1. Contractor's independent testing agency, qualified for testing specified in ASTM E329 and ASTM D3740.

1.6 QUALITY ASSURANCE

A. Qualifications: per Division 01 General Requirements and as follows for geotechnical testing.
1. Geotechnical testing agency to monitor earthwork: qualified per ASTM 329 and ASTM D3740.

B. Independent Testing

1. Minimum of 50 pounds of material in an airtight container to testing laboratory.

C. Samples

1. Each type of soil or aggregate proposed for use on Project, a minimum of 14 days prior to Work.

2. Submit additional material Samples at least every 500 cubic yards throughout course of Work, if requested by Engineer to evaluate consistency of source or process.

1.7 DELIVERY, STORAGE, AND HANDLING

A. Waste Management and Disposal

1. Legally dispose of excess or unsuitable material.

PART 2 – PRODUCTS

2.1 MATERIALS

A. All materials utilized for this Project shall be obtained from a source that has been licensed or permitted for such use by local and state authorities. The Contractor shall be required to submit evidence of such if requested.

1. Suitable materials: Suitable soil materials are defined as those complying with ASTM D2487 soil classification groups GW, SM, SW, and SP.

2. Unsuitable materials: Materials containing excessive amounts of water, clay, vegetation, organic matter, debris, pavement, stones, or boulders over 6 inches in greatest dimension, frozen material, and material, which, in the opinion of the Engineer, will not provide a suitable foundation or subgrade.

3. On-site material: Any suitable material from on-site excavation. Material for embankments and general Site fills outside of the building envelope may contain pieces of excavated ledge having a greatest dimension of up to 6 inches, unless otherwise approved by Engineer. All excess suitable on-site material must be used before additional material from off-site is used.

4. Inspection: The Engineer may inspect off-site sources of materials and order tests of these materials to verify compliance with these Specifications.

5. Sieve Analysis: Submit sieve analysis in accordance with ASTM D 6913 for all materials prior to start of construction.

B. Aggregate Base/Base Gravel:

1. For Pavement: gravel base for pavement shall be sand or gravel of hard durable particles free from vegetable matter, lumps or balls of clay and other deleterious substances meeting the requirements of 2014 Maine Dot Standard Specifications 703.06a Aggregate for Base Type B.

2. Compacted base gravel below sidewalks, should be crushed sand and gravel meeting the requirements of 2014 MaineDOT Standard Specification 703.06a Aggregate for Base - Type B.

C. Aggregate Subbase: As specified on the Drawings.

D. Sand: shall be well-graded coarse sand without excessive fines and free from loam, clay, and organic matter. Beach sand shall not be used. The grading requirements are as follows:

| Sieve Size | % Passing by Weight |
|---|---|
| 3/8" | 100 |
| No. 4 | 95 – 100 |
| No. 16 | 50 – 85 |
| *No. 50* | *10 – 30* |
| No. 100 | 2 – 10 |

E. Compacted Granular Fill (CGF): Aggregate for Compacted Granular Fill shall be sand or gravel of hard durable particles free from vegetable matter, lumps or balls of clay and other deleterious substances meeting the requirements of 2014 MaineDOT Standard Specification 703.06c Aggregate for Subbase Type D. Use CGF within the Zone of Influence of footings and beneath building slabs.

F. Common Fill: Common Fill shall meet the requirements of 2014 MaineDOT Standard Specification 703.18, Common Borrow

G. 3/4 inch Crushed Stone: stone, or durable, clean angular rock fragments obtained by breaking and crushing rock material. Gradation shall be:

| Sieve Size | % Passing by Weight |
|---|---|
| 1" | 100 |
| 3/4" | 90 – 100 |
| ½" | 20 – 55 |
| 3/8" | 0 – 15 |
| No. 4 | 0 – 5 |

H. Refill material: Use 3/4-inch crushed stone for refilling excavation below normal grade, rock excavation, or refilling excavations of unsuitable material, unless otherwise directed by Engineer.

I. Fabric protection layer: As specified on the Drawings and Specifications.

PART 3 – EXECUTION

3.1 EXAMINATION

A. Verification of Conditions

1. Check and verify governing dimensions and elevations before starting Work. Survey condition of adjoining properties with Engineer. Take digital video recording of any prior settlement or cracking of structures, pavements and other improvements. Provide list of damages, verified and signed by Contractor and Engineer.

2. Coordinate survey. Establish exact elevations at fixed points to act as benchmarks. Identify benchmarks and record existing elevations. Locate datum level used to establish benchmark elevations so it will not be affected by excavation operations.

3.2 PROTECTION

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. Provide protective insulating materials to protect subgrades and foundation soils against freezing temperatures or frost. Remove temporary protection before continuing Work.

D. Prevent surface water and groundwater from entering excavations, ponding on prepared subgrades, and flooding Project Site and surrounding area.

E. Protect subgrades from softening, undermining, washout, and damage by rain or water accumulation.

1. Excavation will occur below water level. Complete Work in-the-dry to maintain undisturbed condition of bearing soil.
2. Reroute surface water runoff away from excavated area. Do not allow water to accumulate in excavations to ensure bottoms and sides of excavations remain firm and stable throughout construction operations. Do not use excavated trenches as temporary drainage ditches.
3. Install a dewatering system in accordance with Section 01 57 05 to keep subgrades dry and convey groundwater away from excavations. Maintain until dewatering is no longer required.
4. Recharge water from excavations on-Site avoiding injury to public health, public and private property, existing Work, Work to be completed or in progress, roads, walks and streets, or causing any interference with the public.
5. Do not place concrete or fill in excavations containing free water.

3.3 GENERAL EXCAVATION

A. Ensure sequence of excavation operations provides efficient use of excavated materials into embankments and minimum use of borrow.

B. Dispose of legally excavated materials including unsatisfactory soil materials, cobbles, boulders, and obstructions and replace with suitable backfill materials. Urban fill may be screened to remove unsatisfactory material, and used if requirements of suitable backfill are met.

C. Remove and legally dispose of pavements, curbing and other obstructions visible on ground surface, underground structures and utilities indicated to be demolished and removed, and other materials encountered that are not classified as rock excavation or unauthorized excavation. Legally dispose of surplus materials resulting from excavation not needed for use on Project as determined by Engineer. Obtain necessary permits for legal disposal of surplus material.

D. Unclassified excavation: excavating to subgrade elevations regardless of surface and subsurface conditions.

E. Classified excavation: excavating to subgrade elevations. Material excavated: classified as earth and rock. Do not excavate rock until it has been classified and cross sectioned by Engineer.

1. Earth excavation includes excavating pavements and obstructions visible on surface; underground structures, utilities, and other items indicated to be removed; together with soil, boulders, and other materials not classified as rock or unauthorized excavation.
2. Rock excavation includes removal and disposal of rock. Remove rock to lines and subgrade elevations indicated to permit installation of permanent construction without exceeding the following dimensions.
    a. 24 inches outside of concrete forms other than at footings
    b. 12 inches outside of concrete forms at footings
    c. 6 inches outside of minimum required dimensions of concrete cast against grade
    d. Outside dimensions of concrete walls indicated to be cast against rock without forms or exterior waterproofing treatments
        1) 6 inches beneath bottom of concrete slabs-on-grade
        2) 6 inches beneath pipe in trenches, and the greater of 24 inches wider than pipe or 42 inches wide

F. Remove materials encountered to limits shown on Drawings, as specified or required.

G. Do not perform excavation below normal grade to remove and replace unsuitable materials until approved by Engineer.

H. Unauthorized excavation: removal of materials beyond indicated subgrade elevations or dimensions without specific direction.

1. Refilling Unauthorized Excavation

a. Trenches: use 3/4-inch crushed stone or compacted structural fill and stabilization fabric as separator material as directed.

b. Backfill and compact unauthorized excavations as specified for authorized excavations, of same classification, unless otherwise directed.

c. Excavation below normal grade

1) Notify Engineer to observe conditions when excavation has reached required subgrade elevations. Carry excavations deeper and replace excavated material with compacted structural fill or crushed stone if unsuitable materials are encountered at required subgrade elevations as directed.

2. Excavation Above Normal Grade

a. Remove from Site and dispose of legally if unsuitable materials are encountered above normal grade. Do not use unsuitable materials as backfill on any portion of Project unless approved.

b. Use approved suitable stockpiled material to replace unsuitable material to backfill trenches to dimensions for pipe and structure bedding and backfill as shown on Drawings. Use gravel borrow to complete trench backfills to elevation shown for pipe and structure backfill if suitable stockpile material is not sufficient to backfill trenches to required dimensions.

I. Site Clearing

1. Clear site in accordance with Section 31 10 00.

3.4 EXCAVATION IN ASPHALT PAVEMENT AREAS

A. Saw cut or mill to full depth through existing pavement for pipe or structure placement prior to excavation. Minimize disturbance of remaining pavement.

B. Use shoring and bracing where sides of excavation will not stand without undermining pavement.

C. Remove and legally dispose of existing pavements during course of Work. Avoid mixing existing pavement material with excavation material intended for backfill.

3.5 EXCAVATION FOR TRENCHES

A. Excavate to widths shown on Drawings.

B. Produce an evenly graded flat trench bottom at subgrade elevation required for installation of pipe and bedding material.

C. Load excavated material directly into trucks unless otherwise approved.

D. Place backfill material directly into trench or excavation. Do not stockpile material to be used as backfill in traffic areas.

3.6 EXCAVATION FOR STRUCTURES

A. Excavate to indicated elevations and dimensions within tolerance of plus or minus 1 inch. Extend excavations sufficient distance from structures for placing and removing concrete formwork, for installing services and other construction, and inspections.

1. Excavate footings, foundations, and structures to final grade by hand just before concrete reinforcement placement. Do not disturb bottom of excavation. Trim bottoms to required lines and grades to leave solid base to receive other Work.

2. Do not excavate to final subgrade level until geotextile and compacted structural fill or crushed stone layer can be placed immediately to avoid softening or deterioration of formation. Leave a minimum depth of 3 feet overlying the final subgrade level in place where geotextile and compacted structural fill or crushed stone layer are not immediately placed.

3. Do not allow trafficking on final subgrade or upper surface of crushed stone layer without prior placement of approved sacrificial haulage layer.

B. Approval of Subgrade

1. Notify Engineer when excavations have reached required subgrade. Remove last 6 inches just prior to inspection.

2. Clear subgrade of soft, spongy or other material unsuitable for founding. Continue excavation and replace with compacted structural fill as directed if independent inspection and testing agency or geotechnical consultant determines presence of unsatisfactory soil.

3. Finished subgrade tolerance: plus or minus 1 inch.

4. Seal subgrade and protect from degradation.

5. Re-compact exposed surfaces prior to placing compacted structural fill or constructing foundations in accordance with Article 3.11, with a minimum 4 passes with double-drum vibratory roller compactor following excavation to foundation bearing levels in natural soils, using Bomag BW 60 S or similar. Engineer may waive re-compaction if integrity of subgrade soils is compromised. Do not proof-roll wet or saturated subgrades.

6. Reconstruct subgrades damaged by freezing temperatures, frost, rain, accumulated water or construction activities affecting final subgrade.

7. Seal formations within 4 hours of inspection with specified geotextile and compacted structural or crushed stone fill.

8. Protect formations from loosening by trafficking or resulting from high groundwater table.

C. Provide monitoring of geotechnical instrumentation against predefined target performance values.

3.7 PROCESSING OF ON-SITE URBAN FILL USED FOR BACKFILL

A. Excavate urban fill where encountered in Work to designated depths and stockpile until processed.

B. Pass on-Site cohesionless soils excavated from trench through mechanical screen to remove particles larger than 3 inches.

C. Reuse only processed urban fill containing maximum of 5 percent by dry weight of roots, plants, sod, clay lumps or other cohesive soils.

3.8 ROCK REMOVAL

A. Notify Engineer immediately of change in classification. Expose bedrock surface to allow Engineer to perform an elevation survey and take cross-sectional measurements if bedrock is encountered above trench bottom grade or above subgrade elevation.

B. Perform rock excavation by mechanical methods only. Do not blast.

C. Remove or partially remove boulders exposed on sides or bottom of excavations as directed. Remove boulders to

1. minimum 2 feet outside structure walls

2. minimum 12 inches outside footings

3. minimum 6 inches below under-slab subgrade

4. minimum lateral trench width line limits indicated

5. minimum 12 inches below underside of pipes

D. Refill depressions resulting from removal of boulders and rock with approved compacted bedding.

E. Refill unauthorized rock excavations, or excavations made beyond or below indicated or directed excavation limits, with compacted bedding.

F. Remove and legally dispose of unused rock and boulders off-Site.

G. Remove and legally dispose of residual solids to limits shown on Drawings, as specified, or needed to complete Project in accordance with Laws and Regulations.

3.9 SHORING AND BRACING

A. Provide in accordance with Section 31 50 00.

3.10 BACKFILL AND FILL

A. General

1. Suspend operations when weather conditions are unsatisfactory for placing backfill and avoid disturbing placed material and approved excavations.

2. Remove and replace excavation or material previously placed that have softened or eroded, soft and yielding material, or other unsuitable or damaged areas with compacted backfill as specified.

3. Do not backfill excavations and trenches until new utilities and structures have been inspected and tested satisfactorily for conformance with Drawings and Specifications unless directed. Place soil material in layers to required elevations as shown on Drawings or specified. Fill, backfill, and compact in accordance with this Section to produce minimum subsequent settlement of material. Provide support for surface treatment or structure to be placed on material. Place material in approximately horizontal layers beginning at lowest area, maintaining drainage. Replace frozen or saturated fill in stockpiles with suitable off-Site fill.

B. Provide compacted structural fill or backfill for structure, placed beneath the structures' foundations and slabs-on-grade where unsuitable soil has been over excavated below design subgrades, and against below grade walls.

C. Do not reuse excess excavated on-Site soils as compacted structural fill below foundations.

D. Ground Surface Preparation

1. Remove asphalt and concrete pavements, granular base course, existing sandy and gravelly fills, existing organic silty clay soils, organic peat, vegetation, debris, unsatisfactory soil materials, obstructions, and deleterious materials from ground surface to excavation subgrade prior to placement of fills.

2. When existing ground surface has a density less than specified for a particular area classification, break up ground surface, pulverize, moisture-condition to optimum moisture content, and compact to required depth and percentage of maximum density.

E. Placement

1. Place backfill and fill materials in layers of maximum 6 inches in loose depth for material compacted by heavy compaction equipment or hand-operated tampers. Do not place backfill or fill material on surfaces that are muddy, frozen, or contain frost or ice.

2. Place backfill and fill materials evenly, adjacent to structures, to required elevations. Prevent wedging action of backfill against structures by carrying material uniformly around structure to approximately same elevation in each lift.

3. Do not allow heavy machinery within 5 feet of structure during backfilling and compacting.

F. Backfilling Excavations

1. Backfill excavations promptly as Work permits and after completion of the following.

a. Inspection and recording locations of underground utilities and structures

b. Removal of concrete formwork

c. Removal of shoring and bracing, and backfilling of voids with satisfactory materials

d. Removal of trash and debris

2. Backfill under existing utility pipes crossed by new utility pipes with CDF. Extend CDF continuously from bedding of new pipe to utility pipe crossed, including a 6-inch thick envelope around existing utility pipes.

3. Backfill with CDF when clearance between proposed structure and existing structure is 18 inches or less and sufficient clearance is not provided to obtain suitable compaction.

4. Backfill with CDF for trenches within impervious surfaces with pipes containing less than 3 feet of cover.

5. Provide that 3/4 inch crushed stone backfill stands at its own angle of repose. Do not haunch or form with common fill.

G. Backfilling Trenches

1. Place pipe and structure bedding, and gravel bedding to extent and dimensions shown on Drawings so pipes and structures have complete and uniform bearing.

2. Grade, compact, and shape pipe and structure bedding so full length of pipe barrel has complete and uniform bearing. Dig bell holes and depressions for joints after bedding has been graded and compacted, at proper clearance for jointing pipes.

3. Carefully hand place and compact additional approved bedding to limits shown on Drawings following inspection and approval of pipe installation by Engineer. Perform hand or mechanical tamping on sides of pipe.

4. Place 6 inches of suitable backfill with stones a maximum of 3 inches in diameter in trenches above pipe crown; 6 inches above crown of highest pipe around structures and up to underside of pavement. Spread in layers of maximum 6 inches in loose thickness and compact in accordance with Article 3.11, and each layer by minimum 4 passes with approved vibratory compactor. Avoid disturbance of Work and existing structures. Adjust moisture content of backfill for proper compaction.

5. Bed pipe in 3/4-inch crushed stone pipe and structure bedding as shown on Drawings. Remaining trench backfill: as shown on Drawings.

6. Restore surface of trenches in cross-country runs to pre-existing conditions as shown on Drawings, mounding trench 6 inches above existing grade or as directed.

H. Earthen Embankment Fill

1. Strip organic topsoil, trees, shrubs and roots of other vegetation along length and breadth of areas having fill material placed on top. Fill depressions left by grubbing and stripping with same type material and compact to a density at least equal to surrounding foundation material.

2. Replace unsuitable soil with compacted fill material identified by independent inspection and testing agency or Engineer.

3. Proof roll subgrades as directed prior to placement of fill. Excavate soft areas and replace with appropriate compacted fill.

4. Do not place embankment over porous, wet, frozen, or spongy subgrade or previous embankment surfaces. Excavate and remove unsuitable material prior to placing additional fill.

5. Dewater to maintain groundwater levels a minimum of 1 foot below bottom of excavations or subgrades. Place fill in-the-dry.

6. Bench existing slopes prior to placing horizontal fill layers on existing slopes greater than 6H:1V.

7. Place materials in continuous horizontal layers in loose lift thickness of maximum 8 inches.

8. Compact soil materials in accordance with Article 3.11 in accordance with ASTM D1557, with water content of plus or minus 2 percent moisture content. Remove and replace with drier fill if wet fill cannot be compacted as specified.

9. Uniformly water fill that is too dry for proper compaction with sufficient water to allow compaction to required density.

10. Compact impervious and semi pervious materials with more than 15 percent passing the #200 sieve, with a tamping sheep-foot roller or rubber-tired roller. Scarify surface before placement of next lift if compaction results in smooth surface on top of lift.

11. Remove and replace fill that is disturbed after compaction and re-compact to specified degree of compaction.

12. Place and compact soil material on embankment in a direction parallel to embankment top.

3.11 COMPACTION

A. Use approved methods that produce required degree of compaction throughout entire depth of material placed without damage to new or existing facilities. Adjust moisture content of soil as required. Remove and replace material that is too wet to compact to required density. Compact each layer as Work progresses.

B. Place compacted structural fill for support of footings and foundations and against below grade walls in loose lift thicknesses not exceeding 10 inches. Compact to minimum 95 percent maximum dry density in accordance with ASTM D1557.

C. Place backfill in open areas with self-propelled vibratory rollers, and hand-guided equipment in confined areas. Loose lift thickness: maximum 6 inches.

D. Perform a minimum 4 systematic passes to compact each lift with specified compaction equipment.

E. Place backfill and fill soil materials evenly on sides of structures to required elevations, and uniformly along full length of each structure.

| Compaction Method | Maximum Stone Size | Maximum Loose Lift Thickness | | Minimum Number of Passes | |
|---|---|---|---|---|---|
| | | Below Pavement | Less Critical Areas | Below Pavement | Less Critical Areas |
| Hand-operated vibratory plate or light roller in confined areas | 4 inches | 6 inches | 8 | 4 | 4 |
| Hand-operated vibratory drum rollers weighing at least 1,000 pounds in confined areas | 6 inches | 10 inches | 12 inches | 4 | 4 |
| Light vibratory drum roller minimum weight at drum 5,000 pounds, minimum compaction force 10,000 pounds | 8 inches | 6 inches | 18 inches | 4 | 4 |
| Medium vibratory drum roller min. weight at drum 10,000 pounds, minimum compaction force 20,000 pounds | 8 inches | 6 inches | 24 inches | 6 | 6 |

F. Degree of Compaction

| Fill and Backfill Location | Minimum Density |
|---|---|

| | |
|---|---|
| Top 3 feet under pavement grade | 95 percent of maximum |
| Below slabs and foundations | 95 percent of maximum |
| Below top 3 feet under pavement grade | 92 percent of maximum |
| Pipe Bedding | 92 percent of maximum |
| Beside structure foundation walls | 95 percent of maximum |
| Maximum density | ASTM D698, modified |
| Field density tests | ASTM D1556 (sand cone) or<br>ASTM D6938 (nuclear methods) |

G. Disc harrow or dry fill material that is too wet for compaction to specified moisture content and to required density. Remove and replace with drier fill that cannot be dried within 48 hours of placement.

3.12 GRADING

A. Uniformly grade areas, including adjacent transition areas. Smooth finished surface within specified tolerances. Compact with uniform levels or slopes between points where elevations are shown, or between points where elevations are shown and existing grades.

B. Grade areas adjacent to structure lines to drain away from structures and prevent ponding.

C. Finish surfaces: free from irregular surface changes and as follows.

1. Finish lawn or other unpaved areas to receive topsoil to within a maximum 0.10 feet above or below required subgrade elevations.

2. Shape surface of areas under pavement to line, grade and cross-section, with finish surface not more than plus or minus 1 inch above or below required subgrade elevation.

3.13 RIPRAP

A. Place riprap to full depth of $1.5D_{50}$ in one operation without special handwork, measured perpendicular to face of slope to obtain uniform appearance true to line and grade. Place larger stones at bottom of slope. Place stones in close contact with interlocking of face stones and backing stones. Fill openings between stones with smaller stones. Embed, re-orient or discard loose stones or excessively large stones projecting above surface.

3.14 EROSION CONTROL

A. Provide erosion control measures in accordance with Section 31 25 00.

3.15 PROTECTION

A. Protect newly graded areas from traffic and erosion. Keep free of trash and debris. Repair and re-establish grades in settled, eroded, and rutted areas to specified tolerances.

B. Scarify surface, re-shape, and compact to required density prior to further construction where completed compacted areas are disturbed by subsequent construction operations or adverse weather. Immediately repair any subsequent settling and provide maintenance for remainder of Work.

C. Remove soft or unsuitable material and replace with suitable backfill material prior to paving on sub-grade. Bring low sections, holes, or depressions to required grade with approved material. Shape sub-grade to line, grade, and cross section, and thoroughly compact.

D. Keep roads free of debris. Use watertight vehicles for hauling wet materials over roads and streets. Promptly clean materials dropped or spread by vehicles or when directed by Engineer.

3.16 FIELD QUALITY CONTROL

A. Provide in accordance with Division 01 General Requirements.

B. Owner may engage a qualified special inspector to perform the following special inspections in addition to the Contractor's independent testing.

1. Confirm specified fill and backfill are used.

2. Confirm preparation of Site.

3. Observe removal of existing unsuitable foundation materials from footing and slab areas and confirm character of material encountered at bearing levels.

4. Confirm compliance of fill material and maximum lift thickness.

5. Confirm compliance of in-place density of compacted fill with required frequency.

6. Observe preparation of footing bearing surfaces.

7. Confirm suitability of excavated soils for reuse as fill, including reuse of on-Site soils as common fill.

C. Perform at least 1 test of each soil stratum at foundation subgrades to verify design bearing capacities. Subsequent verification and approval of other footing subgrades may be based on visual comparison of subgrade with tested subgrade when approved.

D. Engage an independent testing agency to test compaction of soils in place in accordance with ASTM D1556, ASTM D2167, ASTM D2922, and ASTM D2937.

1. Tests

a. Paved and structure areas: at subgrade and each compacted fill and backfill layer, at least 1 test for every 2000 square feet or less of paved area or concrete slab, with minimum 3 tests.

b. Foundation walls backfill: at each compacted backfill layer, at least 1 test for every 100 feet or less of wall length, with minimum 2 tests.

c. Trench backfill: at each compacted initial and final backfill layer, at least 1 test for every 150 feet less of trench length, with minimum 2 tests.

2. Scarify and moisten or aerate, or remove and replace soil materials to depth required when testing agency reports subgrades, fills, or backfills have not achieved degree of compaction specified. Re-compact and re-test until specified compaction is obtained.

3. Determine actual in-place densities using field tests as directed.

4. Perform additional Work to obtain proper compaction if in-place densities do not meet specified densities. Retest if directed by Engineer.

5. Tests for Pipe Backfill

a. Suitable backfill: compact backfill in maximum loose lifts per table above. Conduct 1 field density test every 50 linear feet for each lift for utility lines.

b. Pavement sub-base: minimum 1 field density test of sub base for every 50 linear feet of paved area.

PART 4 – BASIS OF PAYMENT:

4.1 METHOD OF MEASUREMENT:

A. Measurement will be as per MaineDOT Standard Specification Section 203.18 and 304.06.

4.2 BASIS OF PAYMENT:

A. Payment will be as per MaineDOT Standard Specification Section 203.19 and 304.07.

B. Payment will be made under:

| Pay Item | | Pay Unit |
|---|---|---|
| 203.20 | Common Excavation | Cubic Yard |
| 203.24 | Common Borrow | Cubic Yard |
| 203.35 | Crushed Stone 3/4-inch | Cubic Yard |
| 304.10 | Aggregate Subbase Course - Gravel | Cubic Yard |
| 304.15 | Aggregate Base Course – Type B | Cubic Yard |

**END OF SECTION**

# SECTION 31 25 00 - EROSION AND SEDIMENTATION CONTROLS

All work and materials shall conform to the Contract Documents and the provisions of the State of Maine Department of Transportation Standard Specifications, Revision November 2014 Section 656 with the following additions:

Add the following:

PART 1 – GENERAL

1.1 RELATED DOCUMENTS

A. The drawings and general conditions of the Contract, including General and Supplementary Conditions and MaineDOT Division 100, General Conditions, apply to this section.

1.2 SUMMARY

A. Section Includes

1. Provide and install permanent devices to control erosion, siltation, and sedimentation in accordance with this Section and applicable reference standards listed in Article 1.03.

1.3 REFERENCES

A. Reference Standards

1. MaineDEP – Maine Erosion & Sedimentation Control Practices Field Guide for Contractors.
2. MaineDOT Standard Specifications
   a. Section 656 – Temporary Soil Erosion and Water Pollution Control
3. Order of Conditions

1.4 SUBMITTALS

A. Product Data: for permanent erosion control matting.

B. Manufacturer's Instructions

C. Closeout and Maintenance Material Submittals: per Division 01 General Requirements.

PART 2 – PRODUCTS

2.1 MATERIALS

A. Permanent Erosion Control Blanket

1. Provide as shown on Drawings or as directed by Engineer in compliance with the Order of Conditions to prevent slope erosion. If sequence of operations is such that only portions of slopes have been completed, preserve those portions by seeding and installation of erosion control blanket when directed, prior to completion of remaining portions of slope.
2. Provide soft pine wood wedges and stakes of biodegradable materials as recommended by manufacturer.
3. Coir log: coconut fiber mats woven into a matrix in compliance with the following.

| PROPERTY | Test Method | Parameter |
|---|---|---|
| Weight | ASTM D 3776 | 17.8 oz/SY (600 g/m2) |
| Wide width tensile strength Wet<br>Machine direction<br>Cross direction | ASTM D 4595 | <br>910 lbs/ft (13.3 kN/m)<br>870 lbs/foot (12.7 kN/m) |
| Wide width tensile strength Dry<br>Machine direction<br>Cross direction | ASTM D 4595 | <br>1130 lbs/foot (16.5 kN/m)<br>1040 lbs/foot (15.2 kN/m) |
| Elongation at failure Wet<br>Machine direction<br>Cross direction | ASTM D 4595 | <br>32 percent<br>26 percent |

| | | |
|---|---|---|
| Open area | Calculated | 58 percent |
| Thickness | ASTM D 177 | 0.35 inch (9 mm) |
| Recommended shear stress | | 4 lbs./sq. ft. (192 N/sq.m.) |
| Recommended flow | | 10 fps (3 m/s) |
| Recommend slope | | 2:1 |

B. Straw mulch: MassDOT M6.04.2, long fibered straw, 100 percent certified weed free, free from foreign matter detrimental to plant life, and in dry condition.

C. Tackifier: biodegradable and non-toxic bonding adhesive agent during hydraulic seeding or straw mulching to minimize wind and water effects.

PART 3 – EXECUTION

3.1 GENERAL

A. Prevent erosion of soil and to prevent silting of drainage ditches, storm sewers, rivers, streams, and lakes.

B. Prevent migration of soil outside of project area as defined on Construction Drawings.

C. Limit duration of exposure of soils on embankments, excavations, and graded areas.

D. Install erosion control measures in any ditch, swale or channel before runoff flows to waterways.

3.2 PREPARATION

A. Protection

1. Provide pollution prevention measures, erosion and sedimentation control, before, during and after soils are exposed. Implement and maintain erosion and sedimentation control measures as necessary until Site is permanently stabilized.

2. Stabilize areas shown on Drawings with permanent erosion control practices immediately, and within 14 days after construction activity on a particular portion of Site has permanently ceased, except where construction activities will resume on the particular portion of Site within 21 days, and where snow cover precludes initiation of stabilization measures.

B. Conform to grades and cross sections for slopes and ditches shown on Drawings.

C. Finish to a smooth and even condition. Rake out and remove debris, roots, stones, and lumps.

D. Loosen soil surface to permit bedding of matting.

E. Apply seed prior to placement.

F. Dewater trenches and swales to install materials in the dry.

3.3 INSTALLATION

A. Install erosion control blanket and straw mulch in accordance with manufacturer’s instructions, the following, and as shown on Drawings or directed by Engineer. Submit manufacturer's instructions to Engineer prior to installation. Place immediately following seeding.

B. Install erosion control blanket onto slopes that have been graded, seeded, completed to required line and where grades are steeper than or equal to 3:1 as shown on Drawings and directed by Engineer.

C. Place strips lengthwise in direction of flow of water.

D. Overlap ends at least 6 inches in a shingle fashion.

E. Turn down up-slope end of each strip of matting and bury to a depth of not less than 6 inches with soil firmly tamped against it.

F. Engineer may require that any edge exposed to more than normal flow of water be buried in a similar manner.

G. Build check slots at right angles to direction of flow of water. Space so one check slot or one end

occurs within each 50 feet of slope length. Construct by placing a tight fold of matting at least 6 inches vertically into ground, and tamp same as up-slope ends.

H. When directed by Engineer, spread additional seed over matting, particularly at locations disturbed by building the slots. Press matting onto ground with a light lawn roller or similar means.

I. Use pine wedges to fasten coir to ground. Metal staples are not allowed. Pound vertically flush to surrounding surface, not protruding above finished grade. Place pine wedges in same locations as recommended by manufacturer for staples.

J. On grades 4:1 or steeper, place pine wedges in same 3 rows, but spaced 2 feet apart.

K. On overlapping or butting edges, double pine wedges, with spacing halved. Secure ends of matting and required check slots spaced every foot.

L. Apply weed free straw mulch in combination with erosion control blanket on side slopes steeper than 3:1.

M. Place mulch according to MassDOT Section 767. Do not use short fibered material or material so wet or decayed that it cannot be properly spread. Apply tackifier as needed.

N. Maintain areas mulched or matted, until Project acceptance.

O. Maintain swales by removing silt that reaches a depth of over one foot, until Project acceptance.

3.4 REPAIR/RESTORATION

A. Repair matting immediately if any pine anchors become loosened or raised, or if any matting becomes loose, torn, or undermined.

3.5 FIELD QUALITY CONTROL

A. Provide in accordance with Division 01 General Requirements.

B. Site/Field Tests and Inspections

1. Inspections of disturbed soil areas, material storage areas exposed to precipitation and erosion control measures will be conducted by both Contractor and Engineer a minimum of once every 14 days and also within 24 hours after any storm event greater than 0.5 inches of rainfall. Immediately correct deficiencies identified.

2. Inspect erosion control blanket immediately after each rainfall and at least daily during prolonged rainfall or snowmelt for damage. Make appropriate repairs or replacement until acceptance by Engineer.

PART 4 – BASIS OF PAYMENT:

4.1 METHOD OF MEASUREMENT AND PAYMENT:

A. Measurement and Payment will be per MaineDOT Standard Specification Section 656.5.1

B. Payment will be made under:

| Pay Item | | Pay Unit |
|---|---|---|
| 656.75 | Temporary Soil Erosion and Water Pollution Control | Lump Sum |

**END OF SECTION**

# SECTION 31 50 00 - EXCAVATION SUPPORT AND PROTECTION

All work and materials shall conform to the Contract Documents and the provisions of the State of Maine Department of Transportation Standard Specifications, Revision November 2014, with the following additions:

Add the following:

PART 1 – GENERAL

1.1 RELATED DOCUMENTS

A. The drawings and general conditions of the Contract, including General and Supplementary Conditions and MaineDOT Division 100, General Conditions, apply to this section.

1.2 SUMMARY

A. Section Includes

1. Provide excavation support and protection in accordance with this Section and applicable reference standards listed in Article 1.03.

B. Related Requirements

1. Section 31 00 00 - Earthwork

1.3 REFERENCES

A. Reference Standards

1. American Institute of Steel Construction (AISC)

a. Steel Construction Manual

2. ASTM International (ASTM)

a. ASTM A36 Standard Specification for Carbon Structural Steel

b. ASTM A307 Standard Specification for Carbon Steel Bolts, Studs, and Threaded Rod 60000 PSI Tensile Strength

c. ASTM A328 Standard Specification for Steel Sheet Piling

d. ASTM A572 Standard Specification for High-Strength Low-Alloy Columbium-Vanadium Structural Steel

e. ASTM A615 Standard Specification for Deformed and Plain Carbon-Steel Bars for Concrete Reinforcement

f. ASTM A690 Standard Specification for High-Strength Low-Alloy Nickel, Copper, Phosphorus Steel H-Piles and Sheet Piling with Atmospheric Corrosion Resistance for Use in Marine Environments

g. ASTM A992 Standard Specification for Structural Steel Shapes

3. American Welding Society (AWS)

a. D1.1 - Structural Welding Code, Steel

1.4 ADMINISTRATIVE REQUIREMENTS

A. Pre-installation Conference

1. Review geotechnical report, existing utilities and subsurface conditions.

2. Review coordination for interruption, shutoff, capping, and continuation of utility services.

3. Review instrumentation and monitoring program, and dewatering program. Confirm coordination with instrumentation and monitoring, and dewatering activities.

4. Review proposed excavations and equipment, monitoring of excavation support and protection system and abandonment or removal of excavation support and protection system.

1.5 SUBMITTALS

1. Do not begin excavation requiring support until submittals are approved.

B. Product Data

1. Include construction details, material descriptions, performance properties, dimensions of individual components and profiles, and calculations for excavation support and protection system for each type of product.

C. Shop Drawings

1. Plans, elevations, sections, and details for excavation support and protection system, by professional engineer licensed in the state where Project is located

2. Arrangement, locations, and details of soldier piles, sheet piling, lagging, tiebacks, bracing, and other components of excavation support and protection system

3. Written plan for excavation support and protection, including sequence of construction of support and protection coordinated with progress of excavation

D. Calculations and analysis data for excavation support and protection system by professional engineer licensed in the state where Project is located

E. Closeout and Maintenance Material Submittals: per Division 01 General Requirements.

1. Identify locations and depths of capped utilities, abandoned-in-place support and protection systems, and other subsurface structural, electrical, or mechanical conditions on record documents.

1.6 QUALITY ASSURANCE

A. Qualifications: per Division 01 General Requirements for Installer and professional engineer.

1.7 DELIVERY, STORAGE, AND HANDLING

A. Provide in accordance with Division 01 General Requirements.

1.8 SITE CONDITIONS

A. Review geotechnical report and determine need to perform additional test borings and conduct other exploratory operations necessary for excavation support and protection.

B. Verify dimensions and elevations before starting Work. Survey condition of adjoining properties with Engineer. Take photographs, recording any prior settlement or cracking of structures, pavements, and other improvements. Prepare list of existing damages, verified by dated photographs, signed by Contractor, Engineer and others conducting the investigation.

C. Survey adjacent structures and improvements, establishing exact elevations at fixed points to act as benchmarks. Identify benchmarks and record existing elevations. Locate datum level where it will not be affected by excavation operations.

D. During excavation, re-survey benchmarks weekly. Maintain log of surveyed elevations for comparison with original elevations. Notify Engineer if changes in elevations occur, or if cracks, sags or other damage is evident.

E. Interruption of Existing Utilities

1. Do not interrupt any utility serving facilities without Owner's written permission. Provide temporary utility if required.

2. Provide minimum 5 days' advance notice of proposed interruption of utility.

PART 2 – PRODUCTS

2.1 MATERIALS

A. Provide shoring and bracing materials, in serviceable condition and adequate for intended purpose.

B. Steel sheet piling and shapes: continuous interlocking type; section modulus, type of section specified, in accordance with ASTM A328, ASTM A572, and ASTM A690, with continuous interlocks.

C. Provide movable box where shoring system is required, and where sheet piling is not specified.

D. Bracing members: wood timbers or steel members in accordance with ASTM A36.

E. Provide bolts in accordance with ASTM A307.

F. Provide structural steel in accordance with ASTM A36, ASTM A690, and ASTM A992.

G. Wood lagging: lumber, mixed hardwood, pressure-treated.

H. Provide reinforcing bars in accordance with ASTM A 615, Grade 60, deformed.

2.2 DESIGN CRITERIA

A. Provide services by professional engineer licensed in the state where Project is located, including preparation of Shop Drawings.

B. Design excavation support system in accordance with earth pressures and other criteria indicated, for construction of permanent structures without excessive movement or settlement of adjacent buildings, roadways, structures, or utilities, as shown on Drawings and as specified. Include analysis by professional engineer licensed in the state where Project is located.

C. Earth support design: coordinated dewatering design incorporating lowest anticipated excavation depths and full differential water head during dewatering.

D. Consult official records of both surface and subsurface existing utilities and connections to verity existing conditions and limitations as they apply to this Work and its relation to other construction work. Proceed with caution in areas of utility facilities. Excavate by hand, or other methods acceptable to utility owner. Protect existing utilities to remain within and adjacent to Work area in accordance with requirements of authorities having jurisdiction.

PART 3 – EXECUTION

3.1 GENERAL

A. Anchor and brace system to resist earth and hydrostatic pressures, including surcharges from surface loads. Support excavation to prevent undermining or disturbance to foundations of existing structures and utilities, or of ongoing or previously completed Work. Shore, support, and protect utilities encountered.

B. Install excavation support and protection systems to ensure minimum interference with roads, streets, walks, and adjacent occupied and used facilities.

1. Do not close or obstruct streets, walks, or adjacent occupied or used facilities without approval. Provide alternate routes around closed or obstructed traffic ways if required.

C. Maintain shoring and bracing while excavation is open.

D. Check base stability.

E. Prevent surface water from entering excavations.

F. Monitor vibrations, settlements, and movements to ensure stability of excavations and constructed slopes to prevent damage to permanent structures.

3.2 STEEL SHEET PILING

A. Install 1-piece sheet piling lengths and interlock vertical edges to form a continuous barrier before starting excavation.

B. Place piling using templates and guide frame unless otherwise specified by sheet piling manufacturer. Limit vertical offset of adjacent sheet piling to 60 inches. Align exposed faces of sheet piling to vary not more than 2 inches from a horizontal line, and not more than 1:120 out of vertical alignment.

C. Cut off sheet piling to be left in place at least 5 feet below finish grade. Indicate location of sheet piling cut off and left in place on record documents.

D. Remove steel sheet piling following completion of Work where shown on Drawings or directed by Engineer. Obtain approval for steel sheet piling to be left in place.

3.3 BRACING

A. Locate bracing to clear columns, floor framing construction, and other permanent Work. Install new bracing before removing original brace if moved. Do not place bracing where it will be cast into permanent concrete Work unless approved by Engineer.

B. Install internal bracing if required to prevent spreading or distortion of braced frames.

C. Maintain bracing until structural elements are supported by other bracing, or until permanent construction is able to withstand lateral earth and hydrostatic pressures.

3.4 REPAIR/RESTORATION

A. Remove excavation support and protection systems in stages to avoid disturbing underlying soils and rock, or damaging structures, pavements, facilities, and utilities.

B. Fill voids immediately with approved backfill compacted to density specified in accordance with Section 31 00 00.

C. Repair or replace adjacent Work damaged or displaced by removing excavation support and protection systems.

3.5 FIELD QUALITY CONTROL

A. Resurvey benchmarks twice weekly during installation of excavation support and protection systems, excavation progress, and for as long as excavation remains open. Maintain an accurate log of surveyed elevations and positions for comparison with original elevations and positions. Promptly notify Owner if changes in elevations or positions occur, or if cracks, sags, or other damage is evident in adjacent construction.

B. Promptly correct detected bulges, breakage, or other evidence of movement to ensure that excavation support and protection system remains stable.

C. Promptly repair damages to adjacent facilities caused by installation or faulty performance of excavation support and protection systems.

PART 4 – BASIS OF PAYMENT:

A. Costs related thereto for Excavation Support and Protection shall be Incidental to the Contract.

**END OF SECTION**

# SECTION 32 31 00 - HEAVY DUTY SWING GATE SYSTEM

All work and materials shall conform to the Contract Documents and the provisions of the State of Maine Department of Transportation Standard Specifications, Revision November 2014, with the following additions:

Add the following:

The gate itself specified herein along with associated concrete foundations is not included in the contract for construction. Electrical power and data shall be installed under base bid. Excavation, foundations, backfill and compaction testing for the gate shall be provided by the Owner under separate contract. The Contractor shall take note of the following information and coordinate all aspects of both the base bid and separate contract work. Sub-base, base, and paving shall be provided under base bid.

The following description of gate work is provided for the Contractor's information and benefit:

PART 1 - GENERAL:

1.01 SECTION INCLUDES:

A. The work in this section shall include furnishing all labor, materials, equipment and appliances necessary to complete all Heavy Duty Swing Gate Systems required for this project in strict accordance with this specification section and drawings. The gate and operator shall be specifically designed to complement each other as a system and be provided by a single manufacturer. Components (operator from one source and gate panel from another) assembled at the job site to form a system will not be approved.

1.02 REFERENCES:

A. Underwriters Laboratory Gate Operator Requirements (UL 325). See 3.01 B.

B. ASTM F 2200 Standard Specification for Automated Vehicular Gate Construction. See 3.01 B.

C. American Welding Society AWS D1.2 Structural Welding Code. See 1.03 C.1.

1.03 SUBMITTALS:

A. Product Data:

1. Provide manufacturer's catalog cuts with printed specifications and installation instructions.
2. Deliver two copies of operation and maintenance data covering the installed products. Manual to include parts list showing manufacturer's names and part numbers for the gate operator.

B. Shop Drawings:

1. Supply shop drawings showing the relationship of operating systems with gate components, including details of all major components.
2. Include complete details of gate construction, gate height ane post spacing dimensions.

C. Certifications:

1. Gate in compliance with ASTM F 2200, Standard Specification for Automated Vehicular Gate Construction per section 1.02 B.
2. The gate operator shall be in compliance with UL 325 as evidenced by UL listing label attached to gate operator. See 1.02 A
3. Gate manufacturer shall provide independent certification as to the use of a documented Welding Procedure Specification and Procedure Qualification Record to insure conformance to the AWS D1.2 welding code. Upon request, Individual Certificates of Welder Qualification documenting successful completion of the requirements of the AWS D1.2 code shall also be provided. See 1.02 C.

PART 2 - PRODUCTS:

2.01 HEAVY DUTY SWING GATE SYSTEM MANUFACTURER:

A. The swing gate system shall be manufactured by Tymetal Corp., 678 Wilbur Avenue, Greenwich, NY 12834 – (800) 328-4283.

B. Approved Substitution: All other systems must be submitted to the design team in accordance with substitution requirements as set forth in the general provisions of the specification manual for approval prior to the bid date. Products submitted after the bid date will not be approved.

2.02 TYM-200-SW GATE OPERATOR DETAILS:

A. Model TYM-200-SW swing gate operator shall open and close swing gates, providing convenience and security. This model is adapted to function with most accessories including: radio controls, single and three button control stations, digital keypads, sensing loops. The TYM-200-SW is available in 115/208/230 Volt AC single phase or 208/230/460 Volt AC three phase power. Control voltage in each case is 24 Volt DC.

2.03 DESIGN CRITERIA:

A. Features include and integral APeX Controller. Operation shall be by means of 1 horsepower single or three phase C-faced instant reversing motor, transferring power to a heavy duty right angle oil bath gear reducer. Power is transferred from the gear reducer to a heavy duty 3 inch diameter torque limiter and #40 plate sprocket. From the torque limiter, power transfers to the 1-1/8 inch output drive shaft with solid cast aluminum arm crank and harmonic action articulating swing gate arm attached to the gate.

B. The Articulating arm shall cycle the gate through to a 90 degree opening in approximately 13-15 seconds using manufacturer recommended installation. By use of an articulating arm design, the gate will start moving slowly, gradually increase in speed, the slow down again as it approaches full open.

2.04 COMPONENTS:

A. Standard mechanical components shall included as a minimum:

1. 14 Gauge weather-resistant galvannealed steel cabinet.
2. Gasketed cabinet door which is removable and lockable.
3. 1 – inch solid steel output drive shaft.
4. Heavy-duty right angle oil bath C-face gear reducer.
5. Heavy-duty pillow block bearings with grease fittings for easy maintenance.
6. Heavy-duty 3 inch diameter torque limiter.
7. Dual C-face 6 foot pound brake.
8. All welded interior steel framework.
9. Steel articulating style gate arm with manual disconnect pin, which is lockable.
10. Powder coat finish.

B. Standard electrical components shall include as a minimum:

1. 1 HP motor with thermal overload protection in 115 and 230 VAC single phase .
2. APeX Solid state logic controller featuring 15 diagnostic L.E.D. indicators and auto-close timer (1 second to 9 minutes)
3. Inherent, adjustable motor over-current sensing to detect obstructions, with separate adjustments for opening and closing directions.
4. Controller housed in zinc plated control box.
5. Power On/Off switch. In 115 VAC units, 115 VAC duplex outlets included.
6. Contacts for opening, closing and reversing accessories, as well as contact and non-contact obstruction sensing devices. 24 VDC available on terminal strip to power accessory devices.
7. Adjustable limits with precision snap-action type limit switches to control gate position.
8. Paired operation / master slave or stand alone capable with dip switch selection. Three wire twisted pair shielded cable required for paired operation.

C. Optional accessories, contact, non-contact, and control devices.

1. Control devices include pushbuttons, radio controls, keypad, card readers, key switches.
2. Contact and non-contact devices include photoelectric sensors, vehicle detectors, proximity sensors, and contact devices.

3. Accessories include flashing strobe lights, cycle counters, and intercom systems.

2.05 GATE CONSTRUCTION DETAILS:

A. Gate Frame:

1. The gate frame shall be fabricated from 6063-T6 aluminum alloy extrusions. The top member shall be a 3" x 5" (76mm x 127mm) aluminum structural channel/tube extrusion weighing not less than 3.0 lb/lf (4.4kg/m). The bottom member shall be a 2” x 5" (51mm x 127mm) aluminum structural tube weighing not less than 2.0 lb/lf (2.9kg/m).

2. Vertical Members:

a. Chain Link: The vertical members at the ends of the opening portion of the frame shall be "P" shaped in cross section with a nominal base dimension of no less than 2” x 2” (51mm x 51mm) and weighing not less than 1.6 lb/lf (2.3kg/m). The intermediate vertical members shall alternate between 2” x 2” (51mm x 51mm) and 1” x 2” (25mm x 51mm) in cross section weighing not less than 1.1 lb/lf (1.6kg/m) and 0.82 lb/lf (1.2kg/m) respectively. The spacing for the vertical intermediates shall be less than 50% of the gate frame height.

b. All welds on the gate frame shall conform to Welding Procedure Specification and Procedure Qualification Record to insure conformance to the AWS D1.2 Structural Welding Code. All individual welders shall be certified to AWS D1.2 welding code. See 1.03 C.1.

3. Each gate leaf shall be provided with a minimum of two pivoting hinges to allow proper operation, and shall be connected to the gate side of the hinge by means of two through-bolts.

B. Diagonal Bracing:

1. Diagonal "X" bracing of 3/16" or 1/4” diameter stainless or galvanized steel cable shall be installed throughout the gate to provide additional vertical adjustment.

C. Posts:

1. Gate hanger posts shall be sized in accordance with gate dimensions as specified by the manufacturer. Height of the post and depth of footing shall be as specified by the engineer.

D. The gate shall be completed by installation of approved filler as specified.

1. Chain Link: 2” x 2” x 9 gauge aluminized steel chain link fabric shall extend the entire length of the gate. Gate filler shall be secured at each end of the gate frame by standard fence industry tension bars and tied at each vertical member with standard fence industry ties.

E. Finish:

1. Gate to be mill finish aluminum or color coated with polyester powder as specified. If powder coated, the gate and all accessories shall be pretreated chemically by sand blasting or other acceptable method to ensure proper coating adherence. Gate posts (to be supplied by others) shall be galvanized or coated as specified by the design team.

PART 3 - EXECUTION:

3.01 INSTALLATION:

A. Excavate, place concrete and install specified sized posts as detailed, and in accordance with approved shop drawings. Install hinges on gate frame and gateposts. Make final adjustments to maintain alignment of gate leaves. Install equipment of this section in strict accordance with the company’s printed instructions unless otherwise shown on the contract drawings.

B. The gate and installation shall comply with UL 325 Gate Operator Requirements and ASTM F 2200, Standard Specification for Automated Vehicular Gate Construction. See 1.02 A and 1.02 B, respectively.

3.02 SYSTEM VALIDATION:

A. The complete system shall be adjusted to assure it is performing properly.

B. The system shall be operated for a sufficient period of time to determine that the system is in proper working order.

C. For operated gate systems - test and explain safety features:

1. Each system feature and device is a separate component of the gate system.
2. Read and follow all instructions for each component.
3. Ensure that all instructions for mechanical components, safety devices and the gate operator are available for everyone who will be using the gate system.
4. The warning signs shipped with the gate operator must be installed in prominent position on both sides of the gate.
5. Ensure the owner is clear with regard to the safety points concerning the basic operational guidelines of the safety features of the gate operator system. These safety points are listed in the gate operator manual and must be read prior to system use.

## PART 4 - MEASUREMENT AND PAYMENT:

### 4.01 METHOD OF MEASUREMENT:

A. Measurement for the work associated with the coordination of all aspects of the base bid and the separate contract work for Heavy Duty Swing Gate System as shown on the plans and described herein will be by the lump sum.

### 4.02 BASIS OF PAYMENT:

A. Payment for the accepted work associated with the coordination of all aspects of the base bid and the separate contract work for Heavy Duty Swing Gate System will be at the contract lump sum price. This payment will include all supervision, materials, labor and equipment necessary to complete the work

B. Payment will be made under:

| Pay Item | | Pay Unit |
|---|---|---|
| DIV. 32 | Site Improvements | Lump Sum |

**END OF SECTION**

# SECTION 33 11 00 - WATER UTILITY DISTRIBUTION PIPING

All work and materials shall conform to the Contract Documents and the provisions of the State of Maine Department of Transportation Standard Specifications, Revision November 2014, with the following additions:

Add the following:

PART 1 – GENERAL

1.1 RELATED DOCUMENTS

A. The drawings and general conditions of the Contract, including General and Supplementary Conditions and MaineDOT Division 100, General Conditions, apply to this section.

1.2 SUMMARY

A. Section Includes

1. Furnishing and installing all service piping and associated water utility appurtenances as noted on the Drawings.
2. Verifying location of existing utilities prior to construction.
3. Coordinating with the Portland Water District MEANS Group (207.774.5961) for new service and construction activities.
4. Flushing, testing and disinfection of all water distribution piping.
5. Repair of water piping damaged during construction.

1.3 REFERENCES

A. Specification Sections:

1. Earthwork: Section 31 00 00.
2. Erosion and Sedimentation Controls: Section 31 25 13.

B. Portland Water District Construction Specifications, latest version (available online https://www.pwd.org/document-library)

1.4 QUALITY ASSURANCE

A. Code Compliance: Comply with State Plumbing Code and local plumbing codes where more stringent. Comply with Maine Department of Human Services, Division of Health Engineering rules.

B. AWWA Standards: Comply with requirements of Section 4 of AWWA C601, "Preventive Measures During Construction" for cleanliness.

C. Other Standards: Comply with requirements of the Portland Water District specifications.

D. Testing: CONTRACTOR shall pay for all flushing, pressure and leakage testing, disinfection, and fire flow testing. CONTRACTOR shall pay for all inspections by the Portland Water District.

1.4 SUBMITTALS

A. Submit manufacturer's product data and installation instructions for each product specified for water service piping, tapping, valving, risers, and fittings.

B. Submit design of thrust block for 16″ diameter water main as shown on plans. Coordinate location and design requirements with Portland Water District. Submittal shall be approved by Portland Water District prior to installation of thrust block.

PART 2 - PRODUCTS

All products and materials shall be as identified in the Construction Drawings, and shall be in accordance with the Portland Water District Construction Specifications.

PART 3 - EXECUTION

The following construction related section is intended to apply to ALL new construction, both public and private. For the purposes of ensuring overall proper workmanship and compliance to these specifications, the District makes no distinction between extensions that are to be owned and maintained by the District, and private extensions installed to

serve commercial, industrial or multi-unit type projects. All work shall be performed in accordance with the Portland Water District Construction Specifications.

3.1 INSTALLATION

A. All water services shall be installed in accordance with the final approved plans and in accordance with the Portland Water District Construction Specifications. Any variation to the plans must have prior approval in writing by the District.

B. Pipe, fittings, valves, hydrants, and associated appurtenances shall be installed in accordance with the latest American Water Works Association Standards, Portland Water District Standards and as directed herein.

C. Fittings and hydrants shall be blocked for horizontal and/or vertical movement in accordance with American Water Works Association Standards and the Portland Water District Construction Specifications.

D. All main line gate boxes, service gate boxes and blow-off appurtenances shall be properly installed and raised to grade at the completion of paving or grading operations. Any gate box found to be improperly installed or not raised to grade at any point prior to the end of the one year warrantee period will be the responsibility (and cost) of the contractor to repair.

E. The trench will be kept dewatered during pipe installation. Every effort shall be made to avoid any situation where groundwater or surface water runoff is allowed to enter the main. The District reserves the right to issue a stop work order upon a project if this situation cannot be controlled.

F. Every effort and precaution must be undertaken to prevent the introduction of any foreign material (insects, rodents or other animals, sediment, organic material, etc.) from entering the pipeline, either before construction or during installation. Each pipe section shall be visibly inspected on the inside and outside prior to lowering into the trench. Failure to follow proper housekeeping during installation will result in a stop work order or rejection of the pipe system.

3.2 BEDDING & BACKFILL

A. Pipe bedding and backfill shall be in accordance with the Construction Drawings and Portland Water District Construction Specifications.

B. No backfill material which is frozen shall be placed in the trench.

C. Trench Compaction: Compaction of backfill material shall be done in 12-inch maximum lifts achieving 95% proctor, or in accordance with the specifications and requirements of the State or Municipality responsible for the street or highway involved (whichever is the more stringent). Under no circumstance shall the District authorize the start of construction for any water main without a pre-approved compaction plan in place. The Portland Water District reserves the right to hire an independent testing firm, at the expense of the contractor, to verify compliance to the approved compaction plan.

PART 4 – BASIS OF PAYMENT

4.1 METHOD OF MEASUREMENT:

A. Water Line Distribution shall be measured for payment by lump sum, complete and fully installed.

4.2 BASIS OF PAYMENT:

A. The accepted quantities of Water Line Distribution Piping will be paid for at the Contract lump sum price complete in place. Payment will be full compensation for all equipment,

labor, and materials including service piping, associated water utility appurtenances, fittings, thrust blocks, and insulation necessary to satisfactory complete the work. Excavation, backfilling and compacting will be considered incidental to the pay item.

B. Payment will be made under:

| Pay Item | | Pay Unit |
|---|---|---|
| 825.68 | Water Line Distribution Piping | LS |

**END OF SECTION**

# SECTION 33 31 00-SANITARY UTILITY SEWERAGE PIPING

All work and materials shall conform to the Contract Documents and the provisions of the State of Maine Department of Transportation Standard Specifications, Revision November 2014, with the following additions:

Add the following:

PART 1 – GENERAL

1.1 RELATED DOCUMENTS

A. The drawings and general conditions of the Contract, including General and Supplementary Conditions and MaineDOT Division 100, General Conditions, apply to this section.

1.2 DESCRIPTION:

A. Provide sanitary sewer system piping in accordance with this section, applicable reference standards listed in Article 1.03, and the Drawings.

B. Provide all labor, materials, equipment, and services necessary for proper and complete installation of the sanitary sewer piping system as indicated on the Plans and as listed herein including the following items:

1. Entire sanitary sewer piping from outside of the proposed building to the connection with the existing sewer system.

2. Underground pipe markers.

3. Bedding and cover materials.

1.3 REFERENCES

A. The publications listed below form a part of this specification to the extent referenced. The publications are referred to within the text by the basic designation only. Unless otherwise noted, the most recent version of the listed publications, including revisions, at time of bid opening shall apply.

B. AMERICAN ASSOCIATION OF STATE HIGHWAY AND TRANSPORTATION OFFICIALS (AASHTO)

1. AASHTO M 252 (2009) Standard Specification for Corrugated Polyethylene Drainage Pipe

2. AASHTO M 294 (2009) Standard Specification for Corrugated Polyethylene Pipe, 300- to 1500-mm Diameter

C. ASTM INTERNATIONAL (ASTM)

1. ASTM D 3350 (2010) Polyethylene Plastics Pipe and Fittings Materials

2. ASTM D 3034 (2008) Standard Specification for Type PSM Poly (Vinyl Chloride) (PVC) Sewer Pipe and Fittings

3. ASTM D 3212 (2007) Standard Specification for Joints for Drain and Sewer Plastic Pipes Using Flexible Elastomeric Seals

4. ASTM F 477 (2008) Standard Specification for Elastomeric Seals (Gaskets) for Joining Plastic Pipe

5. ASTM F 405 (2005) Corrugated Polyethylene (PE) Tubing and Fittings

D. AMERICAN WATER WORKS ASSOCIATION (AWWA)

1. AWWA C104/A21.4 (2008; Errata 2010) Cement-Mortar Lining for Ductile-Iron Pipe and Fittings for Water

2. AWWA C110/A21.10 (2008) Ductile-Iron and Gray-Iron Fittings for Water

3. AWWA C111/A21.11 (2007) Rubber-Gasket Joints for Ductile-Iron Pressure Pipe and Fittings

4. AWWA C150/A21.50 (2002; Errata 2003; 2008) Thickness Design of Ductile-Iron Pipe
5. AWWA C151/A21.51 (2009) Ductile-Iron Pipe, Centrifugally Cast, for Water
6. AWWA C906 (2007) Polyethylene (PE) Pressure Pipe and Fittings, 4 In. (100 mm) through 63 In., (1,575 mm) for Water Distribution and Transmission

1.4 SUBMITTALS

E. Product Data

1. Provide Manufacturer's descriptive data, technical literature, catalog cuts, and installation instructions. Product data shall also include dimensional data for each type of pipe, tube, and fitting. Prior to shipment of pipe, submit a certified affidavit of compliance from the pipe Manufacturer stating that the pipe, fittings, gaskets, linings and exterior coatings for this project have been manufactured and tested in accordance with AWWA and ASTM standards as well as the requirements specified herein.

F. Reports

1. The Contractor shall submit test reports for each section of piping tested for pressure and leakage.
2. Construction Records: Record depth and location of the following:
   a. Sewers
   b. Service capped ends, cleanouts, bends in services, connection points to sewer main.
   c. Keep all records neatly in a dedicated field notebook. Transfer to Drawings and submit to Engineer at Substantial Completion. Provide access to records for the Engineer at all times.

1.5 QUALITY ASSURANCE

A. Provide removal and disposal of all damaged pipe from the project site.

B. All piping utility work shall be in accordance with City of Portland and MaineDOT requirements.

PART 2 – PRODUCTS

2.1 PIPE AND FITTINGS - GENERAL

A. Unless otherwise indicated, all fittings and appurtenances shall be of the same type and grade of materials as the connecting pipe. All products provided under this section shall conform to current AWWA and ANSI specifications as appropriate to the type of pipe specified.

B. Provide commercially manufactured wyes or tees for service connections. Fittings shall have single piece gasket.

2.2 GRAVITY SEWER PIPE & FITTINGS

A. PVC, SDR 35 in accordance with ASTM D3034 for sizes 4 inch to 15 inch and ASTM F679 for sizes 18 inch to 48 inch. Pipe and fittings shall be PVC in accordance with ASTM D1784 Cells Class 12454 or 12364. Gaskets shall be Nitrile (NBR/Buna-N) in accordance with ASTM F477. Joints shall be push-on integral bell and spigot in accordance with ASTM D3212. Pipe stiffness shall be in accordance with ASTM D2412 with $F/\Delta Y = 46$ psi or 115 psi. Provide factory pre-fabricated wyes and fittings which match the properties of the connecting pipe. All gravity sewer piping shall be a product of the following manufacturer:

1. J-M Manufacturing Company – Ring-Tite
2. North American Pipe Corporation
3. Engineer Approved Equal

2.3 BENTONITE CLAY DAM

A. Bentonite Clay Dams: Shall consist of mineral clay material with a liquid limit of equal to or greater than 24 and a natural moisture content of at least 20 percent. The clay should be placed in dry excavations in 6-inch maximum, thick lifts and compacted to 90% of the maximum dry unit weight as determined by AASHTO T99 (Standard Proctor). The clay dams shall be 5 feet long, be in intimate contact with the trench floor, trench walls and circumference of the pipe and extend up to the bottom of the subbase gravels. The excavated existing subbase gravel or similar materials may be placed on top of the clay dams. Take care to ensure that no voids or uncompacted soil is left beside or beneath the pipe.

2.4 DETECTABLE UNDERGROUND MARKING TAPE

A. Underground marking tape shall be detectable marking tape, with a minimum 5.0 mil overall thickness. Tape shall be manufactured using a 0.8 mil clear virgin polypropylene film, reverse printed and laminated to a 0.35 mil solid aluminum foil core, and then laminated to a 3.75 mil clear virgin polyethylene film. Tape shall be printed using a diagonally striped design for maximum visibility, and meet the APWA Color-Code standard for identification of buried utilities. Text or lettering: repeated continuously along length of tape at intervals no greater than 3 feet indicating "Caution Buried Sewer Line Below"

PART 3 – EXECUTION

3.1 INSTALLATION OF GRAVITY SEWER PIPE

A. Install gravity sewer pipe and fittings in accordance with manufacturer's recommendations and the trench details as indicated on the Drawings. Use a laser beam for line and grade unless otherwise permitted by the Engineer. Secure each length of pipe with bedding before placing next length. Plug open ends of pipe when Work is suspended. Bed pipe as shown on the Drawings. Provide 30-inch minimum cover over the top of PVC pipe before the trench is wheel-loaded.

B. Lay pipe to alignment and grade shown on the Drawings. If grade is not shown, determine elevations of start and finish points for each run of pipe. Lay pipe to a uniform grade between these points. Line and grade may be adjusted by the Engineer as required by field conditions. Unless otherwise specified, indicated on the drawings or directed by the Engineer, provide bentonite clay dam every 50 LF along pipe trench. Provide minimum of 1 bentonite clay dam per trench.

C. Lay pipe in the dry. Do not use installed pipe to remove water from work area.

D. Provide bentonite clay dam every 50 feet along pipe trench. Provide a minimum of one bentonite clay dam per trench.

E. Flush all piping and remove all debris. Flushing method used shall be approved by the Engineer. Gravity flushing shall not be acceptable. Provide all labor, water, pumps and related appurtenances for pipe flushing.

F. Connections to manholes: Provide short length of pipe so that joints are located within 3 feet of inside surface of manholes for piping other than PVC pipe.

3.2 UTILITIES TO BE ABANDONED

A. Provide closure of abandoned utilities as specified and as indicated on the Drawings. Provide caps, or watertight plugs on open ends of abandoned underground utilities which are not indicated to be removed or demolished. Provide closures to withstand hydro-static or earth pressure which may result after ends of abandoned utilities have been closed.

3.3 TESTING OF SANITARY SEWERS

A. Test all sanitary sewer pipes after backfilling. Perform tests in the presence of the Engineer. A maximum of 1,000 linear feet of pipe may be installed but not tested at any time. Provide low pressure air testing of all gravity sewer piping systems as follows:

1. Plug all ends of sections to be tested.

2. Supply air slowly to the pipe to be tested until the air pressure inside the pipe is 4.0 psi

greater than the average back pressure of any groundwater submerging the pipe.

3. Disconnect air supply and allow a minimum of two minutes for stabilization of pressure.

4. Following stabilization period measure drop in pressure over the test period based on piping size.

| Nominal Pipe Size (Inches) | Test Period (Minutes) |
|---|---|
| 4 | 4 |
| 6 | 4 |
| 8 | 6 |
| 10 | 6 |
| 12 | 7 |
| 15 | 8 |
| 18 | 9 |
| 21 | 11 |
| 24 | 13 |

5. Acceptable Drop: Pressure drop shall not exceed more than 1.0 psi.

B. Deflection Test for PVC Gravity Sewer Pipe: Provide testing of all pipe with "GO-NO-GO" gauge (mandrel test) allowing a 5% maximum deflection.

C. Provide repair and retesting of all piping systems which do not pass tests using materials and methods approved by the Engineer.

PART 4 – BASIS OF PAYMENT:

4.1 METHOD OF MEASUREMENT:

A. Sanitary sewer piping shall be measured complete and fully installed by the linear foot. Thrust blocks, pipe bends and insulation shall not be measured separately but rather shall be incidental to the corresponding pipe pay item. Excavation, backfilling and compacting shall also be included in the corresponding pipe pay item.

4.2 BASIS OF PAYMENT:

A. The accepted quantities of pipe for sanitary sewer utility piping will be paid for at the contract unit price per linear foot, for the types and sizes specified, complete and in place.

B. Payment will be made under:

| Pay Item | | Pay Unit |
|---|---|---|
| 801.141 | 4″ PVC Sanitary Sewer (SDR-35) | Linear Foot |
| 801.16 | 6″ PVC Sanitary Sewer (SDR-35) | Linear Foot |

**END OF SECTION**

# SECTION 33 39 13 - SANITARY UTILITY SEWERAGE MANHOLES

All work and materials shall conform to the Contract Documents and the provisions of the State of Maine Department of Transportation Standard Specifications, Revision November 2014, with the following additions:

Add the following:

PART 1 – GENERAL

## 1.1 RELATED DOCUMENTS

A. The drawings and general conditions of the Contract, including General and Supplementary Conditions and MaineDOT Division 100, General Conditions, apply to this section.

## 1.2 DESCRIPTION OF WORK

A. Provide all materials, tools, equipment, and labor necessary to manufacture, install and test precast concrete manhole structures complete with steps, frames, covers, and stainless steel anti-buoyancy hardware as specified herein and as shown on the Drawings.

## 1.3 REFERENCES

A. The publications listed below form a part of this specification to the extent referenced. The publications are referred to within the text by the basic designation only. Unless otherwise noted, the most recent version of the listed publications, including revisions, at time of bid opening shall apply.

B. AMERICAN ASSOCIATION OF STATE HIGHWAY AND TRANSPORTATION OFFICIALS (AASHTO)

1. AASHTO M 198 - Joints for Concrete Pipe, Manholes, and Precast Box Sections Using Preformed Flexible Joint Sealants

C. ASTM INTERNATIONAL (ASTM)

1. ASTM C 270 (2008a) Standard Specification for Mortar for Unit Masonry
2. ASTM C 139 (2005) Standard Specification for Concrete Masonry Units for Construction of Catch Basins and Manholes
3. ASTM A 36/A 36M (2008) Standard Specification for Carbon Structural Steel
4. ASTM A 48/A 48M (2003; R 2008) Standard Specification for Gray Iron Castings
5. ASTM B 26/B 26M (2009) Standard Specification for Aluminum-Alloy Sand Castings
6. ASTM C 32 (2009) Standard Specification for Sewer and Manhole Brick (Made from Clay or Shale)
7. ASTM C 478 (2009) Standard Specification for Precast Reinforced Concrete Manhole Sections
8. ASTM C 139 Concrete Masonry Units for Construction of Catch Basins and Manholes
9. ASTM C 913 (2008) Standard Specification for Precast Concrete Water and Wastewater Structures

## 1.4 SUBMITTALS

A. Shop Drawings

1. Show components to be used, elevations of top of precast sections, base and pipe inverts, rim elevation, location of pipe penetrations, and steps for each manhole. Verify finish grade elevation at each proposed manhole location.
2. Record as-built structure information neatly in a permanently bound notebook and submit at Substantial Completion. Provide access to records for Engineer at all times. Submit copies to Engineer on a weekly basis. Record information on as-built structure locations.

B. Product Data

1. Provide Manufacturer's descriptive data, technical literature, catalog cuts, and installation instructions. Product data shall also include dimensional data for each structure. Provide product data for

a. Manholes

b. Joint sealants

c. Inverts

d. Risers

e. Frames

f. Covers

C. Reports

1. Submit leakage test reports for each structure.

2. Record and submit as-built information in accordance with Section 33 31 00 SANITARY UTILITY SEWERAGE PIPING. Provide the following:

a. Location and rim elevations of all precast concrete structures.

b. Locations and invert elevations of all pipe penetrations

D. Certificates

1. Provide design of all precast structures including anti-flotation slabs. Provide the precast structures requiring anti-flotation slabs as one complete unit. Submit a certificate of design signed by a Professional Engineer, registered in the State of the project location with five (5) years minimum experience in the design of similar structures. The design Engineer shall certify that all precast structures including the anti-flotation slabs, whether provided separately or as a monolithic unit, have been designed to withstand all forces including soil, traffic and hydrostatic loads in accordance with all applicable laws, regulations, rules and codes.

## 1.5 QUALITY ASSURANCE

A. Provide complete manhole and precast concrete structures capable of supports AASHTO H20 loading. All precast concrete shall comply with ASTM C 913-07a.

B. Precast Concrete shall comply with ASTM C 913 “Precast Concrete Water and Wastewater Structures”.

C. Precast Manhole Components shall comply with ASTM C 478.

# PART 2 – PRODUCTS

## 2.1 MANHOLES & STRUCTURES – GENERAL

A. Base Sections: Precast monolithic construction with steps

B. Barrel Sections: Precast with steps

C. Top Sections: Precast eccentric cone top as shown on Drawings. Provide flat top structures as specified and as indicated on the Drawings. Substitution of flat top structures for eccentric cones shall only be allowed with written approval of the Engineer.

## 2.2 PRE-CAST CONCRETE

A. All concrete used for precast concrete structures shall conform to the following design criteria and conditions:

B. Concrete compressive strength shall be 5,000 psi (minimum) after 28 days.

C. Unless otherwise specified or indicated on the Drawings the minimum concrete structure thickness shall be 6 inches. Provide increased thicknesses to accommodate loadings from vehicles or mechanical equipment. Provide increased thicknesses to accommodate H20 load ratings.

D. Portland cement shall be Type II conforming to ASTM C 150 standards.

E. Fine aggregate shall consist of natural sand conforming to ASTM C 33 standards.

F. Coarse aggregate shall consist of well graded crushed stone conforming to ASTM C 33.

G. Air entrainment admixture shall conform to ASTM C 260. The air-entrained content shall be not less than 4 percent, nor greater than 7 percent.

H. A superplasticizer shall be used and shall conform to ASTM C 494 type F or G. Concrete shall be placed at a slump of between 5 and 8 inches.

I. Minimum cement content shall be 564 pounds per cubic yard.

J. Provide a trowel finish on all floors.

K. Structures shall be designed to resist soil loads, surcharges, and buoyant forces.

L. Concrete Fillet: Minimum 3,000 psi concrete.

## 2.3 REINFORCEMENT

A. All concrete reinforcement shall conform to the following design conditions and criteria:

1. Minimum reinforcing steel yield stress shall be 40,000 psi.

2. Minimum concrete cover over reinforcing bars shall be 1-1/2 inch.

3. Wire fabric shall conform to the requirements of ASTM A 185.

4. Reinforcing bars shall be new billet steel, deformed, conforming to the requirements of ASTM A 615, Grade 60.

## 2.4 BRICK & MORTAR

A. Sewer Brick: ASTM C 32, Grade SS, hard brick

B. Concrete Masonry Units: Conform to ASTM C 139

1. Portland cement shall conform to ASTM C 150. Sand shall conform to ASTM C 144. Hydrated lime shall conform to ASTM C 207.

2. Use Type II Portland cement, Type S Lime

3. Portions for Mortar are 1 part Portland cement, ¼ part hydrated lime, 3 to 3-¾ parts sand.

## 2.5 STEPS

A. Steps shall be constructed of aluminum or steel reinforced copolymer polypropylene conforming to ASTM C 478, cast-in-place or installed utilizing inserts approved by the Engineer. All steps shall be 12 inches on center with abrasive step surface and safety edge, drop front design, one (1) inch diameter and 16 inches wide. Metal items embedded in concrete shall be provided with a bituminous coating.

## 2.6 JOINTS

A. Pre-cast concrete sections shall be provided with bell and spigot or tongue-in-groove ends to ensure proper connection of the joints. Provide flat joints only where specified or indicated on the Drawings.

B. All joints shall be sealed with a minimum of two rows of butyl rubber sealant. A compatible primer shall be applied as recommended by the manufacturer. All seals shall be applied in accordance with the manufacturer's recommendations. Joint seals shall meet the hydrostatic performance requirements set forth in ASTM C 990, Section 10.1. Sealant properties shall meet or exceed the following criteria:

1. Hydrocarbon Blend Content: 50% (Minimum), per ASTM D4
2. Inert Mineral Filler: 30% (Minimum) by weight, per AASHTO T 111
3. Volatile Matter: 2% (Maximum) by weight, per ASTM D6
4. Specific Gravity: 1.15-1.50, per ASTM D71
5. Ductility: 5.0 (Minimum), per ASTM D 113
6. Penetration Cone: 50-100 mm, per ASTM D 217 at 77 0F, 150 gm. 5 Sec.
7. FED SS-S-210A: No deterioration, no cracking and no swelling after 30 days immersion in 5% solutions of HCl, $H_2SO_4$, NaOH, KOH, and $H_2S$

C. Precast structure joint sealants shall be a product of the following manufacturer:

1. Concrete Sealants, Inc. - Conseal CS-102 or CS-202 (Per Temperature)
2. Hamilton Kent – Kent Seal No. 2
3. Press-Seal Gasket Corporation – Pro-Stik
4. Engineer Approved Equal

## 2.7 PIPE CONNECTIONS

A. Provide seals for all piping penetrations in precast structures as indicated on the Drawings. In cases where the pipe sealing system has not been specifically indicated, provide pre-molded elastomeric (boot type) sealed joints between the pipe and precast sections. Where specified or indicated on the Drawings provide mechanical link type seals for piping penetrations.

B. Pre-molded elastomeric seals shall be manufactured of EPDM with 300 series stainless steel pipe clamps, bands and wedges. Each seal shall also be designed in accordance with the following criteria:

1. Head Pressure: 13 psi for 10 minutes at 00, per ASTM C 923
2. Head Pressure: 10 psi for 10 minutes at 00, per ASTM C 923
3. Deflection: 70, in any direction, per ASTM C 923
4. Load Test: 150 lbs/in pipe diameter, per ASTM C 923

C. All flexible seals shall be a product of the following manufacturer:

1. Trelleborg Pipe Seals, Inc. – Kor-N-Seal
2. A-Lok Products, Inc.
3. Press-Seal Gasket Corporation
4. Engineer Approved Equal

## 2.8 STAINLESS STEEL CONNECTOR

A. Stainless Steel Connector: Provide 304 stainless steel plate connectors between all manhole sections

to prevent frost separation.

## 2.9 DAMPROOFING & WATER SEALING

A. Provide a two coat bituminous damp-proofing (water sealing) system for all precast structures. All exterior coatings shall conform to ASTM D 1227 and ASTM D 1187 standards. Concrete sealants shall be designed for use both above and below grade. Exterior concrete sealants shall be a product of the following manufacturer:

1. BASF Construction Chemicals, Inc. Hydrocide 600, 700 or 700B
2. Karnak Corporation – 100AF
3. Engineer Approved Equal

## 2.10 JOINT WRAP

A. Provide exterior joint wrap for all precast structure joints. The joint seal (wrap) shall be manufactured of a self-shrinking EPDM rubber material with a minimum thickness of 30 mils. The back side of the seal shall be coated with a cross-linked reinforced non-hardening butyl adhesive. The sealant shall be a minimum of 30 mils thick. The sealing system shall be designed to stretch entirely around each structure along the joint and then be overlapped to create a fused bond. The width of the joint wrap shall be 6 inches (minimum) and each wrap shall be overlapped by at least two times the width of the wrap.

B. The butyl component of the tape shall consist of 50% (minimum) butyl rubber and it shall contain 2% or less volatile matter. Provide primer and/or adhesive as recommended by the manufacturer. Joint wrap shall conform to ASTM C 877 (Type III). All joint wrap shall be a product of the following manufacturer:

1. Press-Seal Gasket Corporation – EZ-Wrap
2. Sealing Systems, Inc. – Infi-Shield Gator Wrap
3. Con-Seal – CS-212
4. Engineer Approved Equal

## 2.11 RISERS (GRADE RINGS)

A. Grade Rings: Provide precast concrete grade rings (if required) to raise rim elevations of the frame and covers.

B. Grade rings of injection-molded HDPE shall also be acceptable.

## 2.12 FRAMES & COVERS

A. Cast Iron: Conform to ASTM A 48/A 48M Class 30

B. Aluminum: Provide alloy number 713.0. Conform to ASTM B 26/B 26M.

C. Carbon Steel: Conform to ASTM A 36/A 36M.

D. Manhole Frames & Covers: Labeled with "SEWER" in 3" high raised letters on cover.

1. Standard Frames & Covers: 24-Inch lid: Model R-1670-A frame and type C cover with self-sealing application by Neenah Foundry or Engineer Approved Equal.
2. Waterproof Frames & Covers: Equal to Model R-1755-F2 frame and type C cover by Neenah Foundry or Engineer Approved Equal.
3. Manhole Frames & Hinged Covers: 24 inch opening, PAMREX frame and cover by Certainteed Corporation or Engineer Approved Equal.

## 2.13 ANTI-FLOTATION DESIGN

A. Certificate of Design: The Contractor shall be responsible for design of all precast structures including anti-flotation slabs and may provide the precast structures requiring anti-flotation slabs as one complete unit. Submit a certificate of design signed by a Professional Engineer, registered in the State the project location and having five (5) years minimum experience in the design of similar structures, certifying that all precast structures including the anti-flotation slabs, whether provided separately or as a monolithic unit, have been designed to withstand all forces including soil, traffic and hydrostatic in accordance with all applicable laws, regulations, rules and codes.

B. Each structure shall be designed with a minimum factor of safety of 1.15 against buoyancy with an assumed flood elevation at the top of the structure. Frictional resistance in this calculation shall not be permitted. Where the structure is composed of successive vertical segments, the weight of the segments shall be such as to provide the same factor of safety for buoyancy, or stainless steel mechanical connections shall be used to connect the segments together. The design shall include positive anchorage to a reinforced concrete anti-buoyancy slab of the required size.

## 2.14 DESIGN LOADS

A. Unless otherwise specified or indicated on the Drawings, the design shall meet the requirements of AASHTO HB-17, including a HS-20 vehicle load. A lateral vehicle surcharge load of 125 psf shall be applied. Unless otherwise specified or indicated on the Drawings, water and wastewater structures shall be designed for the loads prescribed in ASTM C 890. Unless otherwise specified or indicated on the Drawings, utility structures shall be designed for the loads prescribed in ASTM C 857.

B. The equivalent lateral fluid pressure shall be 100 psf/lf below flood and/or the design groundwater elevation and 60 psf/lf above such elevation. The specified lateral vehicle surcharge load shall be added to this load.

## 2.15 MISCELLANEOUS

A. Frost Barrier: U.V.-resistant, high grade polyethylene, minimum thickness, 6 mils

B. Butyl Rubber Caulking: Conform to AASHTO M 198, Type B. Provide butyl rubber caulking at all manhole frames and covers as shown on the Drawings and as directed by the Engineer.

# PART 3 – EXECUTION

## 3.1 INSTALLATION OF MANHOLES

A. Placement: Place precast bases on compacted bedding material so bottom of structure is plumb, and pipe inverts are at proper elevations. Place barrel and top sections in the appropriate height combinations. Plug all lifting holes inside and out with non-shrink grout. Fill below structure with 3,000 psi concrete, if required. Lay pipe to alignment and grade shown on the Drawings. If grade is not shown, determine elevations of start and finish points for each run of pipe. Lay pipe to a uniform grade between these points. Line and grade may be adjusted by the Engineer as required by field conditions. Install a mechanical water stop for every 10 vertical feet of sewer main elevation change.

B. Joints: Follow the manufacturer's instructions for sealing joints between precast sections. Provide two rings of 1-inch diameter butyl rubber sealant and joint wrap.

C. Frames and Covers

1. Set to final grade as shown on the Drawings. Unless otherwise specified or indicated on the Drawings frames and covers shall be set with a tolerance of 0 inches above pavement grade, and 1/4 inch below pavement grade (maximum). For cross-country areas, frames and covers shall be set above grade as indicated on the Drawings. Provide adequate temporary covers to prevent accidental entry until final placement of frame and cover is made.

2. Provide two rings of 1-inch diameter butyl rubber sealant between frame and chimney joints. Provide downward force to frame so as to compress the joint, provide a watertight seal, and prevent future settlement. Point compressed joint with butyl rubber caulk sealant.

3. Set manhole frames and covers to final grade only after pavement base course has been applied, or after final grading of gravel roads.

D. Frost Barriers: Wrap each structure to the maximum excavation depth or not less than 7 feet below grade, with a minimum of four layers of 6 mils each of the polyethylene.

1. Clean structure exterior of all dirt and remove any protrusions.

2. Apply a 6-inch wide vertical strip of bituminous waterproofing adhesive from the top of manhole to the greatest excavation depth, but not in excess of 10 feet.

3. Start poly wrap at adhesive strip and proceed around manhole continuously, overlapping adhesive strip a minimum of 24 inches on the final layer.

4. Tuck and pleat poly at top in a continuous manner, minimizing size of folds. Extend poly past top of manhole frame and temporarily tuck remainder inside frame, until final backfill and paving.

5. Paved areas: Cut poly flush with manhole rim after pavement is in place.

6. Unpaved areas: Pull loose ends of poly together, remove excess air and tie off end with galvanized wire. Bury with manhole below grade.

E. Inverts: See detail on Drawings.

F. Steps: Replace any steps that are out of plumb and proper horizontal placement.

## 3.2 LEAKAGE TESTING

A. General: Tests shall be observed and certified by the Engineer. Structures must be complete for final test acceptance except for shelf and invert brickwork. All pipe connections shall be made prior to testing. Plug all pipes and other openings in the structure walls prior to test. The Contractor shall test all precast concrete manholes as soon as they are installed and before they are backfilled to demonstrate that the work confirms to these specifications.

B. Vacuum Tests for Manholes

1. After the manhole has been constructed, the Contractor shall conduct a Manhole Acceptance Test using the vacuum test procedure in ASTM C1244, except as modified herein.

2. The manhole, regardless of diameter, shall pass if the time for the vacuum to drop from 10 inches of mercury to 9 inches of mercury is greater than:

a. 2.0 minutes for 0’-10’ deep manholes

b. 2.5 min for 10’-15’ deep manholes

c. 3.0 min for 15’+ deep manholes

3. If the vacuum drops in excess of the prescribed rate, the Contractor shall locate the leak, make proper repairs, and retest the structure.

4. If the unit fails the test after repair, the unit shall be water exfiltration tested as directed by the Engineer in accordance with the following.

C. Exfiltration Test

1. Plug pipes into and out of structure and secure plugs.

2. Lower groundwater table (GWT) to below structure. Maintain GWT at this level throughout test. Provide means of determining GWT level at any time throughout test.

3. Fill structure with water to top of structure.

4. Allow a period of time for absorption, to be determined by the Engineer.

5. Refill to top of cone.

6. Determine volume of leakage in an 8 hour minimum test period and calculate rate.

7. Acceptable Leakage Rate: Not more than 1 gallon per vertical foot per 24 hours for manholes and wet wells. Not more than 1/10 of 1 percent of the tank volume in any 24-hour period for storage tanks.

8. The Engineer reserves the right to require an exfiltration test if a vacuum test has failed or cannot be performed.

## 3.3 REPAIRS

A. Determine the causes of all leaks and repair them. Perform earthwork required for repairs if manhole has already been backfilled.

B. Perform repairs using methods and materials approved by the Engineer.

C. Remove and replace or reconstruct the manhole if necessary.

D. Remove and replace the defective sections if required by the Engineer.

## 3.4 FIELD QUALITY CONTROL

A. Provide in accordance with Division 01 General Requirements.

B. Do not pave over any of the utility appurtenances/structures unless specifically directed otherwise.

# PART 4 – BASIS OF PAYMENT:

## 4.1 METHOD OF MEASUREMENT:

A. Sewer Manholes and accessories will be measured by the number of units, complete and accepted in place. All excavation and backfill shall be incidental to the pay item.

## 4.2 BASIS OF PAYMENT:

A. The accepted quantities of sewer manholes will be paid for at the contract unit price each for the types and sizes specified, complete and in place. Payment will be full compensation for supplying all equipment and labor to clean the manholes and to dispose of the waste. Excavation and backfill will be considered incidental to the pay item. Cutting and connecting existing sewer piping to manhole will be considered incidental to the pay item.

B. Payment will be made under:

| Pay Item | | Pay Unit |
|---|---|---|
| 803.173 | Sewer Manhole – 4 foot Diameter | EA |

**END OF SECTION**

# SECTION 33 41 00 - STORM UTLIITY DRAINAGE PIPING

All work and materials shall conform to the Contract Documents and the provisions of the State of Maine Department of Transportation Standard Specifications, Revision November 2014 Section 603 with the following additions:

Add the following:

PART 1 – GENERAL

## 1.1 RELATED DOCUMENTS

A. The drawings and general conditions of the Contract, including General and Supplementary Conditions and MaineDOT Division 100, General Conditions, apply to this section.

## 1.2 SUMMARY

A. Section Includes

1. Provide storm drain systems in accordance with this Section, applicable reference standards listed in Article 1.03, and the Drawings.

## 1.3 REFERENCES

A. Reference Standards

1. MaineDOT Standard Specifications.
2. American Association of State Highway and Transportation Officials (AASHTO)
   a. AASHTO M252 - Standard Specification for Corrugated Polyethylene Drainage Pipe

1. ASTM International (ASTM)
   a. ASTM F2306 - Standard Specification for 12 to 60 in. Annular Corrugated Profile-Wall Polyethylene (PE) Pipe and Fittings for Gravity-Flow Storm Sewer and Subsurface Drainage Applications
   b. ASTM C76 - Standard Specification for Reinforced Concrete Culvert, Storm Drain, and Sewer Pipe
   c. ASTM C443 - Standard Specification for Flexible Transition Couplings for Underground Piping Systems
   d. ASTM C1173 - Standard Specification for Flexible Transition Couplings for Underground Piping Systems

## 1.4 SUBMITTALS

1. Product Data
   a. Storm drain pipe and fittings
   b. Bentotnie clay dam
   c. Underground marking tape
2. Manufacturer's notarized certificate certifying conformance with the Specifications to accompany shipments

3. Design Data/Submittals
   a. Pipe manufacturer’s anti-floatation calculations for each pipe material and details, signed and stamped by a Professional Engineer licensed in the state where the Project is located based on the following criteria.
      1) Groundwater elevation shall be set at grade above the pipe.
      2) Factor of safety shall be 1.1; downward forces from the weight of the pipe and soils over pipe shall be 1.1 times the buoyant uplift forces.

3) The pipe shall be considered empty. Calculations shall not consider the weight of internal water.

4. Manufacturer Instructions

5. Field Quality Control Submittals

a. Test results

b. Logs of inspection and testing

B. Closeout and Maintenance Material Submittals:

1. Record depth and take ties to the location of the following for Conformed to Construction Records.

a. Pipe stub capped ends

b. Locations of plugged pipes

c. Manholes and catch basins

## 1.5 DELIVERY, STORAGE, AND HANDLING

A. Packing, Shipping, Handling, and Unloading

1. Provide that each shipment of pipe, pipefittings and appurtenances includes manufacturers' Certificate of Conformance.

2. Inspect upon delivery and reject pipe immediately that does not conform to the specified requirements or has been damaged beyond repair and immediately remove from Site.

B. Remove and legally dispose of damaged pipe.

# PART 2 – PRODUCTS

## 2.1 GENERAL

A. Provide in accordance with MaineDOT Standard Specifications Section 603 and MaineDOT Construction Details and as specified below.

B. Storm Drain Pipe: Provide one of the following

1. Smooth Interior High Density Polyethylene (HDPE) Pipe: AASHTO M252, Type S, or M294, Type S or SP, or F2306.

2. Reinforced Concrete Pipe: ASTM C76, Class IV, Modified tongue and groove compression gasket joints ASTM C443; size and class required to replace pipe damaged during construction.

C. Provide fittings of same type and class of materials as pipe with single piece gasket, unless otherwise specified.

## 2.2 MISCELLANEOUS

A. Pipe to Pipe Connection Flexible Couplings: ASTM C1173.

1. Type A: non-pressure application, elastomeric sleeve or rubber sleeve incorporating stainless steel tension bands and a tightening mechanism to provide a positive seal against both infiltration and exfiltration. Stainless steel bands: 300 series stainless steel. Coupling: resilient and unaffected by soil conditions, resistant to chemicals, ultraviolet rays, and fungus growth.

B. Manholes Connections

1. To New Manholes: compression type flexible connector cast into the manhole wall or flexible boot connection per pipe manufacturer recommendations.

2. To Existing Manholes: by coring and installing a boot type flexible connector.

C. Gasket lubricant: solution of vegetable soap or other solution supplied by the pipe manufacturer.

D. Anti-floatation system for each pipe material: per the design of the pipe manufacturer and provided where required.

## 2.3 BENTONITE CLAY DAM

A. Per Specification Section 33 31 00.

## 2.4 DETECTABLE UNDERGROUND MARKING TAPE

A. Underground marking tape shall be detectable marking tape four (4) inches wide, with a minimum 5.0 mil overall thickness. Tape shall be manufactured using a 0.8 mil clear virgin polypropylene film, reverse printed and laminated to a 0.35 mil solid aluminum foil core, and then laminated to a 3.75 mil clear virgin polyethylene film. Tape shall be printed using a diagonally striped design for maximum visibility, and meet the APWA Color-Code standard for identification of buried utilities. Text or lettering: repeated continuously along length of tape at intervals no greater than 3 feet indicating "Caution Buried Drain Line Below"

# PART 3 – EXECUTION

## 3.1 INSTALLATION

A. Install storm drain piping in accordance with Section 603 of the MaineDOT Standard Specifications, and to the lines and grades and at the locations shown on the Drawings. Field verify elevations and slope and make adjustments as necessary.

B. Install in accordance with manufacturer's recommendations. Do not install unsound or damaged pipe or accessories.

C. Secure each length of pipe with bedding before placing next length. Bed pipe as shown on the Drawings. Excavate bell/coupling holes or provide in the base material to receive the bell or coupling so that only the barrel of the pipe receives bearing pressure from the supporting material. No pipe or fitting shall be permanently supported on blocks, wedges, boards or stones.

D. When each pipe has been properly bedded, place and compact enough of the backfill material between the pipe and the sides of the trench to hold the pipe in correct alignment.

E. Close open ends of pipe by suitable temporary bulkheads to prevent entrance of earth and other materials when pipe laying is not in progress.

F. Take necessary precautions to prevent floatation of the pipe as a result of the water in the trench.

G. Maintain flows during Work per Division 01 General Requirements.

H. Assist Engineer as needed to run level checks on pipe slopes, and take ties.

I. Lay pipe to line and grade shown on the Drawings. If grade is not shown, determine elevations of start and finish points for each run of pipe. Lay pipe to a uniform grade between manholes. Line and grade may be adjusted by the Engineer as required by field conditions. Lay each pipe to form a close joint with the next adjoining pipe and bring the inverts continuously to the required line and grade.

J. Immediately lay pipe as soon as excavation is completed and the bedding material has been brought to the proper grade.

1. Insert circular rubber gasket in the gasket seat provided and apply a thin film of gasket lubricant to the inside surface of the gasket.

2. Clean spigot end of the pipe and enter into the rubber gasket in the bell, using care to keep the joint from contacting the ground.

3. Complete joint shall then be completed by forcing the plain end to the seat of the bell. Pipe which is not furnished with a depth mark shall be marked before assembly to assure that the spigot end is inserted to the full depth of the joint.

K. Do not lay next length of pipe until the previous length has had sufficient material tamped about it to firmly secure it in place so as to prevent any movement or disturbance.

L. Do not lay pipe in water or when trench conditions or weather are unsuitable for such Work, except as approved by Engineer. Do not use installed pipe to remove water from Work area.

M. Lay pipe with the bell ends facing the direction of the laying unless otherwise permitted by the Engineer. Make joints per pipe manufacturers' recommendations.

N. Provide bentonite clay dam every 50 feet along pipe trench. Provide a minimum of one bentonite clay dam per trench.

O. Connections to manholes and catch basins: short length of pipe so that joints are located within 3 feet of inside surface of manholes and catch basins.

P. Use manufacturer recommended anti-floatation system for each pipe material.

3.2 FIELD QUALITY CONTROL

A. Subject pipe to thorough inspection and tests in accordance with the methods prescribed by, and acceptance or rejections e based on, applicable ASTM specifications. Pipes may be rejected at Site if non-conforming or damaged regardless of prior factory acceptance.

B. Remove and replaced damaged pipe found or encase in a Class A concrete collar or envelope as directed, at no additional cost to the Owner.

3.1 CLEANING

A. Clean and flush piping after Work is completed and before final acceptance.

PART 4 – BASIS OF PAYMENT

4.1 METHOD OF MEASUREMENT

A. Method of Measurement will be per MaineDOT Standard Specifications Section 603.11

4.2 BASIS OF PAYMENT

A. Payment will be per MaineDOT Standard Specifications Section 603.12.

B. Payment will be made under:

| Pay Item | | Pay Unit |
|---|---|---|
| 603.159 | 12 Inch Culvert Pipe Option III | Linear Foot |

**END OF SECTION**

# SECTION 33 49 00 - STORM DRAINAGE STRUCTURES

All work and materials shall conform to the Contract Documents and the provisions of the State of Maine Department of Transportation Standard Specifications, Revision November 2014, with the following additions:

Add the following:

PART 1 – GENERAL

## 1.1 RELATED DOCUMENTS

A. The drawings and general conditions of the Contract, including General and Supplementary Conditions and MaineDOT Division 100, General Conditions, apply to this section.

## 1.2 SUMMARY

A. Section Includes:

1. Provide storm drainage manholes and catch basins, and precast concrete items in accordance with this Section, applicable reference standards listed in Article 1.03, and as shown on the Drawings.
    a. Outlet control structure
    b. Drain manhole
    c. Catch basins
    d. Precast anti-floatation slabs

B. Related Requirements

1. Section 31 20 00 Earth Moving
2. Section 33 41 00 Storm Utility Drainage Pipe

## 1.3 REFERENCES

A. American Society for Testing and Materials (ASTM)

1. ASTM A48 Standard Specification for Gray Iron Castings
2. ASTM C32 Sewer and Manhole Brick (Made from Clay or Shale)
3. ASTM C144 Aggregate for Masonry Mortar
4. ASTM C207 Hydrated Lime for Masonry Purposes
5. ASTM C478 Circular Precast Reinforced Concrete Manhole Sections
6. ASTM C913 Standard Specification for Precast Concrete Water and Wastewater Structures
7. ASTM C923 Specification for Resilient Connectors Between Reinforced Concrete Manhole Structures and Pipes
8. ASTM C990 Joints for Concrete Pipe, Manholes, and Precast Box Sections Using Preformed Flexible Joint Sealants
9. ASTM A536 Iron Casting Specific: Tensile- Yield – Elongation.

B. American Association of State Highway and Transportation Officials (AASHTO)

1. AASHTO M198
2. AASHTO H20

C. MaineDOT Standard Specifications

## 1.4 SUBMITTALS

A. Submit

1. Shop Drawings for each drain manhole, outlet control structure and all precast concrete items. Show components to be used, elevations of top of precast sections, base and pipe inverts, location of pipe penetrations, steps, for each manhole. Confirm finish grade elevation for each proposed structure.

2. Manufacturers' product data and installation instructions for frames, covers, grates, precast items, grade rings, manhole sleeves, joint sealants, damproofing, and all appurtenances.

3. Certificate of design (example included as attachment to this Section) for the structural design of the precast concrete structures by a Professional Engineer licensed in the state where the Project is located

4. Design Data/Submittals

a. Manufacturer's anti-floatation calculations for each structure, signed and stamped by a Professional Engineer licensed in the state where Project is located based on the following criteria.

1) Groundwater elevation shall be set at grade above the structure.

2) Factor of safety shall be 1.1; downward forces from the weight of the pipe and soils over pipe shall be 1.1 times the buoyant uplift forces.

3) The structure shall be considered empty. Calculations shall not consider the weight of internal water.

4) Size: Slab size and reinforcement as shown on the Drawings. Calculations performed by a Registered Engineer must accompany any submittal with modified dimensions or reinforcement showing adequate strength and resistance to buoyant forces.

5) Connection of Slab to Manhole: Provide connection hardware as sized and detailed on the Drawings.

5. Manufacturer literature and test reports for manhole inverts

# PART 2 – PRODUCTS

## 2.1 GENERAL

A. Provide complete manhole, and precast concrete structures capable of supporting AASHTO H20 loading. All precast concrete shall comply with ASTM C913.

## 2.2 CATCH BASINS

A. Catch Basins shall conform to ASTM C478 and as shown on the Drawings and capable of supporting AASHTO H20 loading.

B. Catch Basins shall have a minimum 1-foot sump.

C. Catch Basin Hood: Hood shall be constructed so that is forms a baffle against floatable litter and oil. The hood shall protrude at least 6 inches or 1/3 of the pipe's inside diameter, whichever is greater, below the invert. Catch basin hood shall be sealed to the catch basin structure with an oil resistant foam gasket. Vent holes shall be installed on the top of the hood to allow air flow into pipe. The Catch basin hood shall be attached to the structure with stainless steel anchor studs and nuts, allowing the hood to be removed and installed with minimum effort. Hood material shall be HDPE.

## 2.3 MEMBRANE FILTRATION SYSTEM

Shall be as detailed on the construction drawings and shall be JellyFish Membrane Filtration System (JF4- 2-1) by Contech Engineered Solutions or equal. Provide anti-flotation as identified in the Construction Drawings.

## 2.4 ANTI-FLOATATION SLABS

A. Alternate: Anti-floatation slabs can be provided as precast structures as an alternate to cast-in- place.

B. Size: Slab size and reinforcement as shown on the Drawings. Calculations performed by a Registered Engineer must accompany any submittal with modified dimensions or reinforcement showing adequate strength and resistance to buoyant forces.

C. Connection of Slab to Manhole: Provide connection hardware as sized and detailed on the Drawings.

## 2.5 CASTINGS

A. Cast Iron: Conform to ASTM A48, Class 35.

B. Catch basins: E. J. Group Inc., Foundry catalog number 00552030W7 or approved equal catch basin square frame or gutter inlet frames and grates with 2-inch square hole grate per the Drawings.

# PART 3 – EXECUTION

## 3.1 INSTALLATION

A. Set catch basin and drain manhole frames to finished lines and grades, as specified. Set castings in bituminous concrete collars at least 9 inches deep and extend to a radius of 1 foot beyond the circumference of the frame, or as shown on the Drawings.

B. Adjustments to existing drainage structures: per the Drawings or as directed by Engineer. Refill the excavated area with gravel and set casting into a concrete collar. Engineer will determine the new elevation of the structure.

C. Remodeling: per the Drawings or as directed by the Engineer.

1. Provide remodeling of cone of the structure where line or grade requires a change greater than 6 inches at existing drainage structures or where noted on the Drawings.

2. For structures in the roadway: refill excavated area with gravel and set casting into a concrete collar and overlay with 3-inch thick bituminous concrete top course. Engineer will determine the new elevation of the structure.

D. Existing frames and grates belonging to the Owner and not needed for the Work: transported and carefully stacked at a location designated by the Owner or otherwise disposed of as directed by Engineer at no additional cost to Owner.

E. Place frames and covers on catch basins.

F. Seal drain pipe connections to catch basin structures per MaineDOT Standard Specifications.

G. Do not pave over any of the utility appurtenances/structures unless specifically directed otherwise.

# PART 4 – BASIS OF PAYMENT

## 4.1 METHOD OF MEASURMENT

A. Measurement will be per MaineDOT Standard Specification Section 604.05.

## 4.2 BASIS OF PAYMENT

A. Payment will be per MaineDOT Standard Specification Section 604.06.

B. Payment will be made under:

| Pay Item | | Pay Unit |
|---|---|---|
| 604.18 | Adjust Manhole or Catch Basin to Grade | Each |
| 604.245 | Catch Basin Type F4-C | Each |
| 604.247 | Catch Basin Type F5-C | Each |
| 604.252 | Catch Basin Type A5-C | Each |
| 604.3901 | JellyFish Membrane Filtration System | Each |
| 604.40 | Oil Water Separator | Each |

**END OF SECTION**

# APPENDIX A

## Permits

- City of Portland Planning Authority Site Plan Permit Approval – Document will be forthcoming.
- Notice of Intent to Comply with Maine Construction General Permit – Attached.

**COMMITMENT & INTEGRITY**
**DRIVE RESULTS**

41 Hutchins Drive
Portland, Maine 04102
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T 207.774.2112
F 207.774.6635

WOODARD &CURRAN

January 4, 2018

DRAFT

Bureau of Land and Water Quality
Maine Department of Environmental Protection
Southern Maine Regional Office
312 Canco Road, Portland, Maine 04103

Re: International Marine Terminal Maintenance & Operations Facility
Notice of Intent to Comply with Maine Construction General Permit

Dear Reviewer:

Enclosed you will find a Notice of Intent (NOI) to Comply with the Maine Construction General Permit for the Maintenance & Operations Facility project proposed at the International Marine Terminal (IMT) at 454 Commercial Street in Portland, Maine. The proposed project includes the construction of a new Maintenance & Operations Building near the northern corner of the IMT property. This new building will improve facility operations and allow for reprograming of the space that is currently occupied by the existing Maintenance & Operations Building for better efficiency in handling and storing of freight. There is no change in use or expansion of operations as a result of this project.

The proposed project will disturb more than 1 acre of area. The Contractor will be responsible for providing and maintaining temporary erosion and sedimentation control for the entire project in accordance with the contract documents and the Maine Department of Environmental Protection Maine Erosion and Sediment Control Best Management Practices. Sheet C-05 in the plan set includes locations of erosion and sedimentation control features. Sheet C-11 includes erosion and sedimentation control details and notes.

In addition to the NOI form, you will find the following enclosed:

- Agent letter authorizing Woodard & Curran to act on behalf of the Maine Department of Transportation;
- Fee of $105, per the current Maine DEP fee schedule for projects impacting between 1 and 3 acres;
- Photographs of the site;
- U.S.G.S. topographical map of the project site; and
- An engineering plan set (including an erosion and sedimentation control plan).

If you have any questions or require additional information, please feel free to contact me at jsteinglass@woodardcurran.com or 207-558-3732.

Sincerely,

WOODARD & CURRAN INC.

Jedd Steinglass
Project Manager

230769.00

Enclosure(s): Notice of Intent Form with Attachments

cc: Joel Kittredge, Maine Department of Transportation
Nathan Moulton, Maine Department of Transportation
Matthew Burns, Maine Port Authority
Jack Burgess, Becker Structural Engineers

# NOTICE OF INTENT TO COMPLY WITH MAINE CONSTRUCTION GENERAL PERMIT

**PLEASE TYPE OR PRINT IN *BLACK INK ONLY***

| | | | | | |
|---|---|---|---|---|---|
| **Name of Applicant (Owner):** | Maine Department of Transportation | **Applicant Mailing Address:** | 16 State House Station | | |
| **Town/City:** | Augusta | **State:** | ME | **Zip Code:** | 04333 |
| **Daytime phone: (with area code)** | 207-624-3550 | **Email if available:** | Joel.C.Kittredge@maine.gov | **Name of Agent:** | |
| **Project Location: (Town/City):** | Portland | **UTM Northing: (if known)** | 4,833,633 | **UTM Easting: (if known)** | 398,525 |
| **Map #:** | 043 | **Lot #:** | D005, G001 | **Size of disturbed area proposed:** | 1.03 Acres |
| **Creating a common plan of development or sale?** | **Yes** | **No** X | **Part of a larger project?** | **Yes** | **No** X |
| **Name of waterbody(ies) to which the disturbed area drains, or name municipality if drains to an MS4:** | Fore River | | | | |
| **Does site drain to an Impaired Waterbody (C)? If so, give name:** | Fore River | | | | |
| **Detailed directions to site, including address if available:** | 454 Commercial Street, just northeast of the Casco Bay Bridge | | | | |
| **Description of project and its purpose:** | | | | | |

The proposed project includes the construction of a new Maintenance & Operations Building near the northern corner of the IMT property. This new building will improve facility operations and allow for reprograming of the space that is currently occupied by the existing Maintenance & Operations Building for better efficiency in handling and storing of freight. There is no change in use or expansion of operations as a result of this project.

I am filing notice of my intent to carry out work which meets the requirements of the Construction General Permit (effective 3/10/03). I have a copy of the Construction General Permit. I have read and will comply with all of the standards. I have attached all the required submittals. *Notification forms cannot be accepted without the necessary attachments.*

☒ ALL: A check (non-refundable) made payable to: "Treasurer, State of Maine." **See DEP fee schedule for correct fee**. You must know # of acres being permitted to determine the fee**.**

☒ ALL: A U.S.G.S. topo map or Maine Atlas & Gazetteer map with the project site clearly marked.

☒ ALL: Drawing of the proposed activity (site plan).

☒ ALL: An ESC plan.

☒ IF this form is not being signed by the landowner or lessee of the property, attach documentation showing authorization to sign.

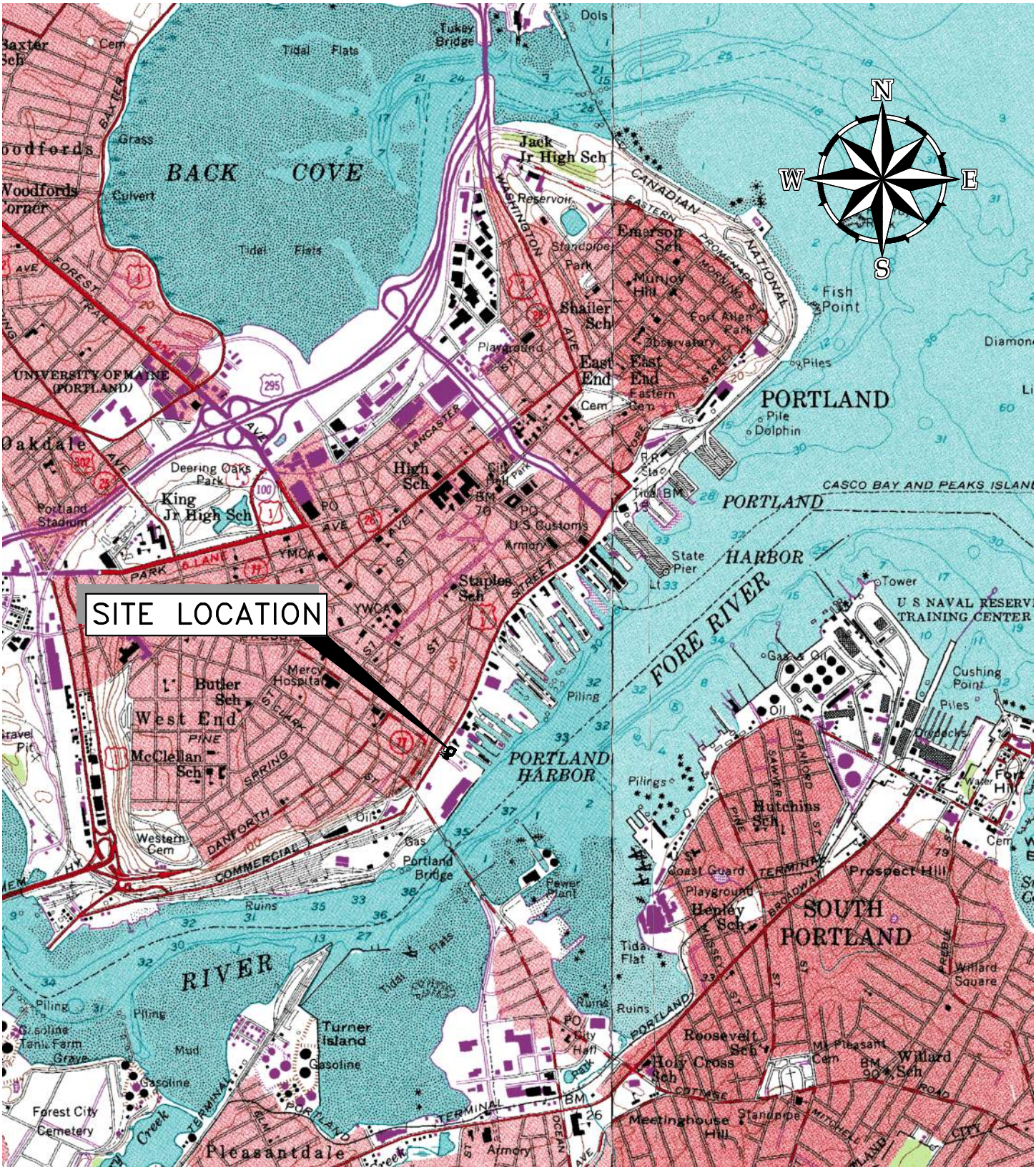
N/A ☐ IF any construction activity will occur in essential habitat, attach written approval from the Dept. of Inland Fisheries & Wildlife.

I authorize staff of the Departments of Environmental Protection to access the project site for the purpose of determining compliance with the general permit. I also understand that ***this permit is not valid until approved by the Department or 14 days after receipt by the Department, whichever is less.***

| | | | |
|---|---|---|---|
| **Signature of Applicant:** | Joel Kittredge | **Date:** | 1-4-18 |

*Keep the bottom copy as a record of permit*. Send the form with attachments via certified mail to the Maine Dept. of Environmental Protection **at the appropriate regional office.** The DEP will send a copy to the Town Office as evidence of the DEP's receipt of notification. No further authorization by DEP will be issued after receipt of notice. Check with DEP Staff to determine the expiration date on this permit . **Work carried out in violation of any standard is subject to enforcement action.**

| | | | | | |
|---|---|---|---|---|---|
| OFFICE USE ONLY | Ck.# | | Staff | Staff | |
| NOI # | FP | Date | Acc. Date | Def. Date | After Photos |




SOURCE: USGS TOPOGRAPHIC MAP

# SITE LOCATION MAP

½ 0 ½ 1
scale mile

2000 0 2000 4000
scale feet




**International Marine Terminal Maintenance & Operations Facility Project Site Viewed from the North.**




**International Marine Terminal Maintenance & Operations Facility Project Site Viewed from the East.**




**International Marine Terminal Maintenance & Operations Facility Project Site Aerial View.**

# APPENDIX B

# Geotechnical Report

HALEY ALDRICH

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# GEOTECHNICAL DESIGN REPORT

## PROPOSED MAINTENANCE AND OPERATIONS BUILDING
## MAINEDOT WIN 021942.02
## INTERNATIONAL MARINE TERMINAL
## COMMERCIAL STREET, PORTLAND, MAINE

by Haley & Aldrich, Inc.
Portland, Maine

for Becker Structural Engineers, Inc.
Portland, Maine

File No. 130189-002
August 2017

HALEY & ALDRICH, INC.
75 Washington Avenue
Suite 1A
Portland, ME 04101
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4 August 2017
File No. 130189-002

Becker Structural Engineers, Inc.
75 York Street
Portland, Maine 04101

Attention: Jack Burgess, P.E.
Associate

Subject: Geotechnical Design Report
Proposed Maintenance and Operations Building
MaineDOT WIN 021942.02
International Marine Terminal
Commercial Street, Portland, Maine

Ladies and Gentlemen:

This Geotechnical Design Report (report) provides the results of previous and recent subsurface exploration and laboratory testing programs and presents geotechnical design recommendations and construction considerations in support of the proposed Maintenance and Operations (M&O) Building. This work was undertaken at your request and in accordance with our proposal, dated 11 April 2017, and your subsequent authorization.

## Elevation Datum

Elevations referenced herein are in feet and reference the National Geodetic Vertical Datum of 1929 (NGVD 29). Tidal datum at the site relates to NGVD 29 as follows:

El. 0 MHHW = El. 5.39 NGVD 29
El. 0 MLLW = El. -4.52 NGVD 29

Please note that this tidal information is site specific and is taken from National Oceanic Atmospheric Administration (NOAA) tidal station No. 8418150 located on the Maine State Pier, Portland, Maine. This is the NOAA tidal station closest to the site.

## Project Location, Existing Site Conditions and Proposed Development

The International Marine Terminal (IMT) is located on a 13.5-acre parcel on Commercial Street in Portland, Maine. The IMT is bound by Commercial Street to the northwest, the Fore River to the southeast, and the Casco Bay Bridge to the west as shown on Figure 1, Project Locus.

Based on information provided by you at the 28 March 2017 meeting, it is our understanding that the Maine Intermodal Port Productivity (MIPP) Project includes several planned improvements at and in the vicinity of the IMT, which will allow for significant growth at the facility. It is also our understanding that as part of the MIPP Project, a new two-story, approximately 10,000 square foot (sf; gross) M&O Building will be constructed in the northwest portion of the site, adjacent to Commercial Street and the existing Office Building. The M&O Building will include an approximate 4,800 sf maintenance bay, with an overhead hoist. Additional office, training, kitchen and bathroom areas are also planned.

Based on information provided by you via email on 6 and 31 July 2017, it is our understanding that the proposed finish floor elevation (FFE) of the M&O Building is planned to be constructed at El. 13.63 and preliminary axial compressive column loads are as follows:

- Interior garage: 115 kips
- Perimeter garage: 60 kips
- Interior office: 70 kips
- Perimeter office: 30 kips

Please note that preliminary lateral and axial uplift loads were not provided at the time this report was prepared.

Existing and proposed site conditions for the M&O Building are shown in Figure 2, Site and Subsurface Exploration Location Plan.

## Subsurface Exploration Programs

Multiple subsurface exploration programs have been completed at and in the immediate vicinity of the site. A subsurface exploration program, consisting of test borings and test pits, was previously completed under the direction of Haley & Aldrich in 1987 in support of the design and construction of a new pier and storage area. A subsurface exploration program was also completed under the direction of Haley & Aldrich in 2010 in support of multiple site improvements including a pier infill, pavement rehabilitation and a new office building. Each exploration program is discussed separately in the following sections of this report.

Test boring locations are shown graphically on Figure 2. Test boring and test pit logs are provided for reference in Appendix A. Observation well installation and groundwater monitoring reports are provided in Appendix B.

### 1987 SUBSURFACE EXPLORATION PROGRAM

A subsurface exploration program consisting of 12 test borings, designated B-1 through B-9 (including B-3A, B-5A and B-7A), and 15 test pits, designated TP1 through TP12 (including TP1A, TP2A and TP7A), was completed at the site in September and October 1987 to support the design and construction of a new pier and storage area. Only two of the test borings (B-8 and B-9) and two of the test pits (TP10 and TP11) were drilled and excavated in the vicinity of the proposed M&O Building and are discussed herein.

The test borings were drilled by Maine Test Borings, Inc. of Brewer, Maine using a truck-mounted drill rig. The test borings were drilled to depths ranging from approximately 85 to 90 ft below ground surface (BGS) using 3-in. (NW-size) inside diameter (ID) steel casing. Soil samples were generally collected at standard 5-ft intervals by driving a 1-3/8-in. ID split-spoon sampler with a 140-lb hammer dropped from a height of 30 in., as indicated on the test boring logs. One observation well was installed in completed borehole B-9. The observation well consisted of ¾-in. diameter PVC pipe that extended approximately 3 ft above ground surface and was outfitted with steel guardpipe. The observation well installation report is provided for reference in Appendix B. Please note that it is likely that the observation well was previously decommissioned and is no longer accessible as it was not visible on site during the recently completed subsurface exploration program.

The test pits were excavated by Shaw Brothers Construction, Inc. of Gorham, Maine using a Komatsu PC200LC excavator. The test pits were excavated to depths ranging from approximately 8 to 14.5 ft BGS. The test pits were backfilled with excavated material after the subsurface conditions were observed and documented.

Please note that the elevations shown on the test boring and test pit logs and the observation well installation and groundwater monitoring reports reference MLLW datum, which is 4.52 ft below NGVD 29 datum.

## 2010 SUBSURFACE EXPLORATION PROGRAM

A subsurface exploration program consisting of 12 test borings, designated HA10-1 through HA10-12, was completed at the site in November 2010 to support the design and construction of multiple different site improvements. Only two test borings (HA10-1 and HA10-11) were drilled in the vicinity of the proposed M&O Building and are discussed herein.

The test borings were drilled by Maine Test Borings, Inc. of Brewer, Maine using a Mobile Drill B-53 truck-mounted drill rig. The test borings were drilled to depths ranging from approximately 3 to 27 ft BGS using solid-stem augers (SSAs), hollow stem augers (HSAs) and/or 4-in. (HW-size) ID steel casing. Soil samples obtained in test borings were typically collected continuously through the fill, then at standard, 5-ft intervals through natural soil, by driving a 1-3/8-in. ID split-spoon sampler with a 140-lb hammer dropped from a height of 30 in., as indicated on the test boring logs. The number of hammer blows required to advance the sampler through each 6-in. interval was recorded and is provided on the test boring logs. The Standard Penetration Test (SPT) N-value is defined as the total number of blows required to advance the sampler through the middle 12 in. of the 24-in. sampling interval. The boreholes were backfilled using drill cuttings. Cold patch was used to replace the bituminous pavement for test borings drilled in paved areas.

All test borings were monitored in the field by Haley & Aldrich personnel.

### 2017 SUBSURFACE EXPLORATION PROGRAM

A subsurface exploration program consisting of three test borings, designated HA17-101 through HA17-103, was completed at the site in June 2017 to support the design and construction of the subject project.

The locations of the test borings were laid out in the field by Haley & Aldrich prior to the start of drilling by taping distances from existing site features. The "as-drilled" plan location of and the ground surface elevations at the test boring locations were determined by James D. Nadeau, LLC. upon completion of drilling using optical surveying methods and equipment.

The test borings were drilled by Northern Test Boring of Gorham, Maine using a Diedrich D-50 track-mounted drill rig. The test borings were drilled to 32 ft BGS and terminated in naturally-deposited soil using a combination of 2-1/4-in. ID HSAs and 4-in. ID steel casing. Soil sampling means and methods and frequency were similar to those used during the 2010 subsurface exploration program discussed in the previous section of this report.

A photoionization detector (PID) was used in the field to screen for the presence of volatile organic compounds (VOCs) in the recovered fill soil samples. No elevated PID readings were detected as noted on the test boring logs provided in Appendix A.

The boreholes were backfilled using drill cuttings. Cold patch was used to replace the bituminous pavement for test borings located in paved areas.

The test borings were monitored in the field by Haley & Aldrich personnel who documented the soil and groundwater conditions encountered in the explorations and prepared test boring logs. All soil samples were collected and preserved in glass jars. Soil samples that were not submitted for laboratory testing are available for review upon request, and are currently being stored at the Haley & Aldrich laboratory facility in Portland, Maine.

## Generalized Subsurface Conditions

The subsurface conditions encountered at the site consist of the following soil units presented in order of increasing depth below ground surface: bituminous concrete, fill, harbor bottom soils, marine sand and glacial till. A general description of each soil unit is provided below. The soil units and thicknesses encountered in each of the explorations are summarized in Table I.

Please note that the soil descriptions provided on the test boring logs and summarized below do not represent actual field conditions other than at the specific test boring locations. The actual conditions will vary from those described and shown herein.

| Soil Unit | Approximate Encountered Thickness (ft) | Generalized Description |
|---|---|---|
| Bituminous Concrete | 0.2 to 0.3 | NA<br>*(encountered in each test boring)* |
| Fill | > 3 to 15 | Well graded SAND with variable amounts of silt and gravel (SW, SW-SM), silty SAND (SM) with variable amounts of gravel, poorly-graded SAND with variable amounts of silt and gravel (SP-SM, SP) SILT with variable amounts of clay, sand and organic matter (ML). Approximate 1.5 to 2-ft thick, non-continuous layers of wood was present between 6.5 and 12 ft BGS in test borings HA17-103 and B-8. Portions of the fill was stained black and contained brick, ash, coal and wood fragments<br>*(encountered in each test boring and test pit)* |
| Harbor Bottom Deposit | > 2.5 to 11 | Well graded SAND with variable amounts of gravel (SW), silty SAND (SM) and poorly-graded SAND with silt (SP-SM). Some portions of the deposit contained shells and had a slight to strong organic-like odor<br>*(encountered in HA17-101, HA17-102 and TP-11)* |
| Marine Sand | > 7 to > 18 | Well graded SAND with variable amounts of silt (SW, SW-SM), poorly-graded SAND with variable amounts of silt (SP-SM, SP)<br>*(encountered in each test boring except HA10-11)* |
| Glacial Till | > 3 to 4 | Fine to coarse SAND with variable amounts of silt and gravel<br>*(encountered in test borings B-8 and B-9)* |

## GROUNDWATER CONDITIONS

As noted in previous sections of this report, an observation well was installed in completed borehole B-9 during the 1987 subsurface exploration program. To determine whether the static water level at the site is influenced by tidal fluctuations in the nearby Fore River, water levels were measured manually at approximately 1-1/2-hour intervals on 23 and 24 November 1987. Additional static water level readings were taken between 7 October and 23 November 1987. A summary of the static water levels measured in the observation well is provided below.

| Approximate Range in Depth of Water Level BGS (ft) | Approximate Range in Water Level (ft, NGVD 29) |
|---|---|
| 8 to 11 | 0.3 to 3.3 |

Please note that the elevations shown on the observation well installation and groundwater monitoring reports provided in Appendix B reference MLLW datum. That information was converted to the NGVD 29 datum by Haley & Aldrich and is summarized above.

Based on the data collected between 7 October and 24 November 1987 it is our opinion that the static water level at the site is influenced by tidal fluctuations in the nearby Fore River. Peak groundwater levels within the observation well were generally coincident with high and low tides, respectively. The fluctuations within the observation well during the period between high and low tides was approximately 3 ft as compared to the approximate 12-ft difference between high and low tides in the Fore River. Please refer to the highlighted data on the plot of measured groundwater level versus time included in Appendix B.

In general, water levels may fluctuate with season, precipitation, local soil/bedrock conditions, excavation means and methods, temperature and tidal conditions. Therefore, water levels may vary from those summarized above, provided on the testing boring logs included in Appendix A and shown on the groundwater monitoring reports included in Appendix B.

## Laboratory Testing

A geotechnical laboratory testing program was undertaken on representative soil samples collected during the 2017 subsurface exploration programs to aid in soil classification and evaluating the reuse potential of the fill soils. The laboratory testing program consisted of six grain size analyses, which were completed in accordance with applicable American Society for Testing Materials (ASTM) testing procedures by GeoTesting Express of Acton, Massachusetts.

In addition, two soils samples obtained from test boring HA10-1 were also submitted for grain size analysis by GeoTesting Express in 2010.

Laboratory test results are summarized below and are provided in Appendix C.

| Laboratory Test | ASTM Test Designation | Soil Unit | No. of Tests | Range in Test Results |
|---|---|---|---|---|
| Grain Size | ASTM D 422 | Fill | 8 | AASHTO Classification: A-1-a, A-1-b, A-2-4 USCS Classification: SP-SM, SW-SM, SM |

## Geotechnical Design Recommendations

This section is primarily intended for members of the design team responsible for design of the structures and preparation of Contract Documents (CDs) and provides geotechnical recommendations for foundation design of the proposed M&O Building. The recommendations outlined herein are based on the lowest level floor slab elevation, preliminary foundation loads and assumed floor slab loads provided by Becker.

In general, design and construction of the proposed M&O Building should be completed in accordance with the requirements of the 2009 International Building Code (IBC Code).

## FOUNDATION SUPPORT

We recommend that the M&O Building be supported on spread footing foundations bearing on a minimum 2-ft thick layer of Compacted Granular Fill (CGF) that is systematically placed and compacted below and within the "zone of influence" (ZOI) of all new footings. For the purposes of this report, the ZOI is defined as the area below the footings and below imaginary lines that extend 1 ft laterally beyond the footing outer bottom edges and down on a 1 horizontal to 1 vertical (1H:1V) slope for a minimum vertical distance of 2 ft. All topsoil, debris and organic soils present at the bottom of the ZOI for footings should be excavated and replaced with CGF. Requirements for in-situ fill subgrade preparation and placement/compaction of CGF are outlined in the Construction Considerations section of this report.

Footings bearing on a 2-ft thick (minimum) layer of properly placed and compacted CGF within the ZOI of the footings should be designed for a maximum allowable bearing pressure equal to 1,500 pounds per square foot (psf). We recommend that all footings be at least 3 ft wide.

Based on our discussions with you, we understand that settlement tolerances for the structure are 1-in. total and ½-in. differentially between columns. At the recommended maximum allowable bearing pressure and with appropriate subgrade preparation, we anticipate total and differential settlement will be maintained within these limits. The near-surface soils at the site are non-compressible so long-term settlement of the building is not a concern.

## GROUND FLOOR SLABS

We recommend that the ground floor slab be designed as a soil-supported, concrete slab-on-grade. The floor slabs within the office and garage portions of the building should bear directly on a minimum of 12 in. and 24 in. of CGF, respectively, and should be structurally independent of the superstructure (i.e. joint at slab/wall interface). All topsoil, debris and organic soils present at slab subgrade level within the slab footprint should excavated and replaced with CGF. Requirements for in-situ fill subgrade preparation and placement/compaction of CGF are outlined in the Construction Considerations section of this report.

## FROST PROTECTION

Soils at the site are considered to be frost-susceptible. Bottom of exterior footings should be founded a minimum of 4.5 ft below the lowest adjacent ground surface exposed to freezing. Bottoms of interior footings in heated areas should be founded a minimum of 2 ft below the top of the adjacent floor slab. Based on our discussions with you, it is our understanding that the garage portion of the building will be heated. However, if exposure to freezing is anticipated either during or following construction, these footings should be lowered in accordance with the recommendations for exterior footings, or the subgrades and foundations should be insulated to prevent freezing.

## FOUNDATION DRAINAGE AND WATERPROOFING

As summarized above, the highest water level measured in the observation well installed in completed borehole B-9 was equal to approximately El. 3.3, which is approximately 10 ft below the proposed FFE. Accordingly, we do not consider installation of an underslab or perimeter foundation drainage system necessary.

## DAMPPROOFING AND VAPOR BARRIERS

In general, based on our review of the proposed site development, dampproofing of foundation walls is not considered necessary.

Based on the proposed building usage/occupancy as well as the man-placed nature of the near-surface, in-situ soils present at the site, we recommend that a vapor barrier be placed below the proposed floor slab in the office (non-garage) space at a minimum. The floor slab design and construction should be coordinated with the vapor barrier installer, as the barrier may impact concrete curing and curling.

## RESISTANCE OF LATERAL DESIGN BUILDING LOADS

We recommend that lateral base shear forces be resisted by one or more of the following:

- Friction along and between the base of the footings and the underlying soil. Frictional resistance should be computed using an ultimate base friction coefficient (tan $\delta$) equal to 0.40 between the spread footing concrete and the CGF.

- If friction alone is not sufficient in resisting the lateral base shear forces, we recommended that consideration be given to using the net passive resistance (passive minus active) provided by the in-situ fill surrounding the spread footings and below grade portions of foundation walls. We recommend that the net passive resistance be calculated using an equivalent fluid weight (triangular distribution) of 200 pounds per cubic foot (pcf). The top of the assumed passive zone should be 1 ft below the ground surface unless it is confined by a slab. This value assumes that existing fill material present on site is free-draining and is placed and compacted in lifts during backfilling operations. Please note that the recommend passive resistance assumes that existing fill material present on site is re-used during backfilling operations and that imported CGF is not required.

- If the combination of friction and passive resistance provided by the in-situ fill is not sufficient in resisting lateral base shear forces, we recommend that the net passive resistance be calculated using an equivalent fluid weight of 300 pcf, which assumes that CGF will be used as backfill within 5 ft laterally of the outside edges of pile caps, grade beams and foundation walls. Please note that if needed, resisting lateral base shear forces using an equivalent fluid weight of 300 pcf will add premium cost to the project as it will require offsite disposal of in-situ fill material and import of additional CGF.

### SEISMIC DESIGN CONSIDERATIONS

Seismic site class and seismic design parameters were determined in accordance with the requirements of Section 1613 of the IBC Code. Due to the nature and thickness of the overburden soil units and bedrock encountered in the previous and recent test borings, we recommend the site be considered "Site Class D". We recommend the following values be used to determine the design spectral response acceleration parameters ($SD_S$ and $SD_1$) and to calculate the base shear for purposes of seismic design:

- Mapped Spectral Accelerations for Short Periods: $S_S$ = 0.314g
- Mapped Spectral Accelerations for 1-Second Periods: $S_1$ = 0.077g
- Site Coefficient for Short Periods: $F_a$ = 1.548
- Site Coefficient for 1-Second Periods: $F_v$ = 2.390

Please note that "g" refers to acceleration due to gravity.

We do not consider the subsurface soils at the site to be liquefaction susceptible.

## Construction Considerations

The purpose of this section is to provide comments and recommendations on items related to excavation, earthwork and other geotechnical aspects of the proposed office building construction. It is written primarily for the Engineer having responsibility for the preparation of contract drawings and specifications. Since it identifies potential construction issues related to foundations and earthwork, it will also aid personnel who monitor the construction activity. Prospective Contractors should evaluate construction required for this project based on their own knowledge and experience in the Portland, Maine area, taking into consideration their proposed construction methods and procedures.

### EXCAVATION

Excavation to depths up to 6.5 ft below existing grades will be required to construct the M&O Building foundations (to approximate El. 5). Based on the results of our explorations, we anticipate that the bottom of the soils encountered during footing excavation will consist of in-situ fill.
We expect that excavation of the in-situ fill can be accomplished using normal earth-excavating equipment (i.e., hydraulic backhoes and excavators). We do not anticipate that bedrock will be encountered during excavation for this building however, the fill soils may contain abandoned foundations from structures that formerly occupied the site as well as other items including but not limited to the following: granite blocks, wood piles and wood debris, concrete slabs, railroad rails, footings, pile caps and grade beams.

Temporary cut slopes, if needed during construction, should typically be stable if constructed no steeper than approximately 1.5H:1V. Some sloughing and raveling should be anticipated in all temporary earth slopes. All temporary excavations should be made in accordance with OSHA and other applicable regulatory agency requirements. The Contractor should be responsible for the design, stability and safety of all temporary excavations.

## CONSTRUCTION DEWATERING

Groundwater was measured between El. 0.3 and El. 3.3 in the observation well installed in completed borehole B-9. Based on this information, we anticipate that the static water level will be approximately 3 to 6 ft below the deepest foundation excavation. Therefore, we do not anticipate that groundwater will be encountered during excavation for foundations. If it becomes necessary, we expect that dewatering within a few feet of encountered groundwater levels may be accomplished by pumping from open sumps and temporary ditches located at the base of excavations. These "passive" systems should be equipped with filters suitable to prevent pumping of fine-grained soil particles. The specifications should require that the Contractor be prepared to conduct this level of dewatering as part of their base bid.

The Contractor should also be responsible for controlling all surface runoff, infiltration and water from other sources at all times during excavation. Rainwater or snowmelt should be directed away from exposed bearing surfaces. Dewatering should be performed as required to maintain the undisturbed nature of the soil bearing surfaces and enable all final excavation, foundation construction and backfilling to be completed "in-the-dry."

Dewatering and discharge of dewatering effluent should be performed in accordance with all local, state and federal regulations. Dewatering should be conducted in a manner that avoids disturbance to prepared foundation subgrades, and that limits pumping of fines.

## SUBGRADE PREPARATION

The following guidelines are recommended to protect the subgrade soils beneath footings and slabs:

- Make final excavations into bearing soils by hand or using smooth-bladed equipment to limit disturbance.
- Prevent water from accumulating on soil surfaces to reduce the possibility of soil disturbance. All filling and concreting of slabs and footings should be performed in-the-dry. Subgrades that become disturbed due to water infiltration should be re-excavated and stabilized. Subgrade stabilization methods could include placement of crushed stone and geotextile fabric with approval of Haley & Aldrich.
- Exposed subgrades should be examined in the field by Haley & Aldrich to verify strength and bearing capacity and to determine if over-excavation of weak, disturbed or otherwise unacceptable soils is required.
- Exposed granular soils at bearing strata should be proofrolled with several passes of a heavy, hand-guided vibratory compactor until firm, as determined by Haley & Aldrich. Any soft areas revealed by proofrolling and identified by Haley & Aldrich be excavated and replaced with CGF.
- Disturbance due to water and adverse weather could be reduced by maintaining footing excavations at least 12 in. above the final bearing level until immediately before placing footing reinforcement and concrete. Alternatively, it may be desirable to protect the exposed soil subgrade areas as soon as possible after acceptance by Haley & Aldrich, by placing a 2 to 3-in. thick lean concrete mud-mat or 4 to 6 in. of crushed stone.

- Limit equipment traffic across the exposed soil bearing surfaces.
- Soil bearing surfaces below completed foundations and slabs must be protected against freezing, before and after foundation construction. If construction is performed during freezing weather, footings should be backfilled to a sufficient depth (up to 4.5 ft) as soon as possible after they are constructed. Alternatively, insulating blankets or other means may be used for protection against freezing.

## FILLING AND BACKFILLING

### General

Placement of compacted fills should not be conducted when air temperatures are low enough (approximately 30° F., or below) to cause freezing of the moisture in the fill during or before placement. Fill materials should not be placed on snow, ice or uncompacted frozen soil. Compacted fill should not be placed on frozen soil. No fill should be allowed to freeze prior to compaction. During construction and at the end of each day's operations, the last lift of fill, after compaction, should be rolled by a smooth wheeled roller to eliminate ridges of uncompacted soil, and covered to prevent freezing.

### Compacted Granular Fill

Compacted granular fill (CGF) placed within the ZOI of footings and beneath building slabs should consist of mineral, bank run sand and gravel, free of organic material, snow, ice, or other unsuitable materials and should be well graded within the following limits:

| Sieve Size | Percent Finer by Weight |
|---|---|
| ½ in. | 35 to 80 |
| ¼ in. | 25 to 65 |
| No. 40 | 0 to 30 |
| No. 200 | 0 to 7 |

Note: Cobbles and boulders having a size exceeding 2/3 of the loose lift thickness should be removed prior to compaction.

CGF should be placed in lifts not exceeding 12 in. in loose measure and compacted using self-propelled vibratory equipment. In confined areas, maximum loose layer reduced to 9 in., and compaction performed by hand-guided equipment.

### Common Fill

Common fill should consist of mineral sandy soil, free from organic matter, plastic, metal, wood, ice, snow or other deleterious material and should have the characteristic that it can be readily placed and compacted. Common fill imported to the site should have a maximum of 80 percent passing the No. 40 sieve and a maximum of 30 percent finer than the No. 200 sieve. The largest particle size for common fill should not exceed 2/3 of the loose lift thickness. Silty common fill soils may require moisture control

during placement and compaction. Common fill should be placed in maximum 12 in. thick loose lifts using compaction equipment as described above for CGF.

## COMPACTION

A summary of recommended compaction requirements is as follows:

| Location | Minimum Compaction Requirements |
|---|---|
| Within the ZOI beneath footings; adjacent to footings and below grade foundation walls | 95 percent |
| Beneath building slabs | 92 percent up to 3 ft below bottom of slab; 95 percent in the upper 3 ft |
| Parking, roadways and sidewalks | 92 percent up to 3 ft below finished grade; 95 percent in the upper 3 ft |
| Landscaped areas | 90 percent nominal compaction |

Minimum compaction requirements refer to percentages of the maximum dry density determined in accordance with ASTM D1557.

## REUSE OF EXCAVATED ON-SITE SOILS FOR BACKFILL

Based on our review of laboratory grain size tests completed on samples of the fill encountered in the test borings, it is our opinion that these soils are not acceptable for use as CGF and should not be placed within the ZOI of footings or within 12 in. (office space) or 24 in. (maintenance bay) of the ground floor slabs.

If approved by the geotechnical engineer, the excavated, in-situ fill materials could be reused as common fill adjacent to footings and below grade foundation walls and beneath the building floor slab (outside of footing ZOI and below the 12-in. thick pad of CGF placed beneath the slab). Common fill soils, especially used adjacent to foundations, should be primarily granular in nature, free of oversize material, organic material, refuse and debris, and should be able to achieve the minimum compaction requirements outlined above. These materials may be used as common fill in landscaped areas and beneath pavement sections if they can be placed and compacted adequately as stated herein. Excavated in-situ fill soils may be reused as common fill.

The final decision on whether in-situ fill material is “acceptable” for use as CGF or common fill should be made in the field by Haley & Aldrich based on the following information: 1.) visual inspection of the soils once they are excavated and stockpiled; and 2.) the results of additional laboratory testing (grain size and compaction should be a requirement of the earthwork specifications). In-situ fill soils may need to be processed using a mechanical screen to eliminate oversize material, organic material, refuse and debris. This material should be able to achieve the minimum compaction requirements outlined below. It is possible that due to the heterogeneous nature of fill soils, it is possible that a portion or all of the in-situ fill may not be acceptable for reuse.

## PREPARATION OF CONTRACT DOCUMENTS AND SUBMITTAL REVIEW

The CDs should be written so that the requirements are consistent with the design intent of the geotechnical recommendations outlined herein. Haley & Aldrich will assist the design team to prepare the specifications and contract drawings related to the following topics:

- Earthwork/Subgrade Preparation
- Construction Dewatering

The contract specifications should require the Contractor and the Contractor's Engineer to perform analyses and submit results to the designers for review. The design team should be allowed to review the geotechnical-related submittals to ensure that the Contractor's analyses/submittals are in accordance with the intent of the design. This will enable us to observe compliance with the design concepts, assumptions and specifications, and to facilitate design changes in the event that subsurface conditions differ from those anticipated prior to the start of construction.

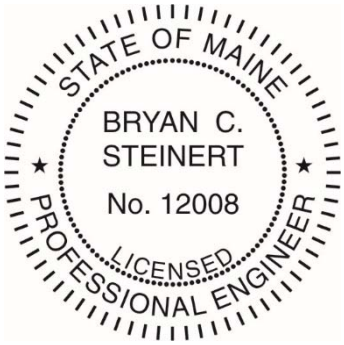
## CONSTRUCTION MONITORING

The foundation and ground floor slab recommendations contained herein are based on the predictable behavior of a properly engineered and constructed foundation. Monitoring of the foundation and ground floor slab installation is required to enable the geotechnical engineer to verify that the procedures and techniques used during construction are in accordance with the recommendations contained herein and the CDs. Therefore, we recommend that Haley & Aldrich be present during construction to:

- Observe preparation of footing, slab and fill bearing surfaces and determining the need for over-excavation and replacement of unsuitable soils within the building footprint and at the bottom of the ZOI for footings.
- Observe placement and compaction of CGF and other compacted fills.
- Confirm that soils used as fill and backfill are in accordance with CDs and make judgments on the suitability of excavated soils for reuse as fill.

Note that Section 1704.7 of the IBC Code requires subgrade inspection prior to engineered fill placement. Also, it is a requirement of the IBC Code that placement and compaction of engineered fills be monitored to insure conformance with design requirements.

Sincerely yours,
HALEY & ALDRICH, INC.




Bryan C. Steinert, P.E.
Project Manager

Wayne A. Chadbourne, P.E.
Senior Associate

Enclosures:

- Table I – Exploration Subsurface Data
- Figure 1 – Project Locus
- Figure 2 – Site and Subsurface Exploration Location Plan
- Appendix A – Logs of Subsurface Explorations
- Appendix B – Observation Well Installation and Groundwater Monitoring Reports
- Appendix C – Laboratory Test Results

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**TABLE I**
Exploration Subsurface Data
Proposed Maintenance and Operations Building
International Marine Terminal
Commercial Street, Portland, Maine

Haley & Aldrich, Inc. File No.: 130189-002

| Test Boring / Test Pit No.[1] | Ground Surface Elevation[2,3] | Approximate Strata Thickness[4,5,6] (ft) | | | | Approximate Elevation of Bottom of Exploration[2,3] |
|---|---|---|---|---|---|---|
| | | Bituminous Concrete / Fill | Harbor Bottom Deposit | Marine Sand | Glacial Till | |
| **2017 Subsurface Exploration Program:** | | | | | | |
| HA17-101 | 11.7 | 14.0 | 11.0 | > 7.0 | -- | -20.3 |
| HA17-102 | 12.6 | 15.0 | 5.0 | > 12.0 | -- | -19.4 |
| HA17-103 | 11.9 | 14.0 | NE | > 18.0 | -- | -20.1 |
| **2010 Subsurface Exploration Program:** | | | | | | |
| HA10-1 | 11.5 | 15.0 | NE | > 12.0 | -- | -15.5 |
| HA10-11 | 12.5 | > 3.0 | -- | -- | -- | 9.5 |
| **1987 Subsurface Exploration Program:** | | | | | | |
| B-8 | 11.3 | 12.0 | NE | 73.5 | 4.4 | -78.6 |
| B-9 | 11.6 | 13.0 | NE | 69.0 | > 3.0 | -73.4 |
| TP-10 | 9.7 | > 8.0 | -- | -- | -- | 1.7 |
| TP-11 | 11.0 | 12.0 | > 2.5 | -- | -- | -3.5 |

Notes:
[1] Test boring and test pit locations are shown on Figure 2, Site and Subsurface Exploration Location Plan.
[2] Ground surface elevations were determined by Haley & Aldrich, Inc. by interpolating between existing topographic contour information (2010 explorations) or by optical survey methods (2017 and 1987 explorations).
[3] Elevations are measured in feet and reference the National Geodetic Vertical Datum of 1929 (NGVD 29).
[4] "NE" indicates stratum was not encountered in test boring or test pit.
[5] "--" indicates test boring/test pit was not drilled/excavated deep enough to determine presence of stratum.
[6] "> 13.5" indicates test boring was not drilled deep enough to determine full thickness of stratum, which is greater than the value shown.

| | Individual | Date |
|---|---|---|
| Prepared By: | KAR | 7/17/2017 |
| Checked By: | BCS | 8/1/2017 |
| Reviewed By: | WAC | 8/4/2017 |




MAP SOURCE: ESRI

SITE COORDINATES: 43°38'56"N, 70°15'30"W



HALEY ALDRICH

PROPOSED MAINTENANCE AND OPERATIONS BUILDING
MAINEDOT WIN 021942.02
INTERNATIONAL MARINE TERMINAL
COMMERCIAL STREET, PORTLAND, MAINE

PROJECT LOCUS

APPROXIMATE SCALE: 1 IN = 2000 FT
AUGUST 2017

FIGURE 1

130189-002_1_LOCUS.PDF

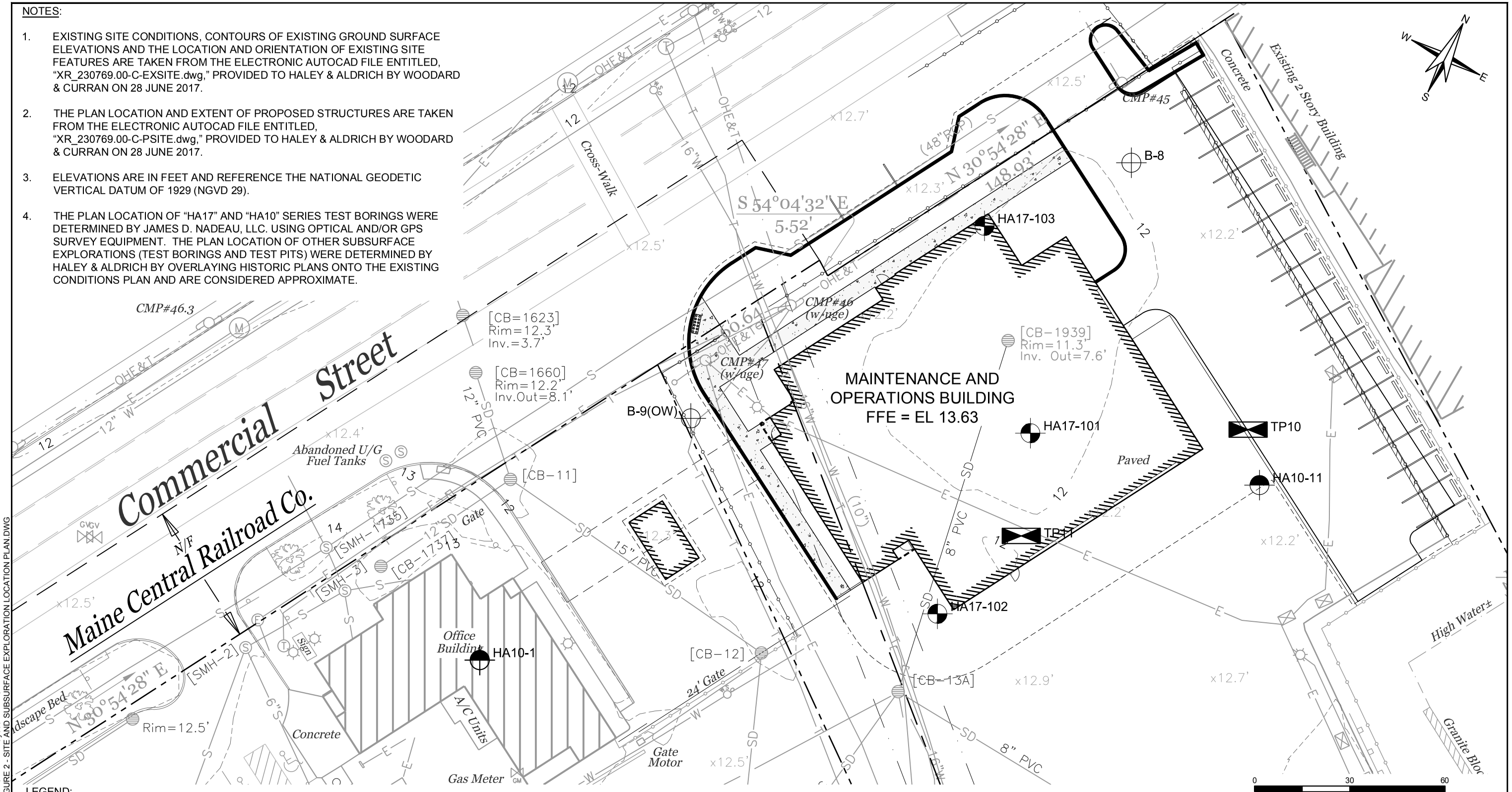
NOTES:

1. EXISTING SITE CONDITIONS, CONTOURS OF EXISTING GROUND SURFACE ELEVATIONS AND THE LOCATION AND ORIENTATION OF EXISTING SITE FEATURES ARE TAKEN FROM THE ELECTRONIC AUTOCAD FILE ENTITLED, "XR_230769.00-C-EXSITE.dwg," PROVIDED TO HALEY & ALDRICH BY WOODARD & CURRAN ON 28 JUNE 2017.

2. THE PLAN LOCATION AND EXTENT OF PROPOSED STRUCTURES ARE TAKEN FROM THE ELECTRONIC AUTOCAD FILE ENTITLED, "XR_230769.00-C-PSITE.dwg," PROVIDED TO HALEY & ALDRICH BY WOODARD & CURRAN ON 28 JUNE 2017.

3. ELEVATIONS ARE IN FEET AND REFERENCE THE NATIONAL GEODETIC VERTICAL DATUM OF 1929 (NGVD 29).

4. THE PLAN LOCATION OF "HA17" AND "HA10" SERIES TEST BORINGS WERE DETERMINED BY JAMES D. NADEAU, LLC. USING OPTICAL AND/OR GPS SURVEY EQUIPMENT. THE PLAN LOCATION OF OTHER SUBSURFACE EXPLORATIONS (TEST BORINGS AND TEST PITS) WERE DETERMINED BY HALEY & ALDRICH BY OVERLAYING HISTORIC PLANS ONTO THE EXISTING CONDITIONS PLAN AND ARE CONSIDERED APPROXIMATE.




LEGEND:

| | |
|---|---|
| HA17-102 | DESIGNATION AND LOCATION OF TEST BORING DRILLED BY NORTHERN TEST BORINGS, INC. OF GORHAM, MAINE UNDER THE DIRECTION OF HALEY & ALDRICH IN JUNE 2017 |
| HA10-1 | DESIGNATION AND LOCATION OF TEST BORING DRILLED BY MAINE TEST BORINGS, INC. OF BREWER, MAINE UNDER THE DIRECTION OF HALEY & ALDRICH IN NOVEMBER 2010 |
| B-9(OW) | DESIGNATION AND APPROXIMATE LOCATION OF TEST BORING DRILLED BY MAINE TEST BORINGS, INC. OF BREWER, MAINE UNDER THE DIRECTION OF HALEY & ALDRICHIN SEPTEMBER AND OCTOBER 1987 |
| TP10 | DESIGNATION AND APPROXIMATE LOCATION OF TEST PIT EXCAVATED BY SHAW BROTHERS CONSTRUCTION, INC. OF GORHAM, MAINE UNDER THE DIRECTION OF HALEY & ALDRICH IN OCTOBER 1987 |
| (OW) | DENOTES OBSERVATION WELL INSTALLED IN COMPLETED BOREHOLE |
| ---15--- | ELEVATION CONTOUR OF EXISTING GROUND SURFACE (FT, NAVD 29) |

| | | |
|---|---|---|
| DRAWN BY | MRS | 08/04/17 |
| CHECKED BY | BCS | 08/04/17 |
| REVIEWED BY | WAC | 08/04/17 |

HALEY ALDRICH

MAINTENANCE AND OPERATIONS BUILDING
INTERNATIONAL MARINE TERMINAL
COMMERCIAL STREET, PORTLAND, MAINE

# SITE AND SUBSURFACE EXPLORATION LOCATION PLAN

SCALE: AS SHOWN
AUGUST 2017

FIGURE 2

STACEY, MICHELLE Printed: 8/4/2017 11:13 AM Layout: HA-FIG-B-L-H
G:\PROJECTS\37272 - IMT\000\FIGURES\FIGURE 2 - SITE AND SUBSURFACE EXPLORATION LOCATION PLAN.DWG
623

## References


1. Report entitled, “Geotechnical Data Report, Portland International Marine Terminal Improvements, Portland, Maine, PIN: 17820.00,” prepared by Haley & Aldrich, Inc. for HNTB Corporation, dated 7 January 2011.
2. Memorandum entitled, “Geotechnical Design Memorandum – Proposed Office Building, Portland International Marine Terminal Improvements, Portland, Maine, PIN: 17820.00,” prepared by Haley & Aldrich, Inc. for HNTB Corporation, dated 7 January 2011.
3. Report entitled, “Report on Proposed Cargo Pier, Portland, Maine,” prepared by Haley & Aldrich, Inc. for Childs Engineering Corporation, dated 8 January 1988.

# APPENDIX A

## Logs of Subsurface Explorations

**2017 Test Boring Logs**

# TEST BORING REPORT

**Boring No. HA17-101**

| | |
|---|---|
| Project | Maintenance and Operations Building, International Marine Terminal, Portland, Maine |
| Client | Becker Structural Engineers, Inc. |
| Contractor | Northern Test Borings, Inc. |

| | Casing | Sampler | Barrel | Drilling Equipment and Procedures |
|---|---|---|---|---|
| Type | HSA | S | -- | Rig Make & Model: Diedrich D-50 |
| Inside Diameter (in.) | 2.25 | 1.375 | -- | Bit Type: Roller Bit |
| Hammer Weight (lb) | -- | 140 | - | Drill Mud: None |
| Hammer Fall (in.) | -- | 30 | - | Casing: HSA to 27'; HW to 30' |
| | | | | Hoist/Hammer: Winch / Automatic Hammer |
| | | | | PID Make & Model: MiniRAE 2000 10.6 eV |

| | |
|---|---|
| File No. | 130189-002 |
| Sheet No. | 1 of 2 |
| Start | 22 June 2017 |
| Finish | 23 June 2017 |
| Driller | M. Nadeau |
| H&A Rep. | M. Snow |
| Elevation | 11.7 |
| Datum | NGVD 29 |
| Location | See Plan |

| Depth (ft) | Sampler Blows per 6 in. | Sample No. & Rec. (in.) | Sample Depth (ft) | Stratum Change Elev/Depth (ft) | USCS Symbol | VISUAL-MANUAL IDENTIFICATION AND DESCRIPTION (Density/consistency, color, GROUP NAME, max. particle size*, structure, odor, moisture, optional descriptions GEOLOGIC INTERPRETATION) | Gravel % Coarse | Gravel % Fine | Sand % Coarse | Sand % Medium | Sand % Fine | % Fines | Field Test Dilatancy | Field Test Toughness | Field Test Plasticity | Field Test Strength |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 0 | | | | 11.4 | | -BITUMINOUS CONCRETE- | | | | | | | | | | |
| | 16 15 25 26 | S1 16 | 0.2 2.2 | 0.3 | SM | Dense brown silty SAND (SM), mps 1.5 in., no odor, dry PID=0 ppm -FILL- | 0 | 13 | 11 | 33 | 23 | 20 | | | | |
| | 10 11 5 7 | S2 16 | 2.2 4.0 | | SM | Medium dense brown silty SAND (SM), mps 2 in., no odor, dry, contains ash, brick fragments, coal PID=0 ppm | 0 | 13 | 11 | 33 | 23 | 20 | | | | |
| | | | | 7.7 | | | | | | | | | | | | |
| 5 | 4 4 5 3 | S3 14 | 4.0 6.0 | 4.0 | SM | Loose brown to rust-brown to black silty SAND with gravel (SM), mps 1.5 in., no odor, dry, contains coal PID=0 ppm -FILL- | 8 | 13 | 6 | 18 | 34 | 21 | | | | |
| | 4 4 4 2 | S4 8 | 6.0 8.0 | | SM | Loose dark brown to black silty SAND with gravel (SM), no odor, dry, contains brick chunks, ash, coal PID=0.5 ppm | 8 | 13 | 6 | 18 | 34 | 21 | | | | |
| | 1 1 1 1 | S5 NR | 8.0 10.0 | | | No Recovery | | | | | | | | | | |
| | | | | 2.7 9.0 | | | | | | | | | | | | |
| 10 | | | | | | Note: Water encountered at 10 ft. | | | | | | | | | | |
| | 3 5 3 4 | S6 6 | 10.0 12.0 | | SM | Loose black silty SAND with gravel (SM), mps 2 in., no odor, wet, contains brick chunks PID=0 ppm -FILL- | 15 | 10 | 10 | 20 | 30 | 15 | | | | |
| | 6 6 10 11 | S7 4 | 12.0 14.0 | | SM | Medium dense black silty SAND with gravel (SM), mps 2 in., no odor, wet PID=0 ppm | 20 | 10 | 5 | 10 | 40 | 15 | | | | |
| | | | | -2.3 14.0 | | | | | | | | | | | | |
| 15 | 10 11 11 10 | S8 16 | 14.0 16.0 | | SM | Medium dense dark gray silty SAND (SM), mps 1.5 in., strong organic odor, wet, contains shells | 5 | 5 | 20 | 35 | 20 | 15 | | | | |
| | | | | | | -HARBOR BOTTOM DEPOSIT- | | | | | | | | | | |
| 20 | | | | | | Note: Drill action indicates easier penetration at 19 ft. | | | | | | | | | | |

## Water Level Data

| Date | Time | Elapsed Time (hr.) | Depth (ft) to: Bottom of Casing | Bottom of Hole | Water |
|---|---|---|---|---|---|
| 6/23/17 | 07:00 | 19.0 | 30.0 | 30.0 | 8.3 |

## Sample ID

O - Open End Rod
T - Thin Wall Tube
U - Undisturbed Sample
S - Split Spoon Sample

## Well Diagram

Riser Pipe
Screen
Filter Sand
Cuttings
Grout
Concrete
Bentonite Seal

## Summary

| | |
|---|---|
| Overburden (ft) | 32.0 |
| Rock Cored (ft) | -- |
| Samples | 11S |

**Boring No. HA17-101**

**Field Tests:** **Dilatancy**: R - Rapid S - Slow N - None
**Toughness**: L - Low M - Medium H - High
**Plasticity**: N - Nonplastic L - Low M - Medium H - High
**Dry Strength**: N - None L - Low M - Medium H - High V - Very High

***Note: Maximum particle size (mps) 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.**

H&A-TEST BORING-07-1 130189-002_HA-LIB09-REV.GLB HA-TB+CORE+WELL-07-1.GDT G:\PROJECTS\130189 - IMT OPERATIONS AND MAINTENANCE BUILDING\FIELD\130189-002_TB_HA17-101_HA17-103.GPJ 4 Aug 17

# TEST BORING REPORT

**Boring No.** HA17-101
File No. 130189-002
Sheet No. 2 of 2

| Depth (ft) | Sampler Blows per 6 in. | Sample No. & Rec. (in.) | Sample Depth (ft) | Stratum Change Elev/Depth (ft) | USCS Symbol | VISUAL-MANUAL IDENTIFICATION AND DESCRIPTION (Density/consistency, color, GROUP NAME, max. particle size*, structure, odor, moisture, optional descriptions GEOLOGIC INTERPRETATION) | Gravel % Coarse | Gravel % Fine | Sand % Coarse | Sand % Medium | Sand % Fine | % Fines | Field Test Dilatancy | Field Test Toughness | Field Test Plasticity | Field Test Strength |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 20 | 5<br>5<br>4<br>5 | S9<br>8 | 20.0<br>22.0 | | SP-SM | Loose dark gray-brown poorly-graded SAND with silt (SP-SM), mps 0.25 in., slight organic odor, wet, contains shells<br><br>-HARBOR BOTTOM DEPOSIT- | | 5 | 10 | 35 | 40 | 10 | | | | |
| 25 | 12<br>14<br>14<br>14 | S10<br>4 | 25.0<br>27.0 | -13.3<br>25.0 | SP-SM | Medium dense brown poorly-graded SAND with silt (SP-SM), mps 1.5 in., no odor, wet<br><br>Note: Running sands encountered from 27 to 30 ft.<br><br>-MARINE DEPOSIT-<br>(sand) | 5 | 5 | 10 | 40 | 30 | 10 | | | | |
| 30 | 5<br>6<br>9<br>9 | S11<br>14 | 30.0<br>32.0 | -20.3<br>32.0 | SP | Medium dense brown poorly-graded SAND (SP), mps 0.5 in., no odor, wet | | 5 | 10 | 45 | 35 | 5 | | | | |
| | | | | | | -BOTTOM OF EXPLORATION 32.0 FT<br>(NO REFUSAL) | | | | | | | | | | |

**NOTE: Soil identification based on visual-manual methods of the USCS as practiced by Haley & Aldrich, Inc.**

**Boring No.** HA17-101

H&A-TEST BORING-07-1 130189-002_HA-LIB09-REV.GLB HA-TB+CORE+WELL-07-1.GDT G:\PROJECTS\130189 - IMT OPERATIONS AND MAINTENANCE BUILDING\FIELD\130189-002_TB_HA17-101_HA17-103.GPJ 4 Aug 17

# TEST BORING REPORT

**Boring No. HA17-102**

| | |
|---|---|
| Project | Maintenance and Operations Building, International Marine Terminal, Portland, Maine |
| Client | Becker Structural Engineers, Inc. |
| Contractor | Northern Test Borings, Inc. |

| | Casing | Sampler | Barrel | Drilling Equipment and Procedures |
|---|---|---|---|---|
| Type | HW | S | -- | Rig Make & Model: Diedrich D-50 |
| Inside Diameter (in.) | 4.0 | 1.375 | -- | Bit Type: Roller Bit |
| Hammer Weight (lb) | 140 | 140 | - | Drill Mud: None |
| Hammer Fall (in.) | 30 | 30 | - | Casing: HSA to 14'; HW to 30' |
| | | | | Hoist/Hammer: Winch / Automatic Hammer |
| | | | | PID Make & Model: MiniRAE 2000 10.6 eV |

| | |
|---|---|
| File No. | 130189-002 |
| Sheet No. | 1 of 2 |
| Start | 23 June 2017 |
| Finish | 23 June 2017 |
| Driller | M. Nadeau |
| H&A Rep. | M. Snow |
| Elevation | 12.6 |
| Datum | NGVD 29 |
| Location | See Plan |

| Depth (ft) | Sampler Blows per 6 in. | Sample No. & Rec. (in.) | Sample Depth (ft) | Stratum Change Elev/Depth (ft) | USCS Symbol | VISUAL-MANUAL IDENTIFICATION AND DESCRIPTION (Density/consistency, color, GROUP NAME, max. particle size*, structure, odor, moisture, optional descriptions GEOLOGIC INTERPRETATION) | Gravel % Coarse | Gravel % Fine | Sand % Coarse | Sand % Medium | Sand % Fine | % Fines | Field Test Dilatancy | Field Test Toughness | Field Test Plasticity | Field Test Strength |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 0 | | | | 12.3 | | -BITUMINOUS CONCRETE- | | | | | | | | | | |
| | 12 13 15 | S1 15 | 0.5 2.0 | 0.3 | SM | Medium dense brown well graded SAND with gravel (SW), mps 1 in., no odor, dry<br>PID=0 ppm | 10 | 15 | 20 | 30 | 20 | 5 | | | | |
| | 9 16 12 9 | S2 11 | 2.0 4.0 | | SP-SM | -FILL-<br>Medium dense brown to dark brown poorly-graded SAND with silt and gravel (SP-SM), mps 2 in., no odor, dry, contains brick fragments<br>PID=0.2 ppm | 21 | 7 | 8 | 29 | 21 | 14 | | | | |
| | 9 8 6 11 | S3 14 | 4.0 6.0 | 8.6<br>4.0 | SW-SM | Medium dense brown well graded SAND with silt and gravel (SW-SM), mps 1.5 in., no odor, dry to moist<br>PID=0.1 ppm | 24 | 20 | 10 | 19 | 16 | 11 | | | | |
| 5 | | | | | | -FILL- | | | | | | | | | | |
| | 10 6 6 10 | S4 12 | 6.0 8.0 | | SW-SM | Medium dense brown well graded SAND with silt and gravel (SW-SM), mps 1.5 in., no odor, dry to moist<br>PID=0.4 ppm | 24 | 20 | 10 | 19 | 16 | 11 | | | | |
| | 5 6 7 12 | S5 16 | 8.0 10.0 | | SW-SM | Medium dense brown well graded SAND with silt and gravel (SW-SM), mps 1.5 in., no odor, moist<br>PID=0 ppm | 25 | 15 | 20 | 20 | 10 | 10 | | | | |
| 10 | 5 5 5 7 | S6 14 | 10.0 12.0 | | SW-SM | Loose brown well graded SAND with silt and gravel (SW-SM), mps 1.5 in., no odor, moist to wet, contains brick fragments<br>PID=0 ppm<br>Note: Water encountered at 11.5 ft. | 25 | 15 | 20 | 20 | 10 | 10 | | | | |
| | 6 6 5 3 | S7 13 | 12.0 14.0 | | SW-SM | Medium dense brown well graded SAND with silt and gravel (SW-SM), mps 1.5 in., no odor, wet<br>PID=0 ppm<br>Note: Switched from augers to HW casing at 14 ft. | 15 | 20 | 20 | 25 | 10 | 10 | | | | |
| | 5 8 8 8 | S8 20 | 14.0 16.0 | -1.4<br>14.0<br>-2.4<br>15.0 | SP | Medium dense brown to rust-brown poorly-graded SAND (SP), contains brick fragments | | 10 | 10 | 40 | 35 | 5 | | | | |
| 15 | | | | | SW | -FILL-<br>Medium dense gray-brown well graded SAND (SW), mps 0.75 in., no odor, wet, contains few shells | | 10 | 25 | 35 | 25 | 5 | | | | |
| | 6 5 5 4 | S9 18 | 16.0 18.0 | | SW | Loose gray-brown well graded SAND with gravel (SW), mps 1 in., no odor, wet | 10 | 20 | 20 | 30 | 15 | 5 | | | | |
| | | | | | | -HARBOR BOTTOM DEPOSIT- | | | | | | | | | | |
| 20 | | | | | | | | | | | | | | | | |

**Water Level Data**

| Date | Time | Elapsed Time (hr.) | Depth (ft) to: Bottom of Casing | Bottom of Hole | Water |
|---|---|---|---|---|---|
| | | | | | |

**Sample ID**

O - Open End Rod
T - Thin Wall Tube
U - Undisturbed Sample
S - Split Spoon Sample

**Well Diagram**

Riser Pipe
Screen
Filter Sand
Cuttings
Grout
Concrete
Bentonite Seal

**Summary**

| | |
|---|---|
| Overburden (ft) | 32.0 |
| Rock Cored (ft) | -- |
| Samples | 12S |

**Boring No. HA17-102**

**Field Tests:** **Dilatancy**: R - Rapid S - Slow N - None **Toughness**: L - Low M - Medium H - High **Plasticity**: N - Nonplastic L - Low M - Medium H - High **Dry Strength**: N - None L - Low M - Medium H - High V - Very High

***Note: Maximum particle size (mps) 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.**

H&A-TEST BORING-07-1 130189-002_HA-LIB09-REV.GLB HA-TB+CORE+WELL-07-1.GDT G:\PROJECTS\130189 - IMT OPERATIONS AND MAINTENANCE BUILDING\FIELD\130189-002_TB_HA17-101_HA17-103.GPJ 4 Aug 17

# TEST BORING REPORT

**Boring No.** HA17-102
File No. 130189-002
Sheet No. 2 of 2

| Depth (ft) | Sampler Blows per 6 in. | Sample No. & Rec. (in.) | Sample Depth (ft) | Stratum Change Elev/Depth (ft) | USCS Symbol | VISUAL-MANUAL IDENTIFICATION AND DESCRIPTION (Density/consistency, color, GROUP NAME, max. particle size*, structure, odor, moisture, optional descriptions GEOLOGIC INTERPRETATION) | Gravel % Coarse | Gravel % Fine | Sand % Coarse | Sand % Medium | Sand % Fine | % Fines | Field Test Dilatancy | Field Test Toughness | Field Test Plasticity | Field Test Strength |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 20 | 3<br>7<br>7<br>6 | S10<br>12 | 20.0<br>22.0 | -7.4<br>20.0 | SP | Medium dense brown poorly-graded SAND (SP), mps 0.25 in., no odor, wet | | | 15 | 45 | 35 | 5 | | | | |
| | | | | | | -MARINE DEPOSIT-<br>(Sand) | | | | | | | | | | |
| 25 | 4<br>5<br>7<br>8 | S11<br>11 | 25.0<br>27.0 | | SP-SM | Medium dense brown poorly-graded SAND with silt (SP-SM), mps 0.25 in., no odor, wet, occasional silt laminae (0.25 in. thickness) | | 5 | 5 | 45 | 35 | 10 | | | | |
| 30 | 6<br>6<br>7<br>8 | S12<br>6 | 30.0<br>32.0 | | SW | Medium dense brown well graded SAND (SW), mps 0.5 in., no odor, wet | | 5 | 15 | 45 | 30 | 5 | | | | |
| | | | | | | -MARINE DEPOSIT-<br>(Sand) | | | | | | | | | | |
| | | | | -19.4<br>32.0 | | -BOTTOM OF EXPLORATION 32.0 FT<br>(NO REFUSAL) | | | | | | | | | | |

**NOTE: Soil identification based on visual-manual methods of the USCS as practiced by Haley & Aldrich, Inc.**

**Boring No.** HA17-102

H&A-TEST BORING-07-1 130189-002_HA-LIB09-REV.GLB HA-TB+CORE+WELL-07-1.GDT G:\PROJECTS\130189 - IMT OPERATIONS AND MAINTENANCE BUILDING\FIELD\130189-002_TB_HA17-101_HA17-103.GPJ 4 Aug 17

# TEST BORING REPORT

**Boring No. HA17-103**

| | |
|---|---|
| Project | Maintenance and Operations Building, International Marine Terminal, Portland, Maine |
| Client | Becker Structural Engineers, Inc. |
| Contractor | Northern Test Borings, Inc. |

| | Casing | Sampler | Barrel | Drilling Equipment and Procedures |
|---|---|---|---|---|
| Type | HSA | S | -- | Rig Make & Model: Diedrich D-50 |
| Inside Diameter (in.) | 2.25 | 1.375 | -- | Bit Type: Roller Bit |
| Hammer Weight (lb) | -- | 140 | - | Drill Mud: None |
| Hammer Fall (in.) | -- | 30 | - | Casing: HSA to 15'; HW to 30' |
| | | | | Hoist/Hammer: Winch / Automatic Hammer |
| | | | | PID Make & Model: MiniRAE 2000 10.6 eV |

| | |
|---|---|
| File No. | 130189-002 |
| Sheet No. | 1 of 2 |
| Start | 22 June 2017 |
| Finish | 23 June 2017 |
| Driller | M. Nadeau |
| H&A Rep. | M. Snow |
| Elevation | 11.9 |
| Datum | NGVD 29 |
| Location | See Plan |

| Depth (ft) | Sampler Blows per 6 in. | Sample No. & Rec. (in.) | Sample Depth (ft) | Stratum Change Elev/Depth (ft) | USCS Symbol | VISUAL-MANUAL IDENTIFICATION AND DESCRIPTION (Density/consistency, color, GROUP NAME, max. particle size*, structure, odor, moisture, optional descriptions GEOLOGIC INTERPRETATION) | Gravel % Coarse | Gravel % Fine | Sand % Coarse | Sand % Medium | Sand % Fine | % Fines | Field Test Dilatancy | Field Test Toughness | Field Test Plasticity | Field Test Strength |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 0 | | | | 11.6 | | -BITUMINOUS CONCRETE- | | | | | | | | | | |
| | 4 3 3 | S1 10 | 0.5 2.0 | 0.3 | SW-SM | Loose brown well graded SAND with silt and gravel (SW-SM), mps 1.5 in., no odor, dry PID=1.0 ppm | 10 | 10 | 15 | 30 | 25 | 10 | | | | |
| | 2 3 4 3 | S2 14 | 2.0 4.0 | | SM | -FILL- Loose dark brown silty SAND with gravel (SM), mps 0.75 in., no odor, moist PID=0.5 ppm | | 15 | 6 | 25 | 34 | 20 | | | | |
| | | | | 7.9 | | Note: Encountered abandoned electrical conduit at approximately 2 ft. | | | | | | | | | | |
| 5 | 2 1 2 2 | S3 6 | 4.0 6.0 | 4.0 | ML | Soft brown clayey SILT (ML), mps 0.42 mm, no odor, moist PID=0.9 ppm -FILL- | | | | | 10 | 90 | | | | |
| | 2 2 2 5 | S4 10 | 6.0 8.0 | | OL | Soft brown-gray SILT with sand and organics (OL), mps 2 mm, strong organic odor, wet, contains 3-in. wood piece PID=0 ppm | | | | | 20 | 80 | | | | |
| | 1 1 20 40 | S5 18 | 8.0 10.0 | | OL | Very soft brown-gray SILT with sand and organics (OL), mps 2 mm, strong organic odor, wet, few brick fragments PID=0.2 ppm | | | | | 15 | 85 | | | | |
| | | | | 2.9 9.0 | | -WOOD- | | | | | | | | | | |
| 10 | 60 1 3 7 | S6 8 | 10.0 12.0 | 1.4 10.5 | SM | Loose dark gray silty SAND (SM), mps 0.25 in., strong organic odor, wet, with 6-in. wood PID=0.4 ppm | | | 5 | 35 | 40 | 20 | | | | |
| | 6 7 10 12 | S7 14 | 12.0 14.0 | | SP-SM | -FILL- Medium dense dark gray poorly-graded SAND with silt (SP-SM), mps 0.5 in., organic odor, wet, few brick fragments PID=0 ppm | | 5 | 10 | 40 | 35 | 10 | | | | |
| | | | | -2.1 14.0 | | | | | | | | | | | | |
| 15 | 8 9 9 8 | S8 12 | 14.0 16.0 | | SP-SM | Medium dense rust-brown poorly-graded SAND with silt (SP-SM), mps 0.5 in., no odor, wet -MARINE DEPOSIT- (Sand) | | 10 | 10 | 40 | 30 | 10 | | | | |
| | 6 7 7 6 | S9 12 | 16.0 18.0 | | SW-SM | Medium dense rust-brown grading to gray-brown well graded SAND with silt (SW-SM), mps 0.5 in., no odor, wet Note: Switched from augers to HW casing at 16 ft. | | 10 | 15 | 40 | 25 | 10 | | | | |
| 20 | | | | | | | | | | | | | | | | |

**Water Level Data**

| Date | Time | Elapsed Time (hr.) | Depth (ft) to: Bottom of Casing | Bottom of Hole | Water |
|---|---|---|---|---|---|
| | | | | | |

**Sample ID**

O - Open End Rod
T - Thin Wall Tube
U - Undisturbed Sample
S - Split Spoon Sample

**Well Diagram**

Riser Pipe
Screen
Filter Sand
Cuttings
Grout
Concrete
Bentonite Seal

**Summary**

| | |
|---|---|
| Overburden (ft) | 32.0 |
| Rock Cored (ft) | -- |
| Samples | 12S |

**Boring No. HA17-103**

**Field Tests:** **Dilatancy**: R - Rapid S - Slow N - None **Toughness**: L - Low M - Medium H - High **Plasticity**: N - Nonplastic L - Low M - Medium H - High **Dry Strength**: N - None L - Low M - Medium H - High V - Very High

***Note: Maximum particle size (mps) 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.**

H&A-TEST BORING-07-1 130189-002_HA-LIB09-REV.GLB HA-TB+CORE+WELL-07-1.GDT G:\PROJECTS\130189 - IMT OPERATIONS AND MAINTENANCE BUILDING\FIELD\130189-002_TB_HA17-101_HA17-103.GPJ 4 Aug 17

# TEST BORING REPORT

**Boring No.** HA17-103
File No. 130189-002
Sheet No. 2 of 2

| Depth (ft) | Sampler Blows per 6 in. | Sample No. & Rec. (in.) | Sample Depth (ft) | Stratum Change Elev/Depth (ft) | USCS Symbol | VISUAL-MANUAL IDENTIFICATION AND DESCRIPTION (Density/consistency, color, GROUP NAME, max. particle size*, structure, odor, moisture, optional descriptions GEOLOGIC INTERPRETATION) | Gravel % Coarse | Gravel % Fine | Sand % Coarse | Sand % Medium | Sand % Fine | % Fines | Field Test Dilatancy | Field Test Toughness | Field Test Plasticity | Field Test Strength |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 20 | 6<br>10<br>12<br>13 | S10<br>14 | 20.0<br>22.0 | | SW | Medium dense rust-brown well graded SAND (SW), mps 0.5 in., no odor, wet | | 10 | 20 | 35 | 30 | 5 | | | | |
| | | | | | | -MARINE DEPOSIT-<br>(Sand) | | | | | | | | | | |
| 25 | 7<br>11<br>15<br>15 | S11<br>14 | 25.0<br>27.0 | | SP | Medium dense brown to rust-brown poorly-graded SAND (SP), mps 0.5 in., no odor, wet | | 10 | 10 | 40 | 35 | 5 | | | | |
| 30 | 10<br>14<br>15<br>18 | S12<br>12 | 30.0<br>32.0 | | SP | Medium dense brown to rust-brown poorly-graded SAND (SP), mps 0.5 in., no odor, wet<br>-MARINE DEPOSIT-<br>(Sand) | | 10 | 10 | 45 | 30 | 5 | | | | |
| | | | | -20.1<br>32.0 | | -BOTTOM OF EXPLORATION 32.0 FT<br>(NO REFUSAL) | | | | | | | | | | |

**NOTE: Soil identification based on visual-manual methods of the USCS as practiced by Haley & Aldrich, Inc.**

**Boring No.** HA17-103

H&A-TEST BORING-07-1 130189-002_HA-LIB09-REV.GLB HA-TB+CORE+WELL-07-1.GDT G:\PROJECTS\130189 - IMT OPERATIONS AND MAINTENANCE BUILDING\FIELD\130189-002_TB_HA17-101_HA17-103.GPJ 4 Aug 17

**2010 Test Boring Logs**

HALEY & ALDRICH

# TEST BORING REPORT

**Boring No.** HA10-1

Project: Portland International Marine Terminal Improvements, Portland, Maine
Client: HNTB Corporation
Contractor: Maine Test Borings

File No. 37272-000
Sheet No. 1 of 2
Start 15 November 2010
Finish 15 November 2010
Driller R. Leonard
H&A Rep. M. Foley
Elevation 11.5 (approx.)
Datum NGVD 29
Location See Plan

| | Casing | Sampler | Barrel | Drilling Equipment and Procedures |
|---|---|---|---|---|
| Type | HW | S | - | Rig Make & Model: Mobile Drill B53 |
| Inside Diameter (in.) | 4.0 | 1.375 | - | Bit Type: Roller Bit |
| Hammer Weight (lb) | 300 | 140 | - | Drill Mud: None |
| Hammer Fall (in.) | 16 | 30 | - | Casing: SSA to 5', HSA to 15.0', HW to 25.0' |
| | | | | Hoist/Hammer: Winch / Safety Hammer |
| | | | | PID Make & Model: N/A |

| Depth (ft) | Sampler Blows per 6 in. | Sample No. & Rec. (in.) | Sample Depth (ft) | Stratum Change Elev/Depth (ft) | USCS Symbol | VISUAL-MANUAL IDENTIFICATION AND DESCRIPTION (Density/consistency, color, GROUP NAME, max. particle size*, structure, odor, moisture, optional descriptions GEOLOGIC INTERPRETATION) | Gravel % Coarse | Gravel % Fine | Sand % Coarse | Sand % Medium | Sand % Fine | % Fines | Field Test Dilatancy | Field Test Toughness | Field Test Plasticity | Field Test Strength |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 0 | | | | 11.3 / 0.2 | | -BITUMINOUS CONCRETE- | | | | | | | | | | |
| | 7 9 10 14 | S1 18 | 0.5 2.5 | 10.0 / 1.5 | SM | Medium dense, brown, silty SAND (SM), mps 0.75 in., no odor, moist -BASE/SUBBASE- | 3 | 3 | 5 | 33 | 36 | 20 | | | | |
| | | | | 9.0 / 2.5 | SW | Medium dense, dark brown, well graded SAND with gravel (SW), mps 0.75 in., no odor, moist, contains brick and wood fragments | | 20 | 5 | 15 | 55 | 5 | | | | |
| | 12 11 7 8 | S2 18 | 2.5 4.5 | | SM | Medium dense, brown, silty SAND (SM), mps 1.25 in., no odor, moist -FILL- | 4 | 6 | 8 | 30 | 34 | 18 | | | | |
| 5 | 5 6 6 9 | S3 11 | 4.5 6.5 | | SW-SM | Medium dense, brown, well graded SAND with silt and gravel (SW-SM), mps 0.3 in., no odor, moist, rust-staining around schist gravel | | 15 | 5 | 10 | 60 | 10 | | | | |
| | 7 9 8 10 | S4 13 | 6.5 8.5 | | SW-SM | Medium dense, brown, well graded SAND with silt and gravel (SW-SM), mps 1.3 in., no odor, moist, rust-staining around schist gravel | | 25 | 10 | 15 | 40 | 10 | | | | |
| 10 | 5 3 13 25 | S5 7 | 8.5 10.5 | | SM | Medium dense, brown, silty SAND with gravel (SM), mps 0.75 in., no odor, wet -FILL- | | 30 | 5 | 25 | 25 | 15 | | | | |
| | 6 2 7 5 | S6A 4 | 10.5 12.5 | | SW | Loose, brown, well graded SAND with gravel (SM), mps 1.5 in., no odor, wet | | 25 | 10 | 20 | 40 | 5 | | | | |
| | | | | | | Note: Advance roller bit through boulder from 12.5 to 13.0 ft. | | | | | | | | | | |
| | 14 22 23 23 | S6B 11 | 13.0 15.0 | | SW | Dense, gray, well graded SAND with gravel (SW), mps 1.0 in., no odor, saturated, brick fragments in coarse sand -FILL- | | 15 | 5 | 15 | 60 | 5 | | | | |
| 15 | 6 5 5 8 | S7 13 | 15.0 17.0 | -3.5 / 15.0 | SP | Loose, gray, poorly graded SAND (SP), mps 0.3 in., no odor, wet | | 10 | 5 | 5 | 75 | 5 | | | | |
| | | | | -4.5 / 16.0 | SP-SW | Loose, brown, well graded SAND (SW), trace gravel, mps 0.2 in., no odor, wet | | 10 | 10 | 30 | 50 | | | | | |
| | 9 8 10 13 | S8 8 | 17.0 19.0 | | SP | Medium dense, brown, poorly graded SAND with silt (SP), mps 2.0 mm, no odor, wet, thin (1 cm) layer of clay in the top of the spoon, thin (1.5 in.) layer of rust-stained sand at approximately 18.0 ft -MARINE DEPOSIT- (Sand) | | | | 15 | 75 | 10 | | | | |
| 20 | | | | | | | | | | | | | | | | |

**Water Level Data**

| Date | Time | Elapsed Time (hr.) | Depth (ft) to: Bottom of Casing | Bottom of Hole | Water |
|---|---|---|---|---|---|
| 11/15/10 | 1445 | 0 | pulled | 27.0 | 4.5 |

**Sample ID**
O - Open End Rod
T - Thin Wall Tube
U - Undisturbed Sample
S - Split Spoon Sample

**Well Diagram**
Riser Pipe
Screen
Filter Sand
Cuttings
Grout
Concrete
Bentonite Seal

**Summary**
Overburden (ft) 27.0
Rock Cored (ft) --
Samples 11S

**Boring No.** HA10-1

**Field Tests:** **Dilatancy**: R - Rapid S - Slow N - None **Toughness**: L - Low M - Medium H - High **Plasticity**: N - Nonplastic L - Low M - Medium H - High **Dry Strength**: N - None L - Low M - Medium H - High V - Very High

***Note: 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.**

H&A-TEST BORING-07-1 HA-LIB07-1R-POR-06-03-08.GLB HA-TB+CORE+WELL-07-1.GDT G:\PROJECTS\37272 - IMT\000\FIELD\37272-000_HA10-1_HA10-12.GPJ 15 Mar 11

HALEY & ALDRICH

# TEST BORING REPORT

**Boring No.** HA10-1
File No. 37272-000
Sheet No. 2 of 2

| Depth (ft) | Sampler Blows per 6 in. | Sample No. & Rec. (in.) | Sample Depth (ft) | Stratum Change Elev/Depth (ft) | USCS Symbol | VISUAL-MANUAL IDENTIFICATION AND DESCRIPTION (Density/consistency, color, GROUP NAME, max. particle size*, structure, odor, moisture, optional descriptions GEOLOGIC INTERPRETATION) | Gravel % Coarse | Gravel % Fine | Sand % Coarse | Sand % Medium | Sand % Fine | % Fines | Field Test Dilatancy | Field Test Toughness | Field Test Plasticity | Field Test Strength |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 20 | 7<br>11<br>15<br>16 | S9<br>11 | 20.0<br>22.0 | | SP | Medium dense, brown, poorly graded SAND (SP), mps 2.0 mm, no odor, wet, thin (0.75 in.) layer of rust-stained sand at bottom of spoon<br><br>-MARINE DEPOSIT-<br>(Sand) | | | | 25 | 75 | | | | | |
| 25 | 7<br>8<br>9<br>10 | S10<br>11 | 25.0<br>27.0 | | SP | Medium dense, brown, poorly graded SAND (SP), mps 2.0 mm, no odor, wet | | | | 25 | 75 | | | | | |
| | | | | -15.5<br>27.0 | | Bottom of Exploration 27.0 ft | | | | | | | | | | |

NOTE: Soil identification based on visual-manual methods of the USCS as practiced by Haley & Aldrich, Inc.

**Boring No.** HA10-1



H&A-TEST BORING-07-1 HA-LIB07-1R-POR-06-03-08.GLB HA-TB+CORE+WELL-07-1.GDT G:\PROJECTS\37272 - IMT\000\FIELD\37272-000_HA10-1_HA10-12.GPJ 15 Mar 11

HALEY & ALDRICH

# TEST BORING REPORT

**Boring No.** HA10-11

Project Portland International Marine Terminal Improvements, Portland, Maine
Client HNTB Corporation
Contractor Maine Test Borings

File No. 37272-000
Sheet No. 1 of 1
Start 18 November 2010
Finish 18 November 2010
Driller R. Leonard
H&A Rep. M. Foley
Elevation 12.5 (approx.)
Datum NGVD 29
Location See Plan

| | Casing | Sampler | Barrel | Drilling Equipment and Procedures |
|---|---|---|---|---|
| Type | SSA | S | - | Rig Make & Model: Mobile Drill B53 |
| Inside Diameter (in.) | - | 1.375 | - | Bit Type: Roller Bit |
| Hammer Weight (lb) | - | 140 | - | Drill Mud: None |
| Hammer Fall (in.) | - | 30 | - | Casing: SSA to 1.0' |
| | | | | Hoist/Hammer: Winch / Safety Hammer |
| | | | | PID Make & Model: N/A |

| Depth (ft) | Sampler Blows per 6 in. | Sample No. & Rec. (in.) | Sample Depth (ft) | Stratum Change Elev/Depth (ft) | USCS Symbol | VISUAL-MANUAL IDENTIFICATION AND DESCRIPTION (Density/consistency, color, GROUP NAME, max. particle size*, structure, odor, moisture, optional descriptions GEOLOGIC INTERPRETATION) | Gravel % Coarse | Gravel % Fine | Sand % Coarse | Sand % Medium | Sand % Fine | % Fines | Field Test Dilatancy | Field Test Toughness | Field Test Plasticity | Field Test Strength |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 0 | | | | 12.3 | | -BITUMINOUS CONCRETE- | | | | | | | | | | |
| | | | | 0.2 | SW | Augered through cobble at 0.5 ft | | 20 | 10 | 15 | 55 | | | | | |
| | | | | 11.5 | | | | | | | | | | | | |
| | 11 | S1 | 1.0 | 1.0 | SW | Dense, brown, well graded SAND with gravel (SW) | | 10 | 5 | 75 | 10 | | | | | |
| | 30 | 22 | 3.0 | 11.0 | SP | Very dense, white, poorly graded SAND (SP) | | 20 | 10 | 15 | 50 | 5 | | | | |
| | 30 | | | 1.5 | | -BASE/SUBBASE- | | | | | | | | | | |
| | 15 | | | | | Very dense, dark brown, well graded SAND with gravel (SW), contains brick fragments, ash, mps 2.0 in., no odor, dry | | | | | | | | | | |
| | | | | 9.5 | | | | | | | | | | | | |
| | | | | 3.0 | | -FILL- | | | | | | | | | | |
| | | | | | | Bottom of Exploration 3.0 ft | | | | | | | | | | |

**Water Level Data**

| Date | Time | Elapsed Time (hr.) | Depth (ft) to: Bottom of Casing | Bottom of Hole | Water |
|---|---|---|---|---|---|
| | | | | | |

**Sample ID**

O - Open End Rod
T - Thin Wall Tube
U - Undisturbed Sample
S - Split Spoon Sample

**Well Diagram**

Riser Pipe
Screen
Filter Sand
Cuttings
Grout
Concrete
Bentonite Seal

**Summary**

| | |
|---|---|
| Overburden (ft) | 3.0 |
| Rock Cored (ft) | -- |
| Samples | 1S |

**Boring No.** HA10-11

**Field Tests:** **Dilatancy**: R - Rapid S - Slow N - None **Toughness**: L - Low M - Medium H - High **Plasticity**: N - Nonplastic L - Low M - Medium H - High **Dry Strength**: N - None L - Low M - Medium H - High V - Very High

***Note: 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.**

H&A-TEST BORING-07-1 HA-LIB07-1R-POR-06-03-08.GLB HA-TB+CORE+WELL-07-1.GDT G:\PROJECTS\37272 - IMT\000\FIELD\37272-000_HA10-1_HA10-12.GPJ 15 Mar 11

**1987 Test Boring Logs**

| MAINE TEST BORINGS, INC.<br>BREWER, MAINE 04412 | CLIENT<br>Haley & Aldrich, Inc. | SHEET 1 OF 3<br>HOLE NO. B-8 |
|---|---|---|
| DRILLER<br>Darrel McKeen | PROJECT NAME<br>Proposed Cargo Pier | LINE & STATION |
| M.T.B. JOB NUMBER<br>87-213 | LOCATION<br>Portland, Maine | OFFSET |

GROUND WATER OBSERVATIONS

AT ____ FT. AFTER ____ HOURS

AT ____ FT. AFTER ____ HOURS

| | CASING | SAMPLER | CORE BARREL |
|---|---|---|---|
| TYPE | NW | SS | |
| SIZE I.D. | 3" | 1 3/8" | |
| HAMMER WT. | 300 | 140 | |
| HAMMER FALL | 16" | 30" | |

DATE START 9/29/87 DATE FIN 9/30/87

SURFACE ELEV. ____

GROUND WATER ELEV. ____

| CASING BLOWS PER FOOT | SAMPLE NO. | SAMPLE O.D. | SAMPLE PEN. | SAMPLE REC. | SAMPLE DEPTH @ BOT. | BLOWS PER 6" ON SAMPLER 0-6 | BLOWS PER 6" ON SAMPLER 6-12 | BLOWS PER 6" ON SAMPLER 12-18 | VANE READING | DEPTH | STRATUM DESCRIPTION |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Auger | 1D | 2" | 18" | | 1.5 | 10 | 15 | 10 | | | Brown silty sandy gravel w/ash |
| " | | | | | | | | | | 2.5 | |
| " | | | | | | | | | | 3.0 | Brick |
| " | | | | | | | | | | | Gray-brown fine sandy SILT, trace medium sand and clay, pieces of brick* |
| " | 2D | 2" | 18" | | 6.5 | 2 | 1 | 1 | | 6.4 | |
| " | | | | | | | | | | | Wood |
| " | | | | | | | | | | 8.0 | |
| " | | | | | | | | | | | Brown silty sand |
| " | | | | | | | | | | 10.0 | |
| " | 3D | 2" | 8" | | 11.2 | 26 | 50 | | | | Wood |
| " | | | | | | | | | | 12.0 | |
| 38 | | | | | | | | | | | Gray fine to coarse sand w/trace of silt |
| 57 | | | | | | | | | | | |
| 38 | | | | | | | | | | | |
| 15 | 4D | 2" | 18" | | 16.5 | 3 | 6 | 7 | | | |
| 31 | | | | | | | | | | 17.0 | |
| 52 | | | | | | | | | | | |
| 72 | | | | | | | | | | | |
| 67 | | | | | | | | | | | |
| 16 | 5D | 2" | 18" | | 21.5 | 9 | 11 | 12 | | | |
| 32 | | | | | | | | | | | |
| 42 | | | | | | | | | | | |
| 50 | | | | | | | | | | | |
| 45 | | | | | | | | | | | |
| 18 | 6D | 2" | 18" | | 26.5 | 7 | 8 | 10 | | | |
| 34 | | | | | | | | | | | |
| 45 | | | | | | | | | | | Brown fine to coarse sand w/trace of silt w/trace of gravel |
| 44 | | | | | | | | | | | |
| 48 | | | | | | | | | | | |
| 21 | 7D | 2" | 18" | | 31.5 | 7 | 8 | 12 | | | |
| 34 | | | | | | | | | | | |
| 55 | | | | | | | | | | | |
| 64 | | | | | | | | | | | |
| 80 | | | | | | | | | | | |
| 31 | 8D | 2" | 18" | | 36.5 | 8 | 13 | 13 | | | |
| 37 | | | | | | | | | | 37.5 | |
| 50 | | | | | | | | | | | Gray fine silty sand w/trace of coarse sand w/ trace of silty clay |
| 77 | | | | | | | | | | | |
| 72 | | | | | | | | | | | |

SAMPLES
D = Splite Spoon
C = 2" Shelby Tube
U = 3½" Shelby Tube

SOIL CLASSIFIED BY:
[X] Driller - Visually
[ ] Soil Technican - Visually
[ ] Laboratory Tests

REMARKS

* Changes made by Haley & Aldrich

HOLE NO. B-8

MTB-14

| MAINE TEST BORINGS, INC.<br>BREWER, MAINE 04412 | CLIENT<br>Haley & Aldrich, Inc. | SHEET 2 OF 3<br>HOLE NO. B-8 |
|---|---|---|
| DRILLER<br>Darrel McKeen | PROJECT NAME<br>Proposed Cargo Pier | LINE & STATION |
| M.T.B. JOB NUMBER<br>87-213 | LOCATION<br>Portland, Maine | OFFSET |

GROUND WATER OBSERVATIONS

AT ____ FT. AFTER ____ HOURS

AT ____ FT. AFTER ____ HOURS

| | CASING | SAMPLER | CORE BARREL |
|---|---|---|---|
| TYPE | NW | SS | |
| SIZE I.D. | 3" | 1 3/8" | |
| HAMMER WT. | 300 | 140 | |
| HAMMER FALL | 16" | 30" | |

DATE START 9/29/87 DATE FIN. 9/30/87

SURFACE ELEV. ____

GROUND WATER ELEV. ____

| CASING BLOWS PER FOOT | SAMPLE NO. | SAMPLE O.D. | SAMPLE PEN. | SAMPLE REC. | SAMPLE DEPTH @ BOT | BLOWS PER 6" ON SAMPLER 0-6 | 6-12 | 12-18 | VANE READING | DEPTH | STRATUM DESCRIPTION |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 50 | 9D | 2" | 18' | | 41.5 | 6 | 9 | 10 | | | |
| 42 | | | | | | | | | | | Gray fine silty sand w/trace of coarse sand w/ trace of silty clay |
| 66 | | | | | | | | | | 43.0 | |
| 117 | | | | | | | | | | | |
| 141 | | | | | | | | | | 45.0 | Brown silty fine to coarse sand w/trace of gravel |
| 64 | 10D | 2" | 18' | | 46.5 | 12 | 12 | 17 | | | |
| 70 | | | | | | | | | | | |
| 73 | | | | | | | | | | | |
| 77 | | | | | | | | | | | |
| 76 | | | | | | | | | | | |
| 41 | 11D | 2" | 18' | | 51.5 | 10 | 15 | 20 | | | |
| 61 | | | | | | | | | | | |
| 100 | | | | | | | | | | | |
| 112 | | | | | | | | | | | |
| 128 | | | | | | | | | | | |
| 23 | 12D | 2" | 18' | | 56.5 | 17 | 26 | 27 | | | |
| 75 | | | | | | | | | | | Brown fine to medium sand w/trace of coarse sand w/trace of silt |
| 123 | | | | | | | | | | | |
| 142 | | | | | | | | | | | |
| 147 | | | | | | | | | | | |
| 63 | 13D | 2" | 18' | | 61.5 | 16 | 21 | 26 | | | |
| 86 | | | | | | | | | | | |
| 127 | | | | | | | | | | | |
| 152 | | | | | | | | | | | |
| 152 | | | | | | | | | | | |
| 67 | 14D | 2" | 18' | | 66.5 | 15 | 21 | 26 | | | |
| 83 | | | | | | | | | | | |
| 107 | | | | | | | | | | 68.0 | |
| 115 | | | | | | | | | | | |
| 121 | | | | | | | | | | | |
| 66 | 15D | 2" | 18' | | 71.5 | 8 | 15 | 27 | | | Brown gravelly coarse sand w/trace of silt |
| 124 | | | | | | | | | | | |
| 117 | | | | | | | | | | | |
| 106 | | | | | | | | | | 74.0 | |
| 76 | | | | | | | | | | | |
| 76 | 16D | 2" | 18' | | 76.5 | 9 | 9 | 3 | | | |
| 73 | | | | | | | | | | | Gray gravelly coarse sand w/trace of silt |
| 81 | | | | | | | | | | | |
| 147 | | | | | | | | | | | |
| 116 | | | | | | | | | | | |

SAMPLES
D = Split Spoon
C = 2" Shelby Tube
U = 3½" Shelby Tube

SOIL CLASSIFIED BY:
[X] Driller - Visually
[ ] Soil Technican - Visually
[ ] Laboratory Tests

REMARKS

HOLE NO. B-8

MTB-14

MAINE TEST BORINGS, INC.
BREWER, MAINE 04412

CLIENT
Haley & Aldrich, Inc.

SHEET 3 OF 3
HOLE NO. B-8

DRILLER
Darrel McKeen

PROJECT NAME
Proposed Cargo Pier

LINE & STATION

M.T.B. JOB NUMBER
87-213

LOCATION
Portland, Maine

OFFSET

GROUND WATER OBSERVATIONS
AT ____ FT. AFTER ____ HOURS
AT ____ FT. AFTER ____ HOURS

| | CASING | SAMPLER | CORE BARREL |
|---|---|---|---|
| TYPE | NW | SS | |
| SIZE I.D. | 3" | 1 3/8" | |
| HAMMER WT. | 300 | 140 | |
| HAMMER FALL | 16" | 30" | |

DATE START 9/29/87 DATE FIN 9/30/87
SURFACE ELEV. ____
GROUND WATER ELEV. ____

| CASING BLOWS PER FOOT | SAMPLE NO. | SAMPLE O.D. | SAMPLE PEN. | SAMPLE REC. | SAMPLE DEPTH @ BOT | BLOWS PER 6" ON SAMPLER 0-6 | 6-12 | 12-18 | VANE READING | DEPTH | STRATUM DESCRIPTION |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 77 | 17D | 2" | 18" | | 81.5 | 15 | 13 | 18 | | | |
| 95 | | | | | | | | | | | Gray gravelly coarse sand w/trace of silt |
| 101 | | | | | | | | | | | |
| 99 | | | | | | | | | | | |
| 104 | | | | | | | | | | 85.5 | |
| 103 | 18D | 2" | 18" | | 86.5 | 15 | 26 | 42* | | | Gray silty fine to medium sand w/trace of gravel |
| 116 | | | | | | | | | | | |
| 230 | | | | | | | | | | 88.7 | |
| 500 | D | 2" | 2" | 0 | 89.9 | 90 | | | | 89.3 | Cobble |
| | | | | | | | | | | 89.9 | Gray gravelly fine to coarse sand w/trace of silt |
| | | | | | | | | | | | Refusal @ 89.9' |
| | | | | | | | | | | | Installed Well |

SAMPLES
D = Splite Spoon
C = 2" Shelby Tube
U = 3½" Shelby Tube

SOIL CLASSIFIED BY:
[X] Driller - Visually
[ ] Soil Technican - Visually
[ ] Laboratory Tests

REMARKS
* Changes made by Haley & Aldrich

HOLE NO. B-8

MTB-14

MAINE TEST BORINGS, INC.
BREWER, MAINE 04412

CLIENT
Haley & Aldrich, Inc.

SHEET 1 OF 3
HOLE NO. B-9

| DRILLER | PROJECT NAME | LINE & STATION |
|---|---|---|
| Darrel McKeen | Proposed Cargo Pier | |
| **M.T.B. JOB NUMBER** | **LOCATION** | **OFFSET** |
| 87-213 | Portland, Maine | |

GROUND WATER OBSERVATIONS
AT ____ FT. AFTER ____ HOURS
AT ____ FT. AFTER ____ HOURS

| | CASING | SAMPLER | CORE BARREL |
|---|---|---|---|
| TYPE | NW | SS | |
| SIZE I.D. | 3" | 1 3/8" | |
| HAMMER WT. | 300 | 140 | |
| HAMMER FALL | 16" | 30" | |

DATE START 10/1/87 DATE FIN. 10/2/87
SURFACE ELEV. ____
GROUND WATER ELEV. ____

| CASING BLOWS PER FOOT | SAMPLE NO. | O.D. | PEN. | REC. | DEPTH @ BOT. | BLOWS PER 6" ON SAMPLER 0-6 | 6-12 | 12-18 | 18-24* | DEPTH | STRATUM DESCRIPTION |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Auger | 1D | 2" | 18" | | 1.5 | 4 | 10 | 14 | | | |
| " | | | | | | | | | | | |
| " | | | | | | | | | | | |
| " | | | | | | | | | | | |
| " | | | | | | | | | | | |
| 19 | 2D | 2" | 18" | | 6.5 | 4 | 4 | 5 | | | Brown gravelly silty sand |
| 13 | | | | | | | | | | | |
| 15 | | | | | | | | | | | |
| 31 | | | | | | | | | | | |
| 65 | | | | | | | | | | 10.5 | |
| 14 | 3D | 2" | 12" | | 11.0 | 25 | 60 | | | | Brown gravelly silty sand w/cobbles and boulders |
| 23 | | | | | | | | | | | |
| 35 | | | | | | | | | | 13.0 | |
| | | | | | | | | | | | |
| | | | | | | | | | | | |
| 14 | | | | | | | | | | | |
| 23 | 4D | 2" | 24" | | 17.0 | 4 | 6 | 8 | 12 | | Brown fine to medium sand w/trace of coarse sand trace of silt trace of gravel |
| 35 | | | | | | | | | | | |
| 47 | | | | | | | | | | | |
| 34 | | | | | | | | | | 20.0 | |
| 14 | | | | | | | | | | | |
| 26 | 5D | 2" | 24" | | 22.0 | 7 | 7 | 9 | 9 | | |
| 38 | | | | | | | | | | | |
| 46 | | | | | | | | | | | |
| 66 | | | | | | | | | | | |
| 28 | | | | | | | | | | | |
| 36 | 6D | 2" | 24" | | 27.0 | 12 | 15 | 18 | 19 | | |
| 55 | | | | | | | | | | | |
| 57 | | | | | | | | | | | |
| 61 | | | | | | | | | | | |
| 23 | | | | | | | | | | | Brown fine to coarse sand w/trace of silt w/trace gravel |
| 30 | 7D | 2" | 24" | | 32.0 | 9 | 14 | 14 | 9 | | |
| 50 | | | | | | | | | | | |
| 76 | | | | | | | | | | | |
| 71 | | | | | | | | | | | |
| 27 | | | | | | | | | | | |
| 41 | 8D | 2" | 24" | | 37.0 | 9 | 12 | 16 | 25 | | |
| 65 | | | | | | | | | | | |
| 79 | | | | | | | | | | | |
| 144 | | | | | | | | | | 40.0 | |

SAMPLES
D = Split Spoon
C = 2" Shelby Tube
U = 3½" Shelby Tube

SOIL CLASSIFIED BY:
[X] Driller - Visually
[ ] Soil Technican - Visually
[ ] Laboratory Tests

REMARKS
* Changes made by Haley & Aldrich

HOLE NO. B-9

MTB-14

| MAINE TEST BORINGS, INC.<br>BREWER, MAINE 04412 | CLIENT<br>Haley & Aldrich, Inc. | SHEET 2 OF 3<br>HOLE NO. B-9 |
|---|---|---|
| DRILLER<br>Darrel McKeen | PROJECT NAME<br>Proposed Cargo Pier | LINE & STATION |
| M.T.B. JOB NUMBER<br>87-213 | LOCATION<br>Portland, Maine | OFFSET |

GROUND WATER OBSERVATIONS

AT ____ FT. AFTER ____ HOURS

AT ____ FT. AFTER ____ HOURS

| | CASING | SAMPLER | CORE BARREL |
|---|---|---|---|
| TYPE | NW | SS | |
| SIZE I.D. | 3" | 1 3/8" | |
| HAMMER WT. | 300 | 140 | |
| HAMMER FALL | 16" | 30" | |

DATE START 10/1/87 DATE FIN 10/2/87

SURFACE ELEV. ____

GROUND WATER ELEV. ____

| CASING BLOWS PER FOOT | SAMPLE NO. | O.D. | PEN. | REC. | DEPTH @ BOT. | BLOWS PER 6" ON SAMPLER 0-6 | 6-12 | 12-18 | 18-24* | DEPTH | STRATUM DESCRIPTION |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 47 | | | | | | | | | | | |
| 51 | 9D | 2" | 24" | | 42.0 | 19 | 19 | 18 | 15 | | |
| 67 | | | | | | | | | | | |
| 67 | | | | | | | | | | | |
| 74 | | | | | | | | | | | |
| 38 | | | | | | | | | | | |
| 62 | 10D | 2" | 24" | | 47.0 | 6 | 12 | 14 | 17 | | |
| 104 | | | | | | | | | | | |
| 120 | | | | | | | | | | | Brown fine to coarse sand w/trace of silt w/ trace of gravel w/trace of cobbles |
| 113 | | | | | | | | | | | |
| 45 | | | | | | | | | | | |
| 55 | 11D | 2" | 24" | | 52.0 | 12 | 12 | 15 | 16 | | |
| 75 | | | | | | | | | | | |
| 80 | | | | | | | | | | | |
| 82 | | | | | | | | | | | |
| 45 | | | | | | | | | | | |
| 74 | 12D | 2" | 24" | | 57.0 | 7 | 17 | 15 | 15 | | |
| 91 | | | | | | | | | | | |
| 90 | | | | | | | | | | | |
| 90 | | | | | | | | | | 60.0 | |
| 83 | | | | | | | | | | | |
| 85 | 13D | 2" | 24" | | 62.0 | 10 | 12 | 12 | 15 | | |
| 90 | | | | | | | | | | | |
| 95 | | | | | | | | | | | |
| 100 | | | | | | | | | | | |
| 71 | | | | | | | | | | | |
| 71 | 14D | 2" | 24" | | 67.0 | 37 | 18 | 12 | 10 | | |
| 69 | | | | | | | | | | | |
| 77 | | | | | | | | | | | Brown gravelly sand, trace silt* |
| 96 | | | | | | | | | | | |
| 72 | | | | | | | | | | | |
| 73 | 15D | 2" | 24" | | 72.0 | 11 | 15 | 15 | 16 | | |
| 82 | | | | | | | | | | | |
| 91 | | | | | | | | | | | |
| 83 | | | | | | | | | | | |
| 65 | | | | | | | | | | | |
| 100 | 16D | 2" | 24" | | 77.0 | 10 | 15 | 20 | 18 | 77.0 | |
| 185 | | | | | | | | | | | |
| 144 | | | | | | | | | | | Brown fine sand w/trace of silt |
| 160 | | | | | | | | | | | |

SAMPLES
D = Splite Spoon
C = 2" Shelby Tube
U = 3½" Shelby Tube

SOIL CLASSIFIED BY:
[X] Driller - Visually
[ ] Soil Technican - Visually
[ ] Laboratory Tests

REMARKS

* Changes made by Haley & Aldrich

HOLE NO. B-9



MTB-14

| MAINE TEST BORINGS, INC.<br>BREWER, MAINE 04412 | CLIENT<br>Haley & Aldrich, Inc. | SHEET 3 OF 3<br>HOLE NO. B-9 |
|---|---|---|
| DRILLER<br>Darrel McKeen | PROJECT NAME<br>Proposed Cargo Pier | LINE & STATION |
| M.T.B. JOB NUMBER<br>87-213 | LOCATION<br>Portland, Maine | OFFSET |

GROUND WATER OBSERVATIONS

AT _____ FT. AFTER _____ HOURS

AT _____ FT. AFTER _____ HOURS

| | CASING | SAMPLER | CORE BARREL |
|---|---|---|---|
| TYPE | NW | SS | |
| SIZE I.D. | 3" | 1 3/8" | |
| HAMMER WT. | 300 | 140 | |
| HAMMER FALL | 16" | 30" | |

DATE START 10/1/87 DATE FIN 10/2/87

SURFACE ELEV. _____

GROUND WATER ELEV. _____

| CASING BLOWS PER FOOT | SAMPLE NO. | SAMPLE O.D. | SAMPLE PEN. | SAMPLE REC. | SAMPLE DEPTH @ BOT. | BLOWS PER 6" ON SAMPLER 0-6 | BLOWS PER 6" ON SAMPLER 6-12 | BLOWS PER 6" ON SAMPLER 12-18 | VANE READING | DEPTH | STRATUM DESCRIPTION |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 112 | 17D | 2" | 18" | | 81.9 | 23 | 50 | 80 | | 81.5 | Brown fine sand w/trace of silt |
| 275 | | | | | | | | | | 82.0 | Gray fine sand w/trace of silt |
| 797 | | | | | | | | | | | Gray gravelly sand w/trace of silt |
| | | | | | | | | | | 85.0 | |
| | | | | | | | | | | | Bottom of Boring @ 85.0' |
| | | | | | | | | | | | Installed Well |

SAMPLES
D = Splite Spoon
C = 2" Shelby Tube
U = 3½" Shelby Tube

SOIL CLASSIFIED BY:
[X] Driller - Visually
[ ] Soil Technican - Visually
[ ] Laboratory Tests

REMARKS

HOLE NO. B-9

MTB-14

**1987 Test Pit Logs**

CONSULTING SOIL ENGINEERS

# TEST PIT REPORT

TEST PIT NO. TP10

PROJECT: PROPOSED CARGO PIER

CLIENT: CHILDS ENGINEERING CORPORATION

CONTRACTOR: SHAW BROTHERS CONSTRUCTION, INC.

EQUIPMENT USED: KOMATSU PC 200 LC BACKHOE

FILE NO. 8872

LOCATION: SEE PLAN

ELEVATION: 13.9

EXPLORATION DATE: 19 OCT.'87

INSPECTOR: M. BROWNSTEIN

| SCALE IN FEET | STRATA CHANGE | SAMPLE NUMBER | SAMPLE DEPTH RANGE | DESCRIPTION OF MATERIALS | REMARKS |
|---|---|---|---|---|---|
| | 0.4 | | | Dark brown to black loamy SILT, little fine sand, numerous roots -TOPSOIL- | |
| 2 | | | | Dark brown silty medium to fine SAND, varying amounts of coarse to fine gravel, numerous bricks, shells, building rubble and ashes<br><br>-MISCELLANEOUS FILL- | |
| 4 | | | | - Timber cribbing throughout test pit at 5 ft.<br>- Wooden pile at 5 ft. | |
| 6 | | | | - Broke abandoned 10" diameter tile pipe at 6 ft. | Water flowing into test pit from pipe and along cribbing at 6 ft. |
| | | | | - Occasional 1' diameter boulders at 7 ft. | |
| 8 | | | | Bottom of Test Pit at 8 ft. | Sides rapidly caving due to inflow of water. |
| 10 | | | | | |
| 12 | | | | | |

**GROUNDWATER**

| DATE | TIME* | DEPTH FT. |
|---|---|---|
| 19 Oct.'87 | 0 | 6 |
| | 0915 | |
| | | |
| | | |
| NOT ENCOUNTERED | * HRS. AFTER COMPL. | |

**PIT DIMENSIONS**

20 (L) × 9 (W) × 8 (D) = 1440 Cu. Ft.

**BOULDERS**

8" to 18" DIAM: No. _____ = Vol. _____ Cu. Ft.

Over 18" DIAM: No. _____ = Vol. _____ Cu. Ft.

**SUMMARY**

DEPTH 8 ft.

JAR SAMPLES --

BAG SAMPLES --

GROUNDWATER 6 ft.

TEST PIT NO. TP10

H & A FORM MAR. 71 24

HALEY & ALDRICH, INC.
CONSULTING SOIL ENGINEERS

# TEST PIT REPORT

TEST PIT NO. TP11

PROJECT: PROPOSED CARGO PIER

CLIENT: CHILDS ENGINEERING CORPORATION

CONTRACTOR: SHAW BROTHERS CONSTRUCTION, INC.

EQUIPMENT USED: KOMATSU PC 200 LC BACKHOE

FILE NO. 8872

LOCATION: SEE PLAN

ELEVATION: 15.2

EXPLORATION DATE: 19 OCT.'87

INSPECTOR: M. BROWNSTEIN

| SCALE IN FEET | STRATA CHANGE | SAMPLE NUMBER | SAMPLE DEPTH RANGE | DESCRIPTION OF MATERIALS | REMARKS |
|---|---|---|---|---|---|
| | | | | Dark brown silty medium to fine SAND, little coarse to fine gravel, numerous bricks, ashes, pieces of wood and building rubble | 4'x4'x2½' concrete block at 0.5 ft. |
| 2 | | | | Highly variable<br>-MISCELLANEOUS FILL- | |
| | | | | Brown silty fine SAND, numerous cobbles, boulders and bricks | |
| 4 | | | | | |
| | | | | - Broken pottery | |
| 6 | | | | - Frequent ashes from approximately 6 to 8 ft. | |
| 8 | | | | | |
| 10 | | | | - Numerous wcoden dowels and bricks at 11 ft. | Water flowing at 10.5 ft. |
| | | | | - 1' diameter boulder at 12 ft. | Broke 10" diameter tile pipe at 11.5 ft. |
| 12 | 12 | | | Gray medium to fine SAND, trace fine gravel, occasional shells and pieces of brick, organic odor -HARBOR BOTTOM DEPOSIT- | |
| | | | | Bottom of Test Pit at 14.5 ft. | Sides remained vertic |

**GROUNDWATER**

| DATE | TIME* | DEPTH FT. |
|---|---|---|
| 19 Oct.'87 | 0 | 10.5 |
| | 1040 | |
| | | |
| | | |

NOT ENCOUNTERED

* HRS. AFTER COMPL.

**PIT DIMENSIONS**

25 (L) × 6 (W) × 14.5 (D) = 2175 Cu. Ft.

**BOULDERS**

8" to 18" DIAM: No. ____ = Vol. ____ Cu. Ft.

Over 18" DIAM: No. ____ = Vol. ____ Cu. Ft.

**SUMMARY**

DEPTH 14.5 ft.

JAR SAMPLES --

BAG SAMPLES --

GROUNDWATER 10.5 ft.

TEST PIT NO. TP11

FORM H & A MAR. 71 24

# APPENDIX B

## Observation Well Installation and Groundwater Monitoring Reports

HALEY & ALDRICH, INC.
CONSULTING SOIL ENGINEERS

# PIEZOMETER INSTALLATION REPORT

PROJECT: PROPOSED CARGO PIER
LOCATION: PORTLAND, MAINE
CLIENT: CHILDS ENGINEERING CORPORATION
CONTRACTOR: MAINE TEST BORINGS, INC.
DRILLER: D. MCKEEN INSPECTOR: M. THOMPSON
INSTALLATION DATE: 2 OCTOBER 1987

FILE NO. 8872
WELL NO. B9-PZ
BORING NO. B9
LOCATION SEE PLAN
SHEET 1 OF 1

SURVEY DATUM MLW

GROUND ELEVATION 15.8

SUMMARIZE SOIL CONDITIONS (NOT TO SCALE)

-FILL-

13 Ft.

-GLACIAL RIVER BOTTOM DEPOSITS-

82 Ft.

-GLACIAL TILL-

Bottom of Boring at 85 Ft.




| | |
|---|---|
| ~~ELEVATION OR~~ STICKUP ABOVE~~/BELOW~~ GROUND SURFACE OF CASING ~~OR ROAD-WAY BOX~~ | 3.4 Ft. |
| ~~ELEVATION OR~~ STICKUP ABOVE~~/BELOW~~ GROUND SURFACE OF RISER PIPE. | 3.3 Ft. |
| THICKNESS OF SURFACE SEAL | 1.0 Ft. |
| TYPE OF SURFACE SEAL | BENTONITE |
| [INDICATE ALL SEALS SHOWING DEPTH, THICKNESS AND TYPE] | |
| TYPE OF CASING | STEEL PIPE |
| INSIDE DIAMETER OF CASING | 3 In. |
| ~~ELEVATION~~/DEPTH OF BOTTOM OF CASING | 3.6 Ft. |
| INSIDE DIAMETER OF RISER PIPE | 0.75 In. |
| TYPE OF BACKFILL AROUND RISER | FILTER SAND |
| DIAMETER OF BOREHOLE | 3 In. |
| ~~ELEVATION~~/DEPTH OF BOTTOM OF RISER | 15.0 Ft. |
| TYPE OF POINT OR MANUFACTURER | SLOTTED PVC |
| SCREEN GAUGE OR SIZE OF OPENINGS | 0.010 In. |
| DIAMETER OF WELLPOINT | 0.75 In. |
| TYPE OF BACKFILL AROUND POINT | FILTER SAND |
| ~~ELEVATION~~/DEPTH OF BOTTOM OF POINT | 20.0 Ft. |
| ~~ELEVATION~~/DEPTH OF BOTTOM OF BOREHOLE | 85.0 Ft. |

[FIGURES REFER TO: EL. ____ DEPTH X]

[7.0 Ft. LENGTH OF CASING $L_3$] [18.3 Ft. LENGTH OF RISER PIPE ($L_1$) + 5.0 Ft. LENGTH OF POINT ($L_2$) = 23.0 Ft PAY LENGTH]

H&A FORM 59 SEP.72

HALEY & ALDRICH, INC.
Portland, Maine

# GROUND WATER MONITORING REPORT

OW/PZ NUMBER: B9-PZ

GROUND SURFACE ELEVATION 15.8

FILE NO. 8872



| DATE | TIME | ELAPSED TIME (DAYS) | DEPTH OF WATER FROM GROUND SURFACE (FT.) | ELEVATION OF WATER IN PIEZOMETER | ELEVATION OF WATER IN HARBOR | REMARKS | READ BY |
|---|---|---|---|---|---|---|---|
| 10-7-87 | 1030 | 5 | 8.8 | 7.0 | 10.6 | HIGH TIDE | MTT |
| 10-12-87 | 1200 | 10 | 9.9 | 5.9 | 4.8 | | MTT |
| 10-13-87 | 1020 | 11 | 10.2 | 5.6 | 1.5 | LOW TIDE | MTT |
| 10-19-87 | 0930 | 17 | 9.0 | 6.8 | 8.4 | | MDB |
| 10-19-87 | 1630 | 17 | 10.3 | 5.5 | 1.3 | | MTT |
| 10-20-87 | 1006 | 18 | 9.1 | 6.7 | 8.7 | HIGH TIDE | MDB |
| 10-20-87 | 1610 | 18 | 10.2 | 5.6 | 0.4 | LOW TIDE | MTT |
| 10-23-87 | 1205 | 21 | 8.8 | 7.0 | 9.5 | HIGH TIDE | MTT |
| NOTE: | ALL TIMES AFTER 24 OCTOBER 1987 ARE IN EASTERN STANDARD TIME | | | | | | |
| 10-28-87 | 1015 | 26 | 9.8 | 6.0 | 1.1 | | JEN |
| 10-28-87 | 1520 | 26 | 8.6 | 7.2 | 10.1 | HIGH TIDE | SRD |
| 11-9-87 | 1400 | 38 | 8.9 | 6.9 | 8.4 | | MTT |
| 11-12-87 | 0955 | 41 | 8.0 | 7.8 | 2.6 | | JEN |
| 11-16-87 | 0940 | 45 | 9.5 | 6.3 | 4.7 | | MTT |
| 11-23-87 | 0820 | 52 | 10.0 | 5.8 | 4.3 | | MTT |
| 11-23-87 | 1007 | 52 | 9.3 | 6.5 | 9.0 | | MTT |
| 11-23-87 | 1145 | 52 | 8.9 | 6.9 | 10.5 | HIGH TIDE | MTT |
| 11-23-87 | 1330 | 52 | 8.6 | 7.2 | 8.8 | | MTT |
| 11-23-87 | 1510 | 52 | 9.4 | 6.4 | 4.3 | | MTT |
| 11-23-87 | 1647 | 52 | 10.1 | 5.7 | 0.3 | | MTT |
| 11-23-87 | 1840 | 52 | 10.8 | 5.0 | -1.3 | LOW TIDE | MDB |
| 11-24-87 | 0632 | 53 | 10.7 | 5.1 | 0 | LOW TIDE | MDB |
| 11-24-87 | 0823 | 53 | 10.2 | 5.6 | 2.5 | | MTT |
| 11-24-87 | 0940 | 53 | 9.8 | 6.0 | 5.8 | | MTT |
| 11-24-87 | 1128 | 53 | 9.0 | 6.8 | 9.2 | | SRD |
| 11-24-87 | 1250 | 53 | 8.6 | 7.2 | 11.0 | HIGH TIDE | SRD |
| 11-24-87 | 1435 | 53 | 8.6 | 7.2 | 9.6 | | SRD |
| 11-24-87 | 1600 | 52 | 9.2 | 6.6 | 4.8 | | MTT |
| 11-24-87 | 1740 | 53 | 10.4 | 5.4 | -0.2 | | MDB |

H&A FORM 59A JAN. 79

HALEY & ALDRICH, INC.
Portland, Maine

# GROUND WATER MONITORING REPORT

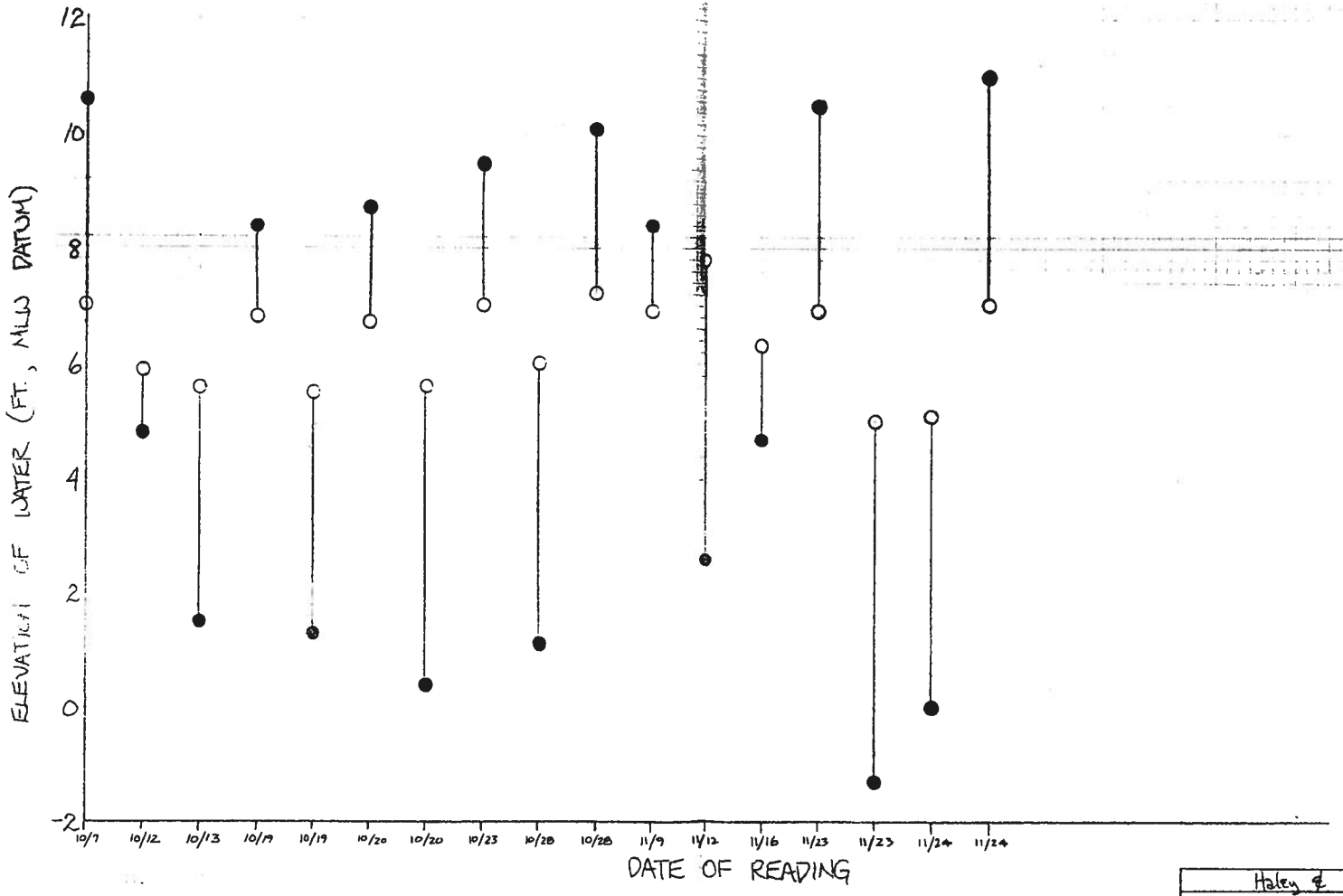
OW/PZ NUMBER: B9-PZ

GROUND SURFACE ELEVATION 15.8

FILE NO. 8872
PAGE NO. 2 OF 2

| DATE | TIME | ELAPSED TIME (DAYS) | DEPTH OF WATER FROM GROUND SURFACE (FT.) | ELEVATION OF WATER IN PIEZOMETER | ELEVATION OF WATER IN HARBOR | REMARKS | READ BY |
|---|---|---|---|---|---|---|---|
| 11-24-87 | 1933 | 53 | 10.7 | 5.1 | -1.1 | LOW TIDE | MDB |
| | | | | | | | |
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H&A FORM JAN. 79 59A




LEGEND:
○ EL. OF WATER IN PIEZO.
● EL. OF WATER IN HARBOR

Haley & Aldrich, Inc.

PROPOSED CARGO PIER
PORTLAND, MAINE

ELEVATION OF WATER IN PIEZOMETER AND HARBOR
B9-PZ

DECEMBER 1987

5/6/25 D3

FILE NO. 8872

HALEY & ALDRICH, INC.
PORTLAND, MAINE

# EL. OF WATER IN PIEZOMETERS AND HARBOR

## 23 AND 24 NOVEMBER 1987

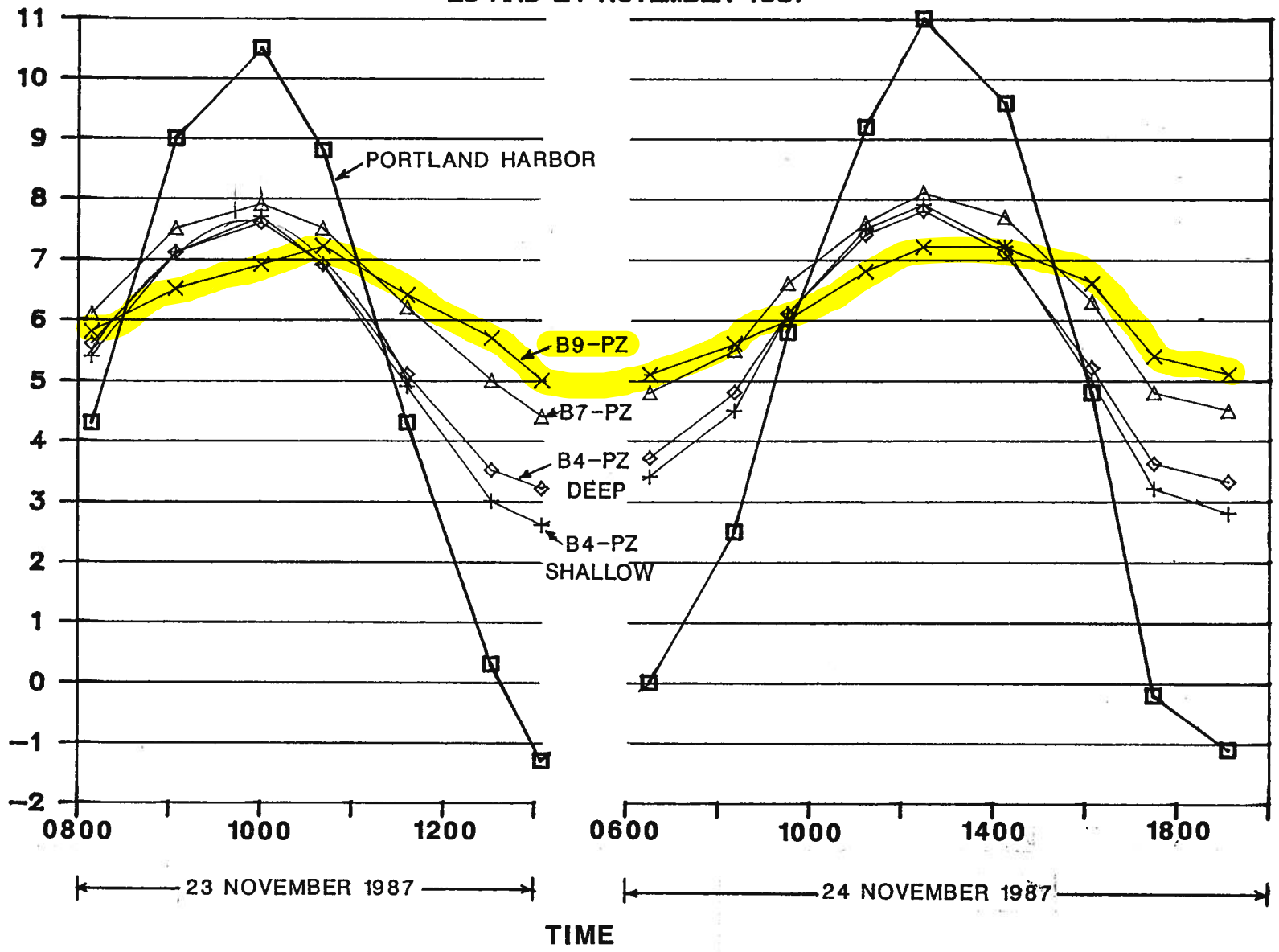



FIGURE D4
632

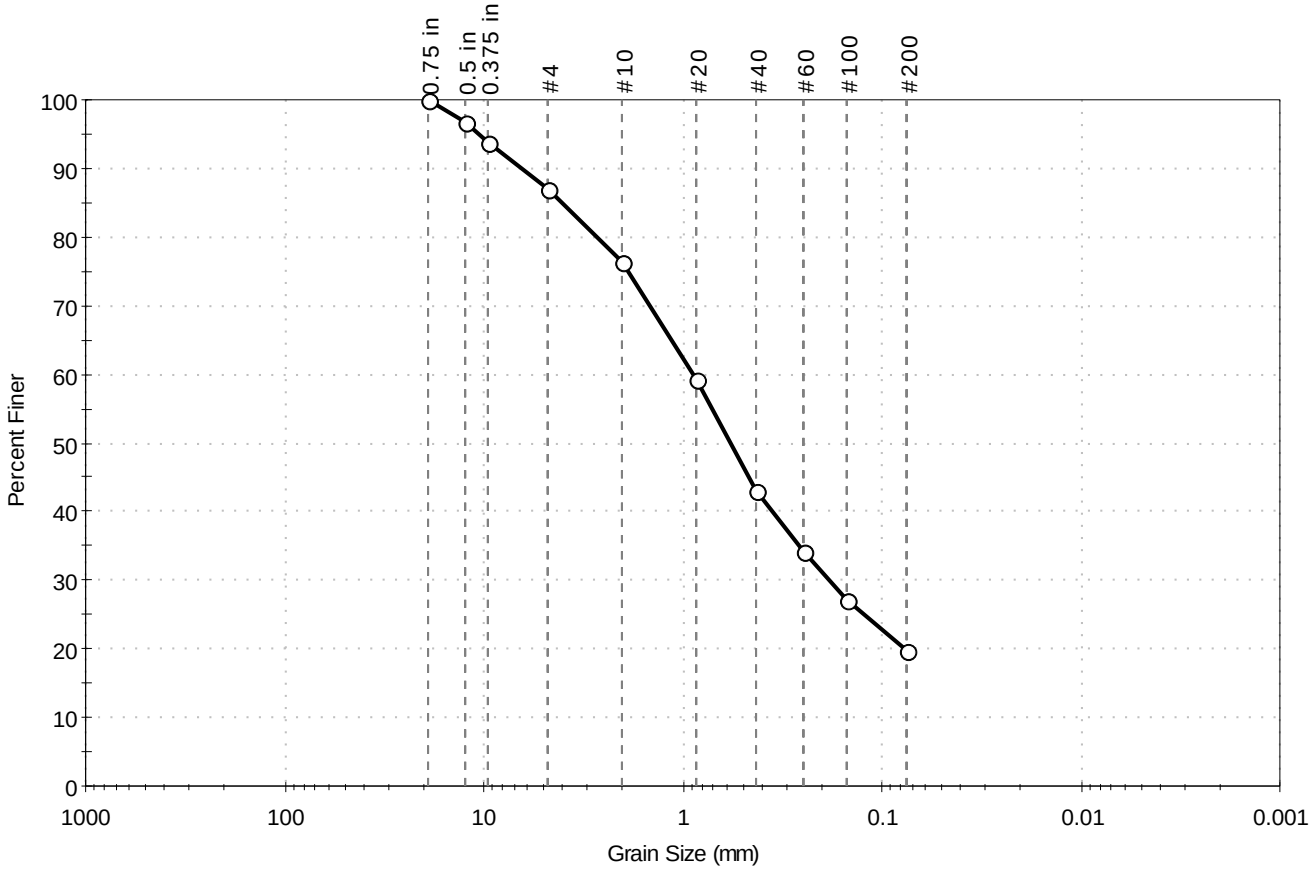
# APPENDIX C

# Laboratory Test Results

# 2017 Laboratory Test Results

| | | | | | |
|---|---|---|---|---|---|
| Client: | Haley & Aldrich, Inc. | | | | |
| Project: | Maintenance and Operations Bldg | | | | |
| Location: | Portland, ME | | | Project No: | GTX-306687 |
| Boring ID: | HA17-101 | Sample Type: | jar | Tested By: | jbr |
| Sample ID: | S1+S2 | Test Date: | 07/13/17 | Checked By: | emm |
| Depth : | 0.2-4 ft | Test Id: | 416551 | | |
| Test Comment: | --- | | | | |
| Visual Description: | Moist, brown silty sand | | | | |
| Sample Comment: | --- | | | | |

# Particle Size Analysis - ASTM D422




| % Cobble | % Gravel | % Sand | % Silt & Clay Size |
|---|---|---|---|
| --- | 12.8 | 67.5 | 19.7 |

| Sieve Name | Sieve Size, mm | Percent Finer | Spec. Percent | Complies |
|---|---|---|---|---|
| 0.75 in | 19.00 | 100 | | |
| 0.5 in | 12.50 | 97 | | |
| 0.375 in | 9.50 | 94 | | |
| #4 | 4.75 | 87 | | |
| #10 | 2.00 | 76 | | |
| #20 | 0.85 | 59 | | |
| #40 | 0.42 | 43 | | |
| #60 | 0.25 | 34 | | |
| #100 | 0.15 | 27 | | |
| #200 | 0.075 | 20 | | |
| | | | | |
| | | | | |

**Coefficients**

$D_{85}$ = 3.9945 mm
$D_{30}$ = 0.1832 mm
$D_{60}$ = 0.8798 mm
$D_{15}$ = N/A
$D_{50}$ = 0.5700 mm
$D_{10}$ = N/A
$C_u$ = N/A
$C_c$ = N/A

**Classification**

ASTM N/A

AASHTO Stone Fragments, Gravel and Sand (A-1-b (0))

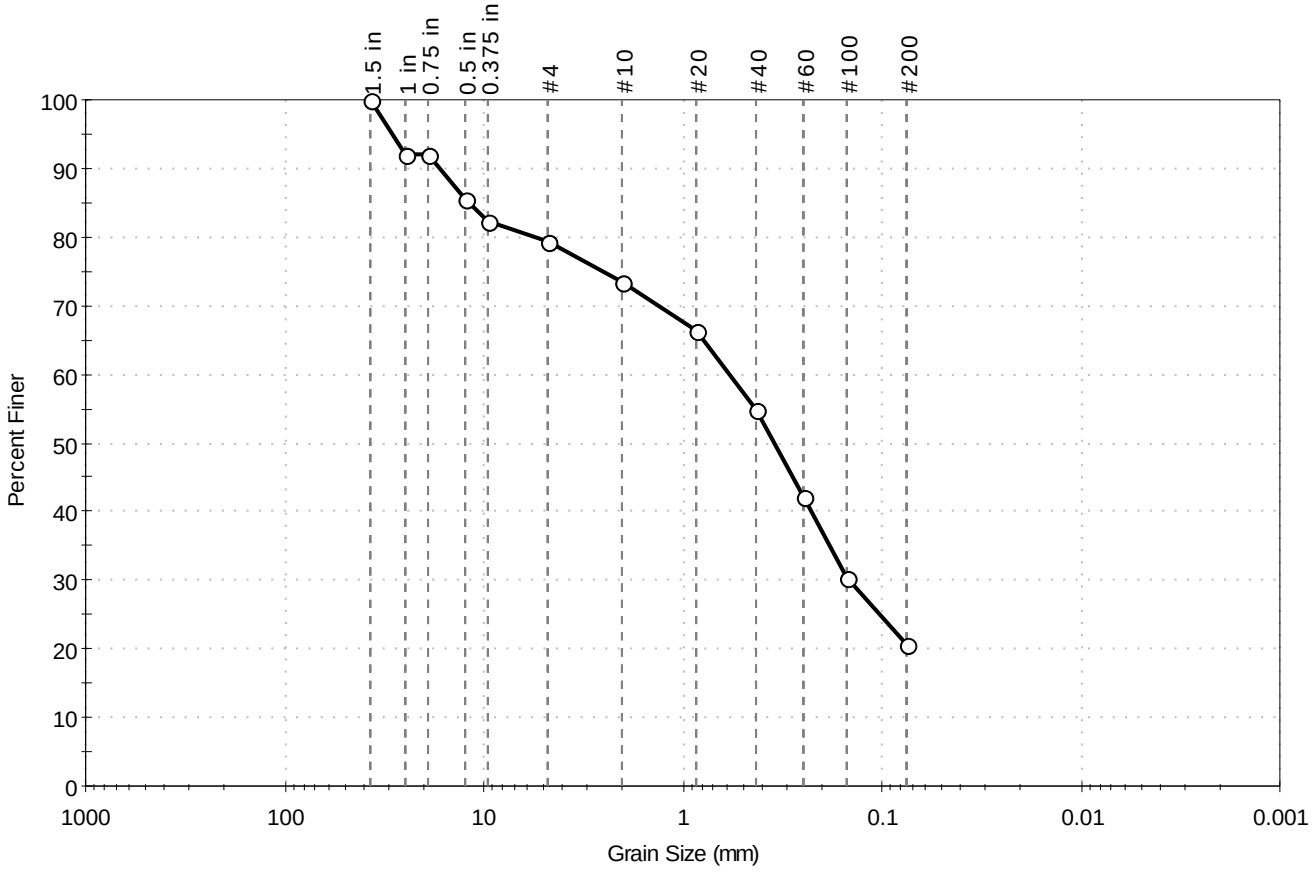
**Sample / Test Description**

Sand/Gravel Particle Shape : ANGULAR

Sand/Gravel Hardness : HARD

| | | | | | |
|---|---|---|---|---|---|
| Client: | Haley & Aldrich, Inc. | | | | |
| Project: | Maintenance and Operations Bldg | | | | |
| Location: | Portland, ME | | | Project No: | GTX-306687 |
| Boring ID: | HA17-101 | Sample Type: | jar | Tested By: | jbr |
| Sample ID: | S3+S4 | Test Date: | 07/13/17 | Checked By: | emm |
| Depth : | 4-8 ft | Test Id: | 416552 | | |
| Test Comment: | --- | | | | |
| Visual Description: | Moist, dark reddish brown silty sand with gravel | | | | |
| Sample Comment: | --- | | | | |

# Particle Size Analysis - ASTM D422




| % Cobble | % Gravel | % Sand | % Silt & Clay Size |
|---|---|---|---|
| --- | 20.7 | 58.6 | 20.7 |

| Sieve Name | Sieve Size, mm | Percent Finer | Spec. Percent | Complies |
|---|---|---|---|---|
| 1.5 in | 37.50 | 100 | | |
| 1 in | 25.00 | 92 | | |
| 0.75 in | 19.00 | 92 | | |
| 0.5 in | 12.50 | 86 | | |
| 0.375 in | 9.50 | 82 | | |
| #4 | 4.75 | 79 | | |
| #10 | 2.00 | 73 | | |
| #20 | 0.85 | 66 | | |
| #40 | 0.42 | 55 | | |
| #60 | 0.25 | 42 | | |
| #100 | 0.15 | 30 | | |
| #200 | 0.075 | 21 | | |
| | | | | |
| | | | | |

**Coefficients**

$D_{85}$ = 11.9372 mm  $D_{30}$ = 0.1452 mm

$D_{60}$ = 0.5769 mm  $D_{15}$ = N/A

$D_{50}$ = 0.3454 mm  $D_{10}$ = N/A

$C_u$ = N/A  $C_c$ = N/A

**Classification**

ASTM N/A

AASHTO Silty Gravel and Sand (A-2-4 (0))

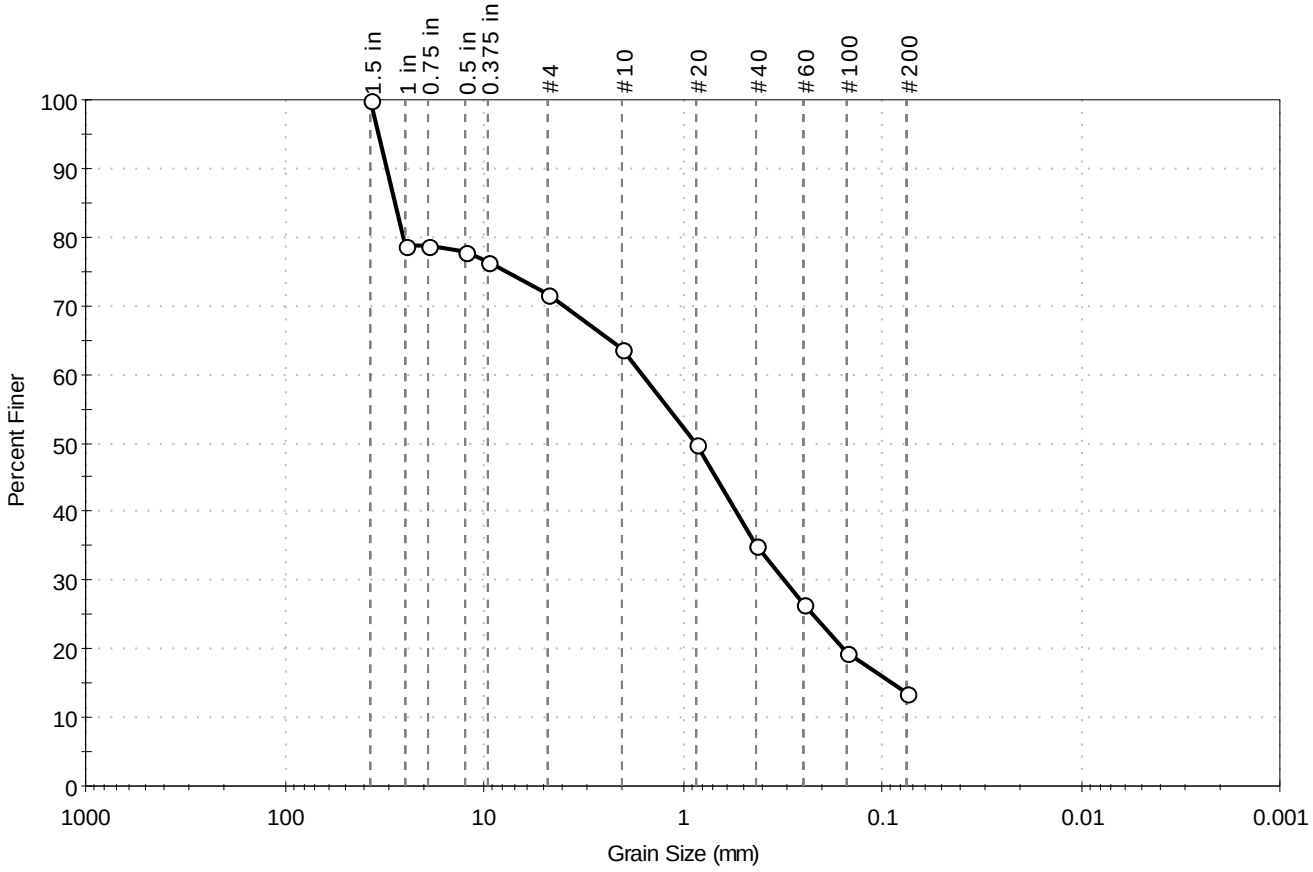
**Sample / Test Description**

Sand/Gravel Particle Shape : ANGULAR

Sand/Gravel Hardness : HARD

| | | | | | |
|---|---|---|---|---|---|
| Client: | Haley & Aldrich, Inc. | | | | |
| Project: | Maintenance and Operations Bldg | | | | |
| Location: | Portland, ME | | | Project No: | GTX-306687 |
| Boring ID: | HA17-102 | Sample Type: | jar | Tested By: | jbr |
| Sample ID: | S2 | Test Date: | 07/13/17 | Checked By: | emm |
| Depth : | 2-4 ft | Test Id: | 416553 | | |
| Test Comment: | --- | | | | |
| Visual Description: | Moist, brown silty sand with gravel | | | | |
| Sample Comment: | --- | | | | |

# Particle Size Analysis - ASTM D422




| % Cobble | % Gravel | % Sand | % Silt & Clay Size |
|---|---|---|---|
| --- | 28.2 | 58.2 | 13.6 |

| Sieve Name | Sieve Size, mm | Percent Finer | Spec. Percent | Complies |
|---|---|---|---|---|
| 1.5 in | 37.50 | 100 | | |
| 1 in | 25.00 | 79 | | |
| 0.75 in | 19.00 | 79 | | |
| 0.5 in | 12.50 | 78 | | |
| 0.375 in | 9.50 | 76 | | |
| #4 | 4.75 | 72 | | |
| #10 | 2.00 | 64 | | |
| #20 | 0.85 | 50 | | |
| #40 | 0.42 | 35 | | |
| #60 | 0.25 | 27 | | |
| #100 | 0.15 | 19 | | |
| #200 | 0.075 | 14 | | |
| | | | | |
| | | | | |

**Coefficients**

$D_{85}$ = 28.2105 mm  $D_{30}$ = 0.3107 mm

$D_{60}$ = 1.5829 mm  $D_{15}$ = 0.0891 mm

$D_{50}$ = 0.8558 mm  $D_{10}$ = N/A

$C_u$ = N/A  $C_c$ = N/A

**Classification**

ASTM N/A

AASHTO Stone Fragments, Gravel and Sand (A-1-b (0))

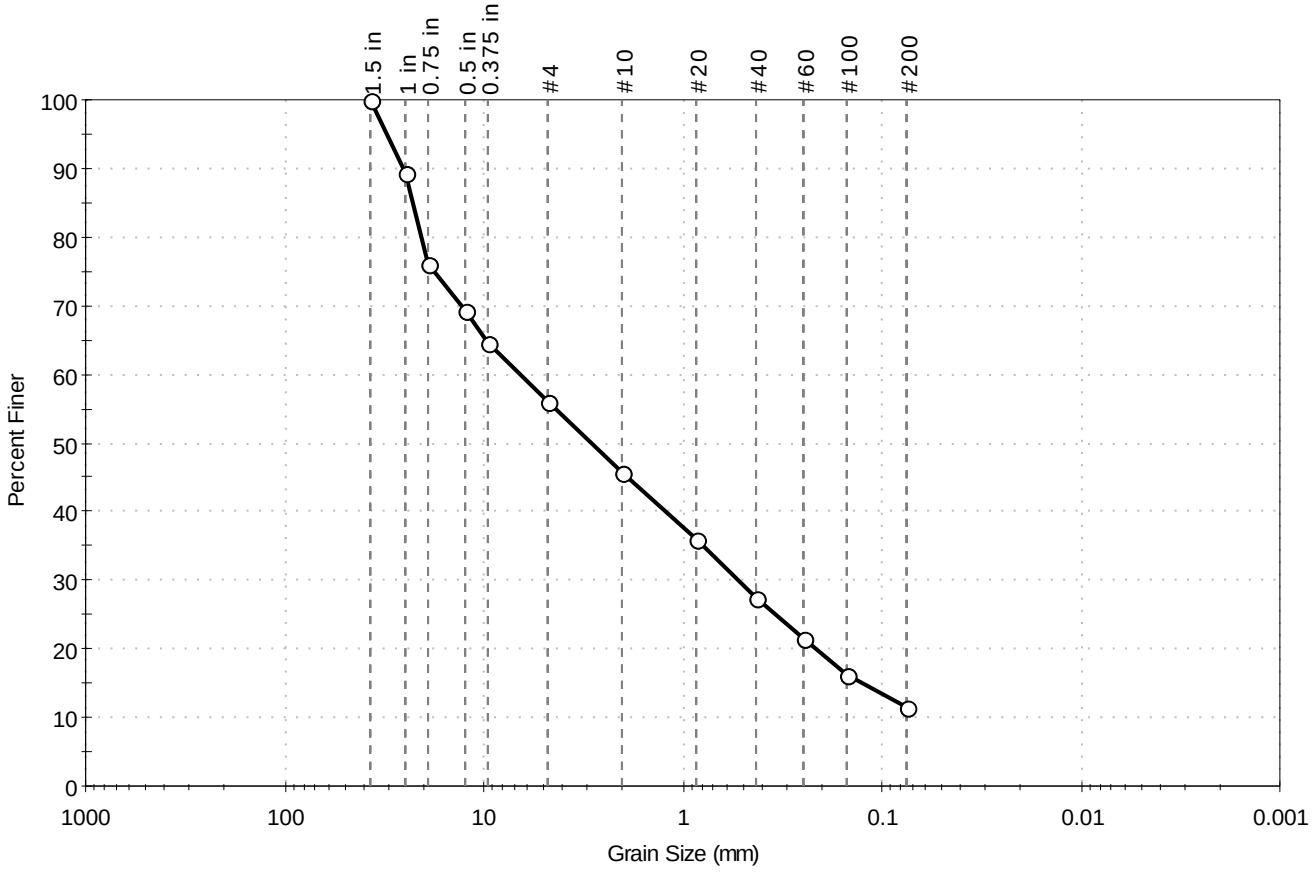
**Sample / Test Description**

Sand/Gravel Particle Shape : ANGULAR

Sand/Gravel Hardness : HARD

| | | | | | |
|---|---|---|---|---|---|
| Client: | Haley & Aldrich, Inc. | | | | |
| Project: | Maintenance and Operations Bldg | | | | |
| Location: | Portland, ME | | | Project No: | GTX-306687 |
| Boring ID: | HA17-102 | Sample Type: | jar | Tested By: | jbr |
| Sample ID: | S3+S4 | Test Date: | 07/13/17 | Checked By: | emm |
| Depth : | 4-8 ft | Test Id: | 416554 | | |
| Test Comment: | --- | | | | |
| Visual Description: | Moist, brown sand with silt and gravel | | | | |
| Sample Comment: | --- | | | | |

# Particle Size Analysis - ASTM D422




| %Cobble | %Gravel | %Sand | %Silt & Clay Size |
|---|---|---|---|
| --- | 44.0 | 44.6 | 11.4 |

| Sieve Name | Sieve Size, mm | Percent Finer | Spec. Percent | Complies |
|---|---|---|---|---|
| 1.5 in | 37.50 | 100 | | |
| 1 in | 25.00 | 89 | | |
| 0.75 in | 19.00 | 76 | | |
| 0.5 in | 12.50 | 69 | | |
| 0.375 in | 9.50 | 65 | | |
| #4 | 4.75 | 56 | | |
| #10 | 2.00 | 46 | | |
| #20 | 0.85 | 36 | | |
| #40 | 0.42 | 27 | | |
| #60 | 0.25 | 21 | | |
| #100 | 0.15 | 16 | | |
| #200 | 0.075 | 11 | | |
| | | | | |
| | | | | |

**Coefficients**

| | |
|---|---|
| $D_{85}$ = 22.8615 mm | $D_{30}$ = 0.5243 mm |
| $D_{60}$ = 6.5821 mm | $D_{15}$ = 0.1278 mm |
| $D_{50}$ = 2.8660 mm | $D_{10}$ = N/A |
| $C_u$ = N/A | $C_c$ = N/A |

**Classification**

ASTM N/A

AASHTO Stone Fragments, Gravel and Sand (A-1-a (0))

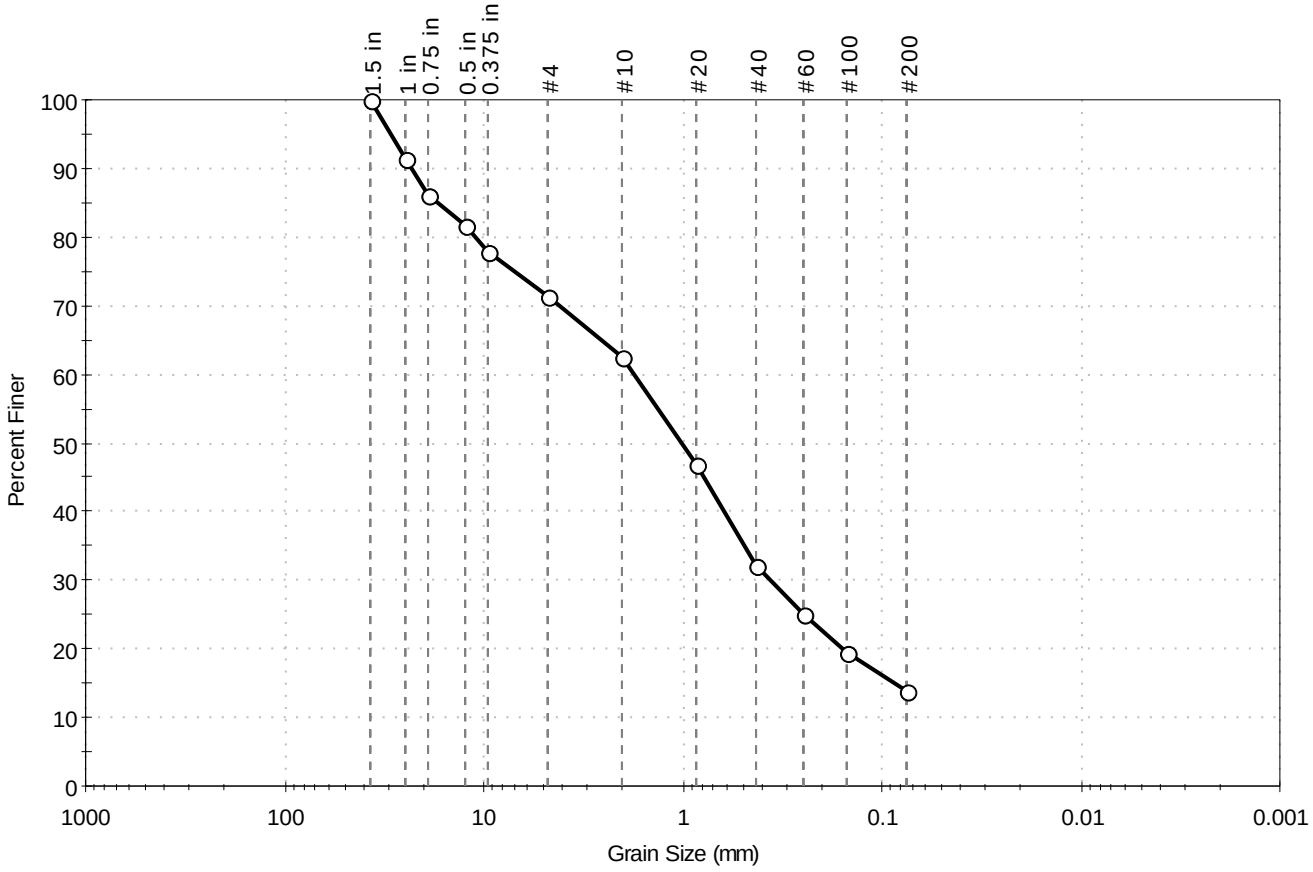
**Sample / Test Description**

Sand/Gravel Particle Shape : ANGULAR

Sand/Gravel Hardness : HARD

| | | | | | |
|---|---|---|---|---|---|
| Client: | Haley & Aldrich, Inc. | | | | |
| Project: | Maintenance and Operations Bldg | | | | |
| Location: | Portland, ME | | | Project No: | GTX-306687 |
| Boring ID: | HA17-103 | Sample Type: | jar | Tested By: | jbr |
| Sample ID: | S1 | Test Date: | 07/13/17 | Checked By: | emm |
| Depth : | 0.5-2 ft | Test Id: | 416555 | | |
| Test Comment: | --- | | | | |
| Visual Description: | Moist, brown silty sand with gravel | | | | |
| Sample Comment: | --- | | | | |

# Particle Size Analysis - ASTM D422




| % Cobble | % Gravel | % Sand | % Silt & Clay Size |
|---|---|---|---|
| --- | 28.5 | 57.7 | 13.8 |

| Sieve Name | Sieve Size, mm | Percent Finer | Spec. Percent | Complies |
|---|---|---|---|---|
| 1.5 in | 37.50 | 100 | | |
| 1 in | 25.00 | 91 | | |
| 0.75 in | 19.00 | 86 | | |
| 0.5 in | 12.50 | 82 | | |
| 0.375 in | 9.50 | 78 | | |
| #4 | 4.75 | 71 | | |
| #10 | 2.00 | 62 | | |
| #20 | 0.85 | 47 | | |
| #40 | 0.42 | 32 | | |
| #60 | 0.25 | 25 | | |
| #100 | 0.15 | 20 | | |
| #200 | 0.075 | 14 | | |
| | | | | |
| | | | | |

**Coefficients**

| | |
|---|---|
| $D_{85}$ = 17.0869 mm | $D_{30}$ = 0.3640 mm |
| $D_{60}$ = 1.7482 mm | $D_{15}$ = 0.0865 mm |
| $D_{50}$ = 1.0086 mm | $D_{10}$ = N/A |
| $C_u$ = N/A | $C_c$ = N/A |

**Classification**

ASTM N/A

AASHTO Stone Fragments, Gravel and Sand (A-1-b (0))

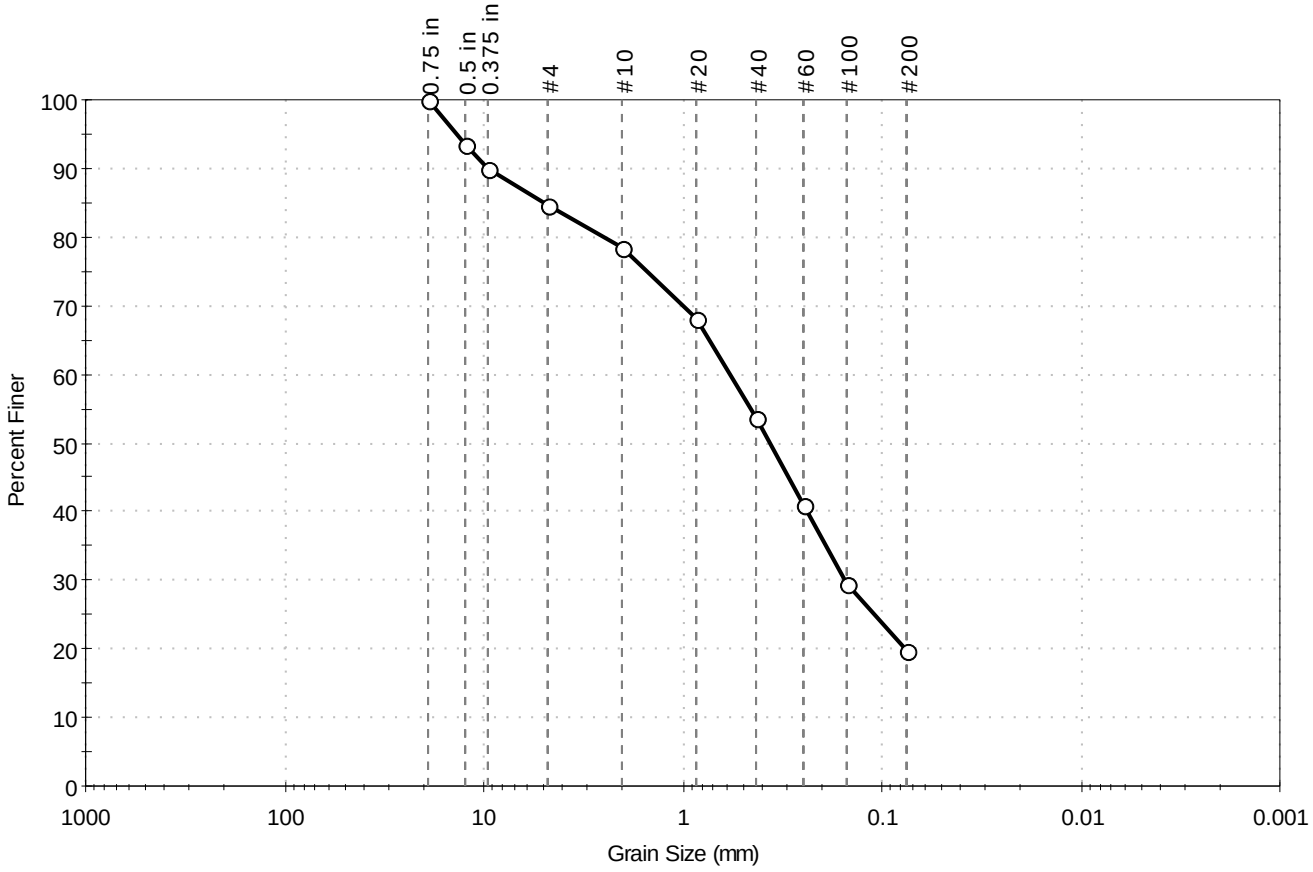
**Sample / Test Description**

Sand/Gravel Particle Shape : ANGULAR

Sand/Gravel Hardness : HARD

| | | | | | |
|---|---|---|---|---|---|
| Client: | Haley & Aldrich, Inc. | | | | |
| Project: | Maintenance and Operations Bldg | | | | |
| Location: | Portland, ME | | | Project No: | GTX-306687 |
| Boring ID: | HA17-103 | Sample Type: | jar | Tested By: | jbr |
| Sample ID: | S2 | Test Date: | 07/13/17 | Checked By: | emm |
| Depth : | 2-4 ft | Test Id: | 416556 | | |
| Test Comment: | --- | | | | |
| Visual Description: | Moist, dark brown silty sand with gravel | | | | |
| Sample Comment: | --- | | | | |

# Particle Size Analysis - ASTM D422




| %Cobble | %Gravel | %Sand | %Silt & Clay Size |
|---|---|---|---|
| --- | 15.3 | 64.8 | 19.9 |

| Sieve Name | Sieve Size, mm | Percent Finer | Spec. Percent | Complies |
|---|---|---|---|---|
| 0.75 in | 19.00 | 100 | | |
| 0.5 in | 12.50 | 93 | | |
| 0.375 in | 9.50 | 90 | | |
| #4 | 4.75 | 85 | | |
| #10 | 2.00 | 79 | | |
| #20 | 0.85 | 68 | | |
| #40 | 0.42 | 54 | | |
| #60 | 0.25 | 41 | | |
| #100 | 0.15 | 30 | | |
| #200 | 0.075 | 20 | | |
| | | | | |
| | | | | |

**Coefficients**

| | |
|---|---|
| $D_{85}$ = 4.9362 mm | $D_{30}$ = 0.1532 mm |
| $D_{60}$ = 0.5748 mm | $D_{15}$ = N/A |
| $D_{50}$ = 0.3637 mm | $D_{10}$ = N/A |
| $C_u$ = N/A | $C_c$ = N/A |

**Classification**

ASTM N/A

AASHTO Silty Gravel and Sand (A-2-4 (0))

**Sample / Test Description**

Sand/Gravel Particle Shape : ANGULAR

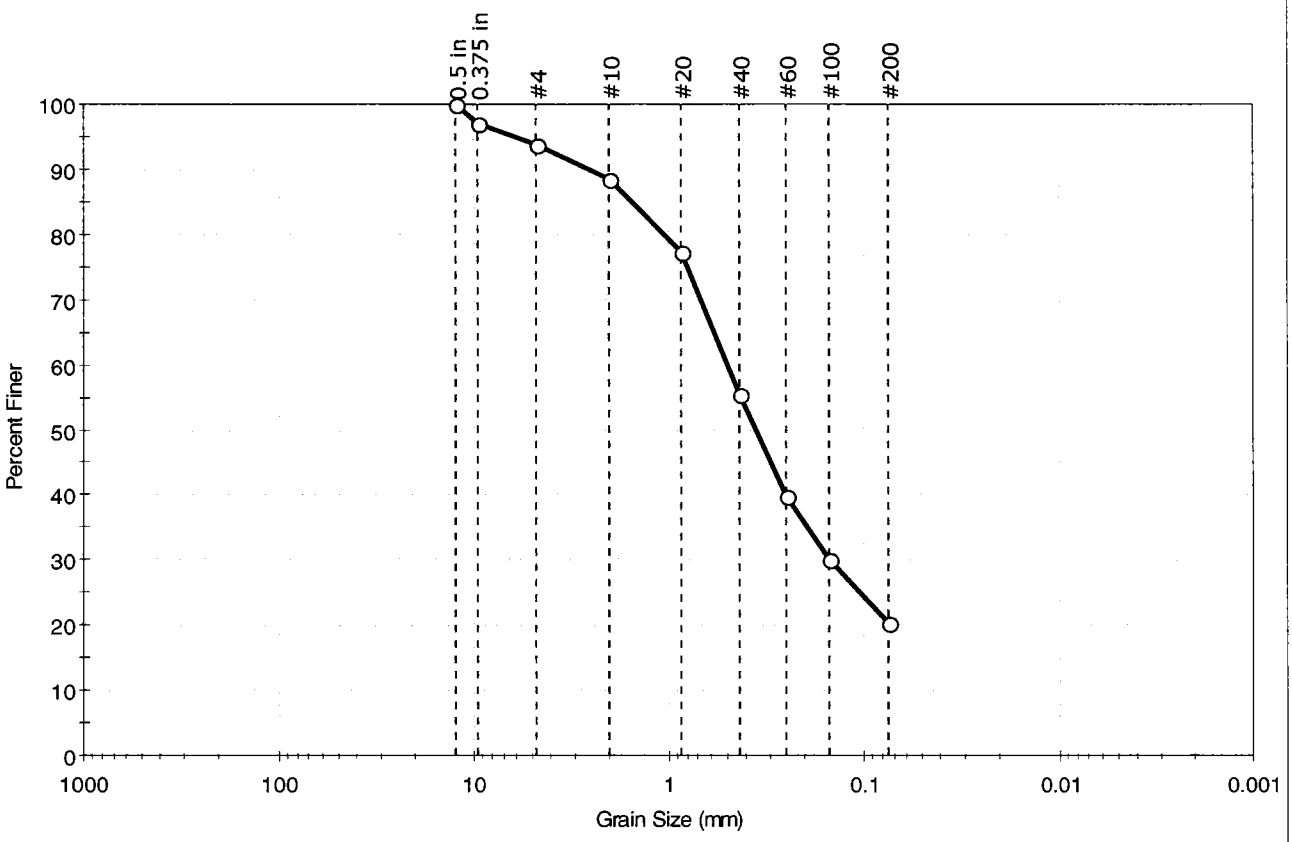
Sand/Gravel Hardness : HARD

# 2010 Laboratory Test Results

GeoTesting EXPRESS

| | | | |
|---|---|---|---|
| Client: | Haley & Aldrich, Inc. | | |
| Project: | International Marine Terminal Improvements | | |
| Location: | Portland. ME | Project No: | GTX-10419 |
| Boring ID: | HA10-1 | Sample Type: jar | Tested By: jbr |
| Sample ID: | S1A | Test Date: 11/30/10 | Checked By: jdt |
| Depth : | 0.5-1.5 ft | Test Id: 199463 | |
| Test Comment: | --- | | |
| Sample Description: | Moist, dark brown silty sand | | |
| Sample Comment: | --- | | |

# Particle Size Analysis - ASTM D 422-63 (reapproved 2002)




| %Cobble | %Gravel | %Sand | %Silt & Clay Size |
|---|---|---|---|
| — | 6.2 | 73.5 | 20.3 |

| Sieve Name | Sieve Size, mm | Percent Finer | Spec. Percent | Complies |
|---|---|---|---|---|
| 0.5 in | 12.50 | 100 | | |
| 0.375 in | 9.50 | 97 | | |
| #4 | 4.75 | 94 | | |
| #10 | 2.00 | 89 | | |
| #20 | 0.85 | 77 | | |
| #40 | 0.42 | 56 | | |
| #60 | 0.25 | 40 | | |
| #100 | 0.15 | 30 | | |
| #200 | 0.075 | 20 | | |

**Coefficients**

$D_{85}$ = 1.5257 mm  $D_{30}$ = 0.1485 mm
$D_{60}$ = 0.4898 mm  $D_{15}$ = N/A
$D_{50}$ = 0.3520 mm  $D_{10}$ = N/A
$C_u$ = N/A  $C_c$ = N/A

**Classification**

ASTM N/A

AASHTO Silty Gravel and Sand (A-2-4 (0))

**Sample/Test Description**

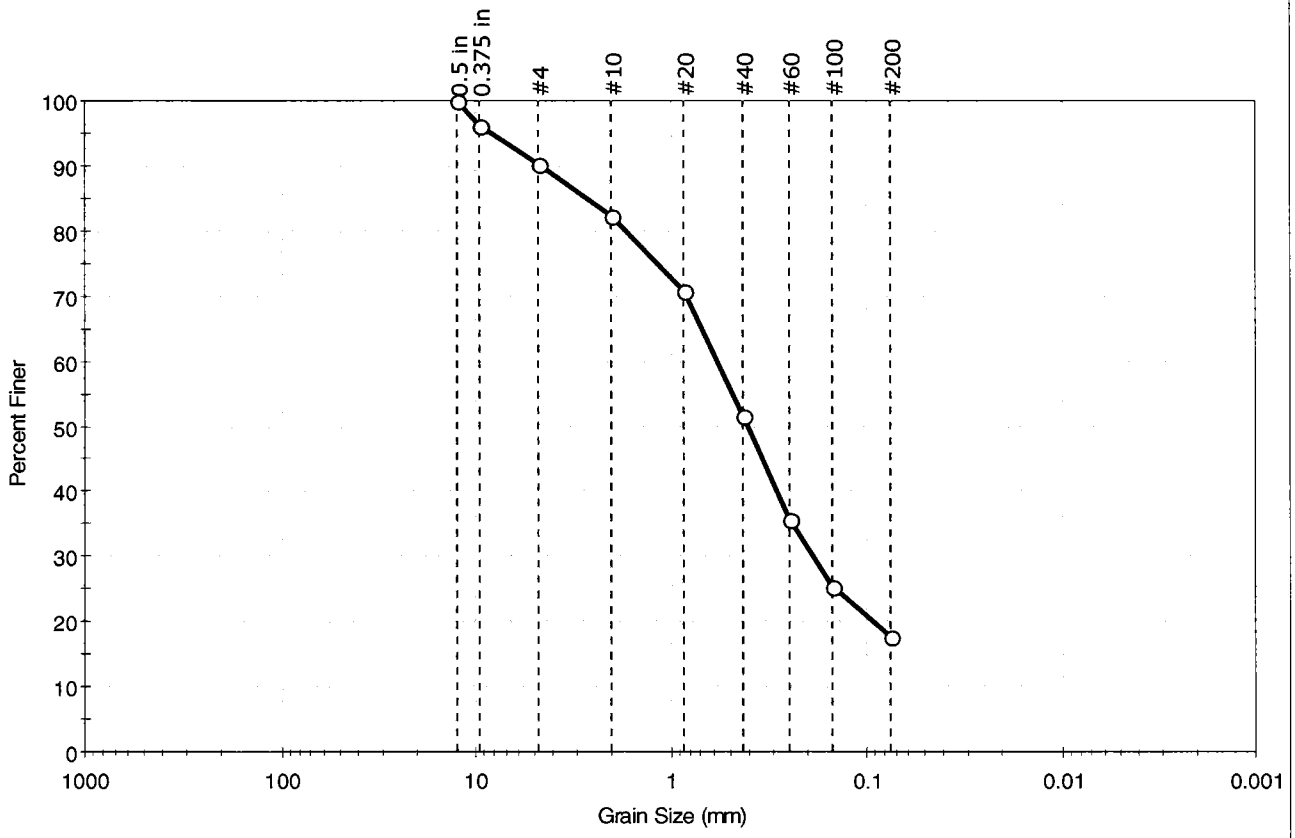
Sand/Gravel Particle Shape : ROUNDED

Sand/Gravel Hardness : HARD

GeoTesting EXPRESS

| | | | | | |
|---|---|---|---|---|---|
| Client: | Haley & Aldrich, Inc. | | | | |
| Project: | International Marine Terminal Improvements | | | | |
| Location: | Portland. ME | | | Project No: | GTX-10419 |
| Boring ID: | HA10-1 | Sample Type: | jar | Tested By: | jbr |
| Sample ID: | S2 | Test Date: | 11/30/10 | Checked By: | jdt |
| Depth : | 2.5-4.5 ft | Test Id: | 199464 | | |
| Test Comment: | --- | | | | |
| Sample Description: | Moist, dark brownish gray silty sand | | | | |
| Sample Comment: | --- | | | | |

# Particle Size Analysis - ASTM D 422-63 (reapproved 2002)




| % Cobble | % Gravel | % Sand | % Silt & Clay Size |
|---|---|---|---|
| — | 9.7 | 72.7 | 17.6 |

| Sieve Name | Sieve Size, mm | Percent Finer | Spec. Percent | Complies |
|---|---|---|---|---|
| 0.5 in | 12.50 | 100 | | |
| 0.375 in | 9.50 | 96 | | |
| #4 | 4.75 | 90 | | |
| #10 | 2.00 | 82 | | |
| #20 | 0.85 | 71 | | |
| #40 | 0.42 | 52 | | |
| #60 | 0.25 | 36 | | |
| #100 | 0.15 | 25 | | |
| #200 | 0.075 | 18 | | |

**Coefficients**

$D_{85}$ = 2.6857 mm  $D_{30}$ = 0.1880 mm
$D_{60}$ = 0.5741 mm  $D_{15}$ = N/A
$D_{50}$ = 0.4013 mm  $D_{10}$ = N/A
$C_u$ = N/A  $C_c$ = N/A

**Classification**

ASTM N/A

AASHTO Silty Gravel and Sand (A-2-4 (0))

**Sample/Test Description**

Sand/Gravel Particle Shape : ROUNDED

Sand/Gravel Hardness : HARD

September 06, 2017
Supersedes January 03, 2017

# STANDARD DETAIL UPDATES

Standard Details and Standard Detail updates are available at:
http://maine.gov/mdot/contractors/publications/standarddetail/

| Detail # | Description | Revision Date |
|---|---|---|
| 501(02) | Pipe Pile Splice | 3/05/2015 |
| 501(03) | H – Pile Splice | 3/05/2015 |
| 504(07) | Diaphragm & Crossframe Notes | 10/13/2015 |
| 505(01) | Shear Connectors | 10/24/2016 |
| 507(13) | Steel Bridge Railing | 6/03/2015 |
| 507(14) | Steel Bridge Railing | 6/03/2015 |
| 507(31) | Barrier – Mounted Steel Bridge | 8/06/2015 |
| 526(02) | Temporary Concrete Barrier | 8/06/2015 |
| 652(06) | Construction Signs | 10/24/2016 |
| 652(12) | Construction Traffic Control | 10/24/2016 |
| 802(05) | Roadway Culvert End Slope Treatment | 1/03/2017 |
| 504(10) | Drip Bar Details | 9/06/2017 |

SUPPLEMENTAL SPECIFICATIONS
(Corrections, Additions, & Revisions to Standard Specifications - November 2014)

# SECTION 101
# CONTRACT INTERPRETATION

101.1 Abbreviations Revise the definition of AWPA to "**American Wood Protection Association**".

101.2 Definitions
Page 1-5 – Remove the definition of Bridge in its entirety and replace with:
"**Bridge A structure that is erected over a depression or an obstruction, such as water, a highway or a railway, and has an opening measured along the centerline of the Roadway of more than 20 feet between: The faces of abutments; spring line of arches; extreme ends of openings of box culverts, pipes or pipe arches; or the extreme ends of openings for multiple box culverts, pipes or pipe arches**."

Page 1-12 – Remove the definition of Large Culvert in its entirety and replace with:
"**Large Culvert Any structure not defined as a Culvert or Bridge that provides a drainage or non-drainage opening under the Roadway or Approaches to the Roadway, with an opening that is 5 feet but less than 10 feet**."

Remove the definition of Minor Span in its entirety and replace with:
"**Minor Span Same definition as Bridge, except having an opening of between 10 feet and 20 feet, inclusive**."

# SECTION 103
# AWARD AND CONTRACTING

Amend this Section by adding the following:

**"103.1a Tie Bids - In the case where two responsive bids from responsible bidders are equal monetarily, the Department shall determine the apparent low bidder by flipping a coin. The coin shall have sides clearly marked as heads and tails. The contractor whose first letter in their official company name that comes first in the alphabet shall be heads.**

**If there are three bids, each bidder will flip the coin and the bidder with the odd toss will be the winner. (i.e. if the results are two heads and a tails, the bidder who had tails is the winner). For a three way tie, bidders may flip their own coin or have the Contracts Engineer flip for them.**

**The coin flip will occur at the next bid opening by the Contracts and Specifications Engineer or a designee. The tied bidders may attend the coin flip in person or watch on the internet as they choose."**

In 103.3.2 Notice of Determination Revise this section by removing sections A – M and replacing with the following A - K:

**(A) Default(s) or termination(s) on past or current Contracts.**

**(B) Failure on past or current Contracts to pay or settle all bills for labor, Materials or services;**
**to comply with directives of the Department, to fulfill warranty obligations, or to provide Closeout Documentation.**

**(C) "Below Standard" performance as determined from the Department's Contractor's Performance Rating process.**

**(D) Insufficient bonding capability or Inability of the Contractor to obtain or retain performance or Payment Bonds meeting MDOT requirements, or a pattern of unsupported Claims.**

**(E) Failure to accept an Award of a Contract made by the Department.**

**(F) Failure to provide information requested by the Department in a timely manner.**

**(G) Debarment, suspension or a denial of prequalification or 'award of contract' by any federal, State, or local governmental procurement agency or the Contractor's Agreement to refrain from Bidding as part of the settlement with any such agencies or any of the reasons contained in Section 102.02 of the "Rules Regarding Debarment of Contractors", Maine Department of Transportation Register 17-229, Chapter 102 (October 2, 1985).**

**(H) Failure to demonstrate ability to do work to the satisfaction and at the sole discretion of the Department.**

**(I) Number of personnel working directly for the Contractor with applicable knowledge and experience is significantly below industry standards.**

**(J) Safety Record, Environmental Record, Civil Rights or Equal Opportunity Record significantly below industry standards.**

**(K) Serious misconduct that the Department reasonably determines will substantially and adversely affect the cost, quality or timeliness of Work, or the safety of Workers or the public, any deceptive, evasive or fraudulent statements or omissions contained in the Application, made or omitted at any interview or hearing, or otherwise made to or omitted from the Department; or any other substantial deficiencies in experience or conduct that are clearly below industry standards and that clearly demonstrate in the sole discretion of the Department, that the Contractor is "Not Qualified".**

# SECTION 104
# GENERAL RIGHTS AND RESPONSIBILITES

This Section shall be amended by adding the following two sub-sections:

**104.3.8.1 Electronic Payroll Submission** **On federally funded projects the prime contractor, all subcontractors, and lower-tier subcontractors will submit their certified payrolls electronically utilizing the Elations system. There is no charge to the contracting community for the use of this service. The submission of paper payrolls will not be allowed or accepted. Additional information can be found at** http://www.maine.gov/mdot/contractors/ **under the "Bidder Info" go to "Electronic Payroll System."**

**104.3.8.2 Payment Tracking** **On federally funded projects the prime contractor and all subcontractors and lower-tier subcontractors will track and confirm the delivery and receipt of all payments through the Elation System**

104.4.10 Coordination of Road Closure / Bridge Closure / Bridge Width Restrictions
Revise the last sentence by adding a period after 'Resident'; remove the "and" after Resident; and adding "**not covered by Pay Items**" between 'costs' and 'will'. So that the last paragraph reads "**All Newspaper notices, radio announcements and any notifications will be subject to the approval of the Resident. All costs not covered by Pay Items will be considered incidental to the Contract**.".

104.5.5 Prompt Payment of Subcontractors Add the following paragraph to this subsection:

**C. Payment Tracking Federal Projects** **On federally funded projects, the prime contractor, subcontractors and lower-tier subcontractors will track and confirm the delivery and receipt of all payments through the Elation System. They will be responsible for entering all payments to all sub and lower tier contractors. MaineDOT will run a query monthly to ensure that contractors are complying and generate an e-mail to contractors who have not responded to confirm receipt of MaineDOT payment or contractor payment to lower tier subcontractors.**

# SECTION 105
# GENERAL SCOPE OF WORK

105.2.5 Compliance with Health and Safety Laws Remove the second paragraph of this subsection in its entirety and replace with:

"**For related provisions, see Sections 105.2.3 – Project Specific Emergency Planning, 105.3 – Traffic Control and Management and 105.4 – Maintenance of work**."
105.4.5 Special Detours Remove this subsection in its entirety and replace with:

**"105.4.5 Maintenance of Existing Structures When a new Bridge or Minor Span is being installed on a new alignment and the existing structure is to remain in service, the Department will maintain the existing structure and the portions of the roadway required for maintaining traffic until such time that the new structure is opened to traffic and the existing structure is taken out of service. A similar situation exists when a new Bridge or Minor Span is being installed on the same alignment as the existing structure, requiring a temporary detour to be installed by the Contractor per Section 510, Special Detours, prior to removal of the existing structure. In this case, the Department will maintain the existing structure and the portions of the existing roadway required for maintaining traffic until such time that either the temporary detour is opened to traffic or the Contractor begins any work on the existing structure, including, but not limited to, repairs, modifications, moving, demolition or removal. In either case, once the new structure or temporary detour is opened to traffic, or the Contractor begins any work on the existing structure, the Contractor shall be solely responsible for all maintenance of the existing structure and the portions of the existing approaches that lie outside the new roadway or the temporary detour, respectively. This specification is not intended to supersede Standard Specification Section 104.3.11, Responsibility for Property of Others."**

105.6.2.4 Department Verification Add the following to the end of the first sentence:
"**or other approved method, such as reference staking, to allow the Department to independently verify the accuracy of the work, as approved by the Department."**

## SECTION 106
## QUALITY

106.3.4 Storage Revise this Section by adding the following sentence after the first sentence:
**"Materials shall not be stored under or in close proximity to Highway Structures unless the Contractor receives written permission from the Resident."**

106.4.1 General - In the first sentence, remove "When required by Special Provision," and replace with **"When required elsewhere in the Contract, "**

Revise Subsection C by replacing the last sentence with the following:

**Approval of both standard and project specific QCPs shall be as outlined in paragraph B above, with the exception that the initial 14 day review period for standard plans will begin on March 1, and that the supplemental project specific QCP for the project shall be submitted a minimum of 14 days prior to any related work being performed with an initial review period of 7 days.**

# SECTION 108
# PAYMENT

108.3 Retainage - Remove the paragraph beginning with " The Contractor may withdraw…" in its entirety.

108.4.1 Price Adjustment for Hot Mix Asphalt:
Remove this section in its entirety and replace with the following

**For all contracts with hot mix asphalt in excess of 500 tons total, a price adjustment for performance graded binder will be made for the following pay items:**

| | |
|---|---|
| **Item 403.102** | **Hot Mix Asphalt – Special Areas** |
| **Item 403.206** | **Hot Mix Asphalt - 25 mm** |
| **Item 403.207** | **Hot Mix Asphalt - 19 mm** |
| **Item 403.2071** | **Hot Mix Asphalt - 19 mm (Polymer Modified)** |
| **Item 403.2072** | **Hot Mix Asphalt - 19 mm (Asphalt Rich Base)** |
| **Item 403.208** | **Hot Mix Asphalt - 12.5 mm** |
| **Item 403.2081** | **Hot Mix Asphalt - 12.5 mm (Polymer Modified)** |
| **Item 403.209** | **Hot Mix Asphalt - 9.5 mm (sidewalks, drives, & incidentals)** |
| **Item 403.210** | **Hot Mix Asphalt - 9.5 mm** |
| **Item 403.2101** | **Hot Mix Asphalt - 9.5 mm (Polymer Modified)** |
| **Item 403.2102** | **Hot Mix Asphalt - 9.5 mm (Asphalt Rich Base)** |
| **Item 403.2104** | **Hot Mix Asphalt - 9.5 mm (Thin Lift Surface Treatment)** |
| **Item 403.21041** | **Hot Mix Asphalt - 9.5 mm (Polymer Modified Thin Lift Surface Treatment)** |
| **Item 403.211** | **Hot Mix Asphalt – Shim** |
| **Item 403.2111** | **Hot Mix Asphalt – Shim (Polymer Modified)** |
| **Item 403.212** | **Hot Mix Asphalt - 4.75 mm (Shim)** |
| **Item 403.213** | **Hot Mix Asphalt - 12.5 mm (base and intermediate course)** |
| **Item 403.2131** | **Hot Mix Asphalt - 12.5 mm (base and intermediate course Polymer Modified)** |
| **Item 403.2132** | **Hot Mix Asphalt - 12.5 mm (Asphalt Rich Base and intermediate course)** |
| **Item 403.214** | **Hot Mix Asphalt - 4.75 mm (Surface)** |
| **Item 403.235** | **Hot Mix Asphalt (High Performance Rubberized HMA)** |
| **Item 403.301** | **Hot Mix Asphalt (Asphalt Rubber Gap-Graded)** |
| **Item 404.70** | **Colored Hot Mix Asphalt – 9.5mm (Surface)** |
| **Item 404.72** | **Colored Hot Mix Asphalt – 9.5mm (Islands, sidewalks, & incidentals)** |
| **Item 461.13** | **Light Capital Pavement** |
| **Item 461.210** | **9.5 mm HMA - Paver Placed Surface** |
| **Item 462.30** | **Ultra-Thin Bonded Wearing Course** |
| **Item 462.301** | **Polymer Modified Ultra-Thin Bonded Wearing Course** |

**Price adjustments will be based on the variance in costs for the performance graded binder component of hot mix asphalt. They will be determined as follows:**

**The quantity of hot mix asphalt for each pay item will be multiplied by the performance graded binder percentages given in the table below times the difference in price between the base price and the period price of asphalt cement. Adjustments will be made upward or downward, as prices increase or decrease.**

**Item 403.102–6.2%**
**Item 403.206–4.8%**
**Item 403.207–5.2%**
**Item 403.2071–5.2%**
**Item 403.2072–5.8%**
**Item 403.208–5.6%**
**Item 403.2081–5.6%**
**Item 403.209–6.2%**
**Item 403.210–6.2%**
**Item 403.2101–6.2%**
**Item 403.2102–6.8%**
**Item 403.2104–6.2%**
**Item 403.21041–6.2%**
**Item 403.211–6.2%**
**Item 403.2111–6.2%**
**Item 403.212–6.8%**
**Item 403.213–5.6%**
**Item 403.2131–5.6%**
**Item 403.2132–6.2%**
**Item 403.214–6.8%**
**Item 403.235–5.5%**
**Item 403.301–6.2%**
**Item 404.70–6.2%**
**Item 404.72–6.2%**
**Item 461.13–6.5%**
**Item 461.210 – 6.4%**
**Item 462.30–0.0021 tons/SY**
**Item 462.301–0.0021 tons/SY**

**Hot Mix Asphalt: The quantity of hot mix asphalt will be determined from the quantity shown on the progress estimate for each pay period.**

**Base Price: The base price of performance graded binder to be used is the price per standard ton current with the bid opening date. This price is determined by using the average New England Selling Price (Excluding the Connecticut market area), as listed in the Asphalt Weekly Monitor.**

**Period Price: The period price of performance graded binder will be determined by the Department by using the average New England Selling Price (Excluding the Connecticut market area), listed in the Asphalt Weekly Monitor current with the paving date. The maximum Period Price for paving after the adjusted Contract Completion Date will be the Period Price on the adjusted Contract Completion Date.**

## SECTION 109
## CHANGES

109.5.1 Definitions - Types of Delays
Delete Paragraph 'A' in its entirety and replace with:

"**A. Excusable Delay Except as expressly provided otherwise by this Contract, an "Excusable Delay" is a Delay to the Critical Path that is directly and solely caused by (1) a weather related Event of such an unusually severe nature that a Federal Emergency Disaster is declared. The Contractor will only be entitled to an adjustment of time if the Project falls within the geographic boundaries prescribed under the disaster declaration. or (2) a flooding event at the effected location of the Project that results in a Q25 headwater elevation, or greater, but less than a Q50 headwater elevation. Theoretical headwater elevations will be determined by the Department; actual headwater elevations will be determined by the Contractor and verified by the Department or (3) An Uncontrollable Event**."

## APPENDIX A TO DIVISION 100

Remove Section D in its entirety as this is now covered in Section 105.10 EQUAL OPPORTUNITY AND CIVIL RIGHTS.

## SECTION 203
## EXCAVATION AND EMBANKMENT

203.02 Materials
At the bottom of page 2-12, add as the first item in the list:

**Crushed Stone, ¾ inch 703.13**

203.042 Rock Excavation and Blasting
On page 2-16, add the word "**No**" to the third sentence in Section 5 Submittals, Subsection V, 1 so that it reads:
"***No* blasting products will be allowed on the job site if the date codes are missing**."

# SECTION 304
# AGGREGATE BASE AND SUBBASE COURSE

304.02 – Aggregate Add the following sentence before the sentence starting with "When designated on the plans…": **"Aggregate Base Course – Type C will be capped with 2" of millings or Untreated Aggregate Surface Course – Type B. Payment for this material will be made under 304.16"**

Revise the sentence beginning "When designated on the Plans, Type E…" by removing "When designated on the Plans," so it reads "**Type E subbase may be used 9 inches below and lower beneath the pavement**."

# SECTION 307
# FULL DEPTH RECYCLED PAVEMENT

Remove this Section in its entirety and replace with:

# SECTION 307
# FULL DEPTH RECYCLING
## (UNTREATED OR TREATED WITH EMULSIFIED ASPHALT STABILIZER)

**307.01 Description This work shall consist of pulverizing a portion of the existing roadway structure into a homogenous mass, adding an emulsified asphalt stabilizer (if required) to the depth of the pulverized material specified in the contract, placing and compacting this material to the lines, grades, and dimensions shown on the plans or established by the Resident.**

**MATERIALS**

**307.02 Pulverized Material Pulverized material shall consist of the existing asphalt pavement layers and one inch or more as specified of the underlying gravel, pulverized and blended into a homogenous mass. Pulverized material will be processed to 100% passing a 2 inch square mesh sieve.**

**307.021 New Aggregate and Additional Recycled Material New aggregate, if required by the contract, shall meet the requirements of Subsection 703.10 - Aggregate for Untreated Surface Course and Leveling Course, Type A. Aggregate Subbase Course Gravel Type D processed to 100 percent passing a 2 inch square mesh sieve and meeting the requirements of 703.06 – Aggregate for Base and Subbase may be used in areas requiring depths greater than 2 inches. New aggregate, will be measured and paid for under the appropriate item.**

**Recycled material, if required, shall consist of salvaged asphalt material from the project or from off-site stockpiles that has been processed before use to 100 percent passing a 2 inch square mesh sieve. Recycled material shall be conditionally accepted at the source by the Resident. It shall be free of winter sand, granular fill, construction debris, or other materials not generally considered asphalt pavement.**

**Recycled material generated and salvaged from the project shall be used within the roadway limits to the extent it is available as described in 307.09. No additional payment will be made for material salvaged from the project.**

**Recycled material supplied from off-site stockpiles shall be paid for as described in the contract, or by contract modification.**

**307.022 Emulsified Asphalt Stabilizer. If required, the emulsified asphalt stabilizer shall be grade MS-2, MS-4, SS-1, or CSS-1 meeting the requirements of Subsection 702.04 Emulsified Asphalt.**

**307.023 Water Water shall be clean and free from deleterious concentrations of acids, alkalis, salts or other organic or chemical substances.**

**307.024 Portland Cement If required, Portland Cement shall be Type I or II meeting the requirements of AASHTO M85.**

**307.025 Hydrated Lime If required, Hydrated Lime shall meet the requirements of AASHTO M216.**

## EQUIPMENT

**307.03 Pulverizer The pulverizer shall be a self-propelled machine, specifically manufactured for full-depth recycling work and capable of reducing the required existing materials to a size that will pass a 2 inch square mesh sieve. The machine shall be equipped with standard automatic depth controls and must maintain a consistent cutting depth and width. The machine also shall be equipped with a gauge to show depth of material being processed.**

**307.04 Liquid Mixer Unit or Distributor. If treatment of the recycled layer with emulsified asphalt is required by the contract, a liquid mixing unit or distributor shall be used to introduce the emulsified asphalt stabilizer into the pulverized material. The mixing unit shall contain a liquid distribution and mixing system which has been specifically manufactured for full-depth recycling work, capable of mixing the pulverized material with an evenly metered distribution of emulsified asphalt into a homogeneous mixture, to the depth and width required.**

**The mixing unit shall be designed, equipped, maintained, and operated so that emulsified asphalt stabilizer at constant temperature may be applied uniformly on variable widths of pulverized material up to 6 feet at readily determined and controlled rates from 0.01 to 1.06 gal/yd$^2$ with uniform pressure and with an allowable variation from any specified rate not to exceed 0.01 gal/ yd$^2$. Mixing units shall include a tachometer, pressure gages, and accurate volume measuring devices or a calibrated tank and a thermometer for measuring temperatures of tank contents.**

**307.041 Cement or Lime Spreader If required by the contract, spreading of the Portland Cement or Hydrated Lime shall be done with a spreader truck designed to spread dry particulate (such as Portland Cement or Lime) or other approved means to insure a uniform distribution across the roadway and minimize fugitive dust. Pneumatic application, including through a slotted pipe, will not be permitted. Other systems that have been developed include fog systems, vacuum systems, etc. Slurry applications may also be accepted. The Department reserves the right to accept or reject the method of spreading cement. The Contractor shall provide a method for verifying that the correct amount of cement is being applied.**

**307.05 Placement Equipment Placement of the Full Depth recycled material to the required slope and grade shall be done with an approved highway grader or by another method approved by the Resident.**

**307.06 Rollers The full depth recycled material shall be rolled with a vibratory pad foot roller, a vibratory steel drum soil compactor and a pneumatic tire roller. The pad foot roller drum shall have a minimum of 112 tamping feet 3 inches in height, a minimum contact area per foot of 17 inch$^2$, and a minimum width of 84 inches. The vibratory steel drum roller shall have a minimum 84 inch width single drum. The pneumatic tire roller shall meet the requirements of Section 401.10 and the minimum allowable tire pressure shall be 85 psi.**

## MIX DESIGN

**If treatment of the recycled layer with emulsified asphalt is required by the contract, the Department will supply a mix design for the emulsified asphalt stabilized material based on test results from pavement and soil analysis taken to the design depth. The Department will provide the following information prior to construction:**

1. **Percent of emulsified asphalt to be used.**
2. **Quantity of lime or cement to be added.**
3. **Optimum moisture content for proper compaction.**
4. **Additional aggregate (if required).**

**After a test strip has been completed or as the work progresses, it may be necessary for the Resident to make necessary adjustments to the mix design. Changes to compensation will be in accordance with the Mix Design Special Provision.**

## CONSTRUCTION REQUIREMENTS

**307.06 Pulverizing** **The entire depth of existing pavement shall be pulverized together with 1 inch or more of the underlying gravel into a homogenous mass. All pulverizing shall be done with equipment that will provide a homogenous mass of pulverized material, processed in-place, which will pass a 2 inch square mesh sieve.**

**307.07 Weather Limitations** **Full depth recycled work shall be performed when;**

**A. Recycling operations will be allowed between May 15th and September 15th inclusive in Zone 1 - Areas north of US Route 2 from Gilead to Bangor and north of Route 9 from Bangor to Calais.**
**B. The atmospheric temperature, as determined by an approved thermometer placed in the shade at the recycling location, is 50°F and rising.**
**C. When there is no standing water on the surface.**
**D. During generally dry conditions, or when weather conditions are such that proper pulverizing, mixing, grading, finishing and curing can be obtained using proper procedures, and when compaction can be accomplished as determined by the Resident.**
**E. When the surface is not frozen and when overnight temperatures are expected to be above 32°F.**
**F. Wind conditions are such that the spreading of lime or cement on the roadway ahead of the recycling machine will not adversely affect the operation.**

**307.08 Surface Tolerance** **The complete surface of the Full Depth Recycled course shall be shaped and maintained to a tolerance, above or below the required cross sectional shape, of ⅜ inch.**

**307.09 Full Depth Recycling Procedure** **New aggregate or recycled material meeting the requirements of Section 307.021 - New Aggregate and Additional Recycled Material, shall be added as necessary to restore cross-slope and/or grade before pulverizing. Locations will be shown on the plans or described in the construction notes. The Resident may add other locations while construction of the project is in progress. The Contractor will use recycled material to the extent it is available, in lieu of new aggregate. The material shall then be pulverized, processed, and blended into a homogeneous mass passing a 2 inch square mesh sieve. Material found not pulverized down to a 2 inch size will be required to be reprocessed by the recycler with successive passes until approved by the Resident.**

**Should the Contractor be required to add new aggregate or recycled material to restore cross-slope and/or grade after the initial pulverizing process, those areas will require re-processing to blend into a homogenous mass passing a 2 in square mesh sieve.**

**Sufficient water shall be added during the recycling process to maintain optimum moisture for compaction.**

**The resultant material from the initial pulverizing processes shall be graded and compacted to the cross-slope and profile shown on the plans or as directed by the Resident. The Contractor will also be responsible for re-establishing the existing profile grade. The completed surface of the full depth recycled course shall be shaped and maintained to a tolerance, above or below the required cross sectional shape, of ⅜ inch. Areas not meeting this tolerance will be repaired as described in Section 307.091. The initial pulverizing process density requirements will be the same as Section 307.101 unless otherwise directed by the Resident.**

**Additives, if required, shall be introduced following completion of the initial pulverizing and blending process. Emulsified asphalt stabilizer shall be incorporated into the top of the processed material as specified in section 307.04 to the depth specified in the contract by use of the liquid mixer unit or a distributor, at the rate specified in the mix design. The emulsified asphalt shall then be uniformly blended into a homogeneous mass until an apparent uniform distribution has occurred. The rate of application may be adjusted as necessary by the Resident. Cement or lime shall be introduced as described in section 307.041. The resultant material shall be graded and compacted to the cross-slope and profile shown on the plans or as directed by the Resident. The Contractor will also be responsible for re-establishing the existing profile grade.**

**After final compaction, the roadway surface shall be treated with a light application of water, and rolled with pneumatic-tired rollers to create a close-knit texture. The finished layer shall be free from:**

**A. Surface laminations.**
**B. Segregation of fine and coarse aggregate.**
**C. Corrugations, centerline differential, potholes, or any other defects that may adversely affect the performance of the layer, or any layers to be placed upon it.**

**The Contractor shall protect and maintain the recycled layer until a lift of pavement is applied. Any damage or defects in the layer shall be repaired immediately. An even and uniform surface shall be maintained. The recycled surface shall be swept prior to hot mix asphalt overlay placement.**

**307.091 Repairs Repairs and maintenance of the recycled layers, resulting from damage caused by traffic, weather or environmental conditions, or resulting from damage caused by the Contractor's operations or equipment, shall be completed at no additional cost to the Department.**

**For recycled layers stabilized with emulsified asphalt, low areas will be repaired using a hot mix asphalt shim. Areas up to 1 inch high can be repaired by milling or shimming with hot mix asphalt. Areas greater than 1 inch high will be repaired using a hot mix asphalt shim. All repair work will be done with the Resident's approval at the Contractor's expense.**

## TESTING REQUIREMENTS

**307.10 Quality Control The Contractor shall operate in accordance with the approved Quality Control Plan (QCP) to assure a product meeting the contract requirements. The QCP shall meet the requirements of Section 106.4 - Quality Control and this Section. The Contractor shall not begin recycling operations until the Department approves the QCP in writing.**
**Prior to performing any recycling process, the Department and the Contractor shall hold a Pre-recycle conference to discuss the recycling schedule, type and amount of equipment to be used, sequence of operations, and traffic control. A copy of the QC random numbers to be used on the project shall be provided to the Resident. All field supervisors including the responsible onsite recycling process supervisor shall attend this meeting.**

**The QCP shall address any items that affect the quality of the Recycling Process including, but not limited to, the following:**

- **A. Sources for all materials, including New Aggregate and Additional Recycled Material.**
- **B. Make and type of rollers including weight, weight per inch of steel wheels, and average contact pressure for pneumatic tired rollers.**
- **C. Testing Plan.**
- **D. Recycling operations including recycling speed, methods to ensure that segregation is minimized, grading and compacting operations.**
- **E. Methods for protecting the finished product from damage and procedures for any necessary corrective action.**
- **F. Method of grade checks.**
- **G. Examples of Quality Control forms.**
- **H. Name, responsibilities, and qualifications of the Responsible onsite Recycling Supervisor experienced and knowledgeable with the process.**
- **I. A note that all testing will be done in accordance with AASHTO and MDOT/ACM procedures.**

**The Project Superintendent shall be named in the QCP, and the responsibilities for successful implementation of the QCP shall be outlined.**

**The Contractor shall sample, test, and evaluate the full depth reclamation process in accordance with the following minimum frequencies:**

**MINIMUM QUALITY CONTROL FREQUENCIES**

| Test or Action | Frequency | Test Method |
|---|---|---|
| **Density** | **1 per 1000 feet / lane** | **AASHTO T 310** |
| **Air Temperature** | **4 per day at even intervals** | |
| **Surface Temperature** | **At the beginning and end of each days operation** | |
| **Yield of all materials (Daily yield, yield since last test, and total project yield.)** | **1 per 1000 ft/lane** | |

**The Department may view any QC test and request a QC test at any time. The Contractor shall submit all QC test reports and summaries in writing, signed by the appropriate technician, to the Department's onsite representative by 1:00 P.M. on the next working day, except when otherwise noted in the QCP due to local restrictions. The Contractor shall make all test results, including randomly sampled densities, available to the Department onsite.**

**The Contractor shall cease recycling operations whenever one of the following occurs:**

**A. The Contractor fails to follow the approved QCP.**
**B. The Contractor fails to achieve 98 percent density after corrective action has been taken.**
**C. The finished product is visually defective, as determined by the Resident.**
**D. The computed yield differs from the mix design by 10 percent or more.**

**Recycling operations shall not resume until the Department approves the corrective action to be taken.**

**307.101 Test Strip The contractor shall assemble all items of equipment for the recycling operation on the first day of the recycling work. The Contractor shall construct a test strip for the project at a location approved by the Resident. The Responsible onsite Recycling Supervisor will work with Department personnel to determine the suitability of the mixed material, moisture control within the mixed material, and compaction and surface finish. The test strip section is required to:**

**A. Demonstrate that the equipment and processes can produce recycled layers to meet the requirements specified in these special provisions.**
**B. Determine the effect on the gradation of the recycled material by varying the forward speed of the recycling machine and the rotation rate of the milling drum.**

**C. Determine the optimum moisture necessary to achieve proper compaction of the recycled layer.**
**D. Determine the sequence and manner of rolling necessary to obtain the compaction requirements and establish a target density. The Contractor and the Department will both conduct testing with their respective gauges at this time.**

**The test strip shall be at least 300 feet in length of a full lane-width (or a half-road width). Full recycling production will not start until a passing test strip has been accomplished. If a test strip fails to meet the requirements of this specification, the Contractor will be required to repair or replace the test strip to the satisfaction of the Resident. Any repairs, replacement, or duplication of the test strip will be at the Contractor's expense.**

**After the test strip has been pulverized, and the roadway brought to proper shape, the Contractor shall add water until it is determined that optimum moisture has been obtained. The test strip shall then be rolled using the specified compaction equipment as directed until the density readings show an increase in dry density of less than 1 pcf for the final four roller passes of each roller. The Contractor and Department will each determine a target density using their respective gauges by performing several additional density tests and averaging them. The average of these tests will be used as the target density of the recycled material for QC and Acceptance purposes.**

**Following completion of the test strip, compaction of the material shall continue until a density of not less than 98 percent of the test strip target density has been achieved for the full width and depth of the layer. During the construction and compaction of the Full Depth Recycled base, should three consecutive Acceptance test results for density fail to meet a minimum of 95 percent of the target density, or exceed 102 percent of target density, a new test strip shall be constructed.**

**ACCEPTANCE TEST FREQUENCY**

| Property | Frequency | Test Method |
|---|---|---|
| In-place Density | 1 per 2000 ft / lane | AASHTO T 310 |

**<u>308.102 Curing</u>. No new pavement shall be placed on the full depth recycled pavement until curing has reduced the moisture content to 1 percent or less by total weight of the mixture, or a curing period of 4 days has elapsed, whichever comes first.**

**<u>307.11 Method of Measurement</u> Full Depth Recycled Pavement (Untreated or Treated with Emulsified Asphalt Stabilizer) will be measured by the square yard.**

**307.12 Basis of Payment** **The accepted quantity of Full Depth Recycled Asphalt Pavement (Untreated or Treated with Emulsified Asphalt Stabilizer) will be paid for at the contract unit price per square yard, complete in-place which price will be full compensation for furnishing all equipment, materials and labor for pulverizing, blending, placing, grading, compacting, and for all incidentals necessary to complete the work.**

**The addition of materials to restore profile grade and/or cross-slope in areas shown on the plans or described in the construction notes will be paid separately under designated pay items within the contract. No additional payment will be made for materials salvaged from the project.**

**Payments will be made under:**

| **Pay Item** | **Pay Unit** |
|---|---|
| **307.331 Full Depth Recycled Pavement (Untreated)** | **Square Yard** |
| **307.332 Full Depth Recycled Pavement (with Emulsified Asphalt Stabilizer) 5 in. depth** | **Square Yard** |
| **307.333 Full Depth Recycled Pavement (with Emulsified Asphalt Stabilizer) 6 in. depth** | **Square Yard** |

## SECTION 411
## UNTREATED AGGREGATE SURFACE COURSE

411.02 – Aggregate Add the following to the end of the first sentence: **"- Type A"**

## SECTION 501
## FOUNDATION PILES

501.05 – Method of Measurement

b. Piles Furnished – After the second sentence, add the sentence **"Measurement will not include any pile tips"**.

c. Piles in Place – Add the sentence to the end of the second paragraph, **"Measurement will include the pile tips"**.

d. Pile Tips – Add the words "**on the Pile**" to the end of the sentence.

# SECTION 502
# STRUCTURAL CONCRETE

502.05 Composition and Proportioning

Replace Table 1 with

TABLE 1

| Concrete CLASS | Minimum Compressive Strength (PSI) | Permeability as indicated by Surface Resistivity (KOhm-cm) | Entrained Air (%) | | Notes |
|---|---|---|---|---|---|
| | | LSL | LSL | USL | |
| S | 3,000 | N/A | N/A | N/A | 4,5 |
| A | 4,000 | 14 | 6.0 | 9.0 | 1,4,5 |
| P | ----- | ----- | 5.5 | 7.5 | 1,2,3,4 |
| LP | 5,000 | 17 | 6.0 | 9.0 | 1,4,5 |
| Fill | 3,000 | N/A | 6.0 | 9.0 | 4,5 |

In the list of information submitted by the contractor for a mix design:

Item J Replace "Target Coulomb Value." with "Target KOhm-cm Value."

Note #1 - Remove, **"…Standard Specification Section 711.05, Protective Coating for Concrete Surfaces, and per the manufacturer's recommendations, at no additional cost to the Department."** and replace with, **"…Standard Specification Section 515, Protective Coating for Concrete Surfaces, at no additional cost to the Department."**

502.1703 Acceptance Methods A and B

In the paragraph that starts with "The Department will take Acceptance…" Remove the word chloride from chloride permeability in the last sentence.

Replace the paragraph starting with "Rapid Chloride Permeability specimens…" With the following:

"Surface Resistivity specimens will be tested by the Department in accordance with AASHTO TP-95 at an age ≥ 56 days. Four 4 inch x 8 inch cylinders will be cast per sublot placed. The average of three concrete specimens per sublot will constitute a test result and this average will be used to determine the permeability for pay adjustment computations."

502.1706 Acceptance Method C

Remove in its entirety and Replace with:

**502.1706 Acceptance Method C The Department will determine the acceptability of the concrete through Acceptance testing. Acceptance tests will include compressive strength, air content and permeability. Method C concrete not meeting the requirements listed in Table 1 shall be removed and replaced at no cost to the Department. At the Department's sole discretion, material not meeting requirements may be left in place and paid for at a reduced price as described in Section 502.195.**

502.1707 Resolution of Disputed Acceptance Test Results

Section B

Remove "Rapid Chloride" from the section heading.

In paragraph 4 replace T-277 with TP-95

502.192 Pay Adjustment for Chloride Permeability

Remove "Chloride" from the heading and from the first sentence.

Replace the sentence that starts with "values greater than…" and replace with "values less than 10 KOhms-cm for Class A concrete or 11 KOhms-cm for Class LP concrete shall be subject to rejection and replacement, at no additional cost to the Department."

502.194 Pay Adjustments for Compressive Strength, Chloride Permeability and Air Content, Methods A and B

Remove the word "Chloride" from the section heading and from the equation for CPF.

502.195 Pay Adjustment Method C

In Table 6: Method C Pay Reductions (page 5-53)
Under "Entrained Air" for "Class Fill", in the first line,
change from "< 4.0 (Removal)" to **"< 4.5 (Removal)**"

In Table 6: Method C PAY REDUCTIONS, revise the Chloride Permeability section by removing it in its entirety and replacing it with:

| Surface Resistivity {Permeability in Kohm-cms and Pay Reduction per CY} | | | |
|---|---|---|---|
| 15-16 ($50) | 13 ($25) | N/A | N/A |
| 13-14 ($75) | 12($50) | N/A | N/A |
| 12 ($100) | 11 ($75) | N/A | N/A |
| 11 ($125) | 10 ($100) | N/A | N/A |
| < 11 (Removal) | < 10 (Removal) | N/A | N/A |

## SECTION 503
## REINFORCING STEEL

503.06 Placing and Fastening Revise this Subsection by removing, in its entirety, the paragraph which begins, "Stainless steel reinforcement shall not be tied to any other type of reinforcement……"

## SECTION 504
## STRUCTURAL STEEL

504.26 Welding Remove the second paragraph beginning with "The range of heat…." in its entirety.

504.29 Welding ASTM A 709 HPS 70W Steel. Remove the third paragraph beginning with "Make Weld runoff tabs…" in its entirety.

## SECTION 510
## SPECIAL DETOURS

510.032 Geometric and Approach Design a. Horizontal alignment
The third paragraph of this section is revised to read as follows:

"The roadway width shall be increased on curved portions of the Special Detour to account for the off tracking characteristics of WB-62 vehicle in accordance with **the AASHTO publication A Policy On Geometric Design of Highways and Streets (the Green Book), chapter 3 table entitled Design Widths of Pavements for Turning Roadways."**

## SECTION 527
## ENERGY ABSORBING UNIT

527.02 Materials This section is revised to read as follows.

527.02 Materials Work Zone Crash Cushions must comply with NCHRP Report 350. Work Zone Crash Cushions shall be selected from MaineDOT's Qualified Products List of Crash Cushions / Impact Attenuators, or an approved equal.

## SECTION 534
## PRECAST STRUCTURAL CONCRETE

534.14 Process Control Test Cylinders
Revise this subsection to read:

"**534.14 Acceptance and Quality Control Testing of Concrete Refer to Section 712.061**."

# SECTION 535
## PRECAST, PRESTRESSED CONCRETE SUPERSTRUCTURE

Section 535.08 – Quality Assurance

Revise the second paragraph to read:

**"The QAI will perform acceptance sampling and testing and will witness or review documentation, workmanship and testing to assure the Work is being performed in accordance with the Contract Documents."**

Section 535.15 - Process Control Test Cylinders

Revise the first paragraph to read:

**"535.15 Acceptance and Quality Control Testing of Concrete Acceptance of structural precast/prestressed units, for each day's production, will be determined by the Department, based on compliance with this specification and satisfactory concrete testing results. At least once per week, the QAI will make 2 concrete cylinders (6 cylinders when the Contract includes permeability requirements) for use by the Department; cylinders shall be standard cured in accordance with AASHTO T23 (ASTM C31). The QAI will perform entrained air content and slump flow testing, determine water-cement ratio and determine temperature of the sampled concrete at the time of cylinder casting. All testing equipment required by the QAI to perform this testing shall be provided in accordance with Standard Specification Section 502.041, Testing Equipment. In addition, the Contractor shall provide a slump cone meeting the requirements of AASHTO T 119. Providing and maintaining testing and curing equipment shall be considered incidental to the work and no additional payment will be made."**

Insert the following as the second paragraph of Section 535.15:

**"Quality Control concrete test cylinders shall be made for each day's cast and each form bed used. Cylinders tested to determine strand release strength and design strength shall be field cured in accordance with AASHTO T23 (ASTM C31). 28 day cylinders shall be standard cured. Record unit identification, entrained air content, water-cement ratio, slump flow and temperature of the sampled concrete at the time of cylinder casting."**

# SECTION 604
## MANHOLES, INLETS CATCH BASINS

604.04 Adjusting Catch Basins and Manholes**,**

Add the following paragraph to the end of 604.04 b:

**The Department will allow the use of metal ring inserts set into the manhole top frame or composite risers placed beneath the manhole frame to adjust manhole slope and grade for paving projects. The use of metal ring inserts shall be in accordance with 604.04 d. Ring Insert Requirements. The use of composite risers shall be in accordance with 604.04 e. Composite Riser Requirements.**

Add the following paragraph after the first paragraph of 604.04 c:

**The Department will allow the use of metal ring inserts set into the manhole top frame or composite risers placed beneath the manhole frame to adjust manhole slope and grade for paving projects. The use of metal ring inserts shall be in accordance with 604.04 d. Ring Insert Requirements. The use of composite risers shall be in accordance with 604.04 e. Composite Riser Requirements.**

Add the following sections to 604.04:

**<u>d. Ring Insert Requirements</u> Ring inserts to adjust manhole top frame slope and grade will are allowed in accordance with the following requirements:**

**1) Materials**

**i. All ring inserts must be made of iron. *Multiple ring inserts will not be allowed.* The single ring insert may be any height up to a maximum of 2 inches tall.**

**ii. Ring inserts shall not be welded to the manhole frame to prevent brittle failure of the cast iron frame.**

**iii. Ring inserts shall be fastened to the manhole frame using liquid steel-filled epoxy such as Loctite Fixmaster Steel Liquid or equivalent. The epoxy shall be installed in accordance with the manufacturer's recommendations.**

**2) Where Ring Inserts May/May Not Be Used**

**i. MaineDOT will allow the use of a single manhole ring insert to raise manholes on state and state-aid highways.**

**ii. *Manhole ring inserts may not be used along state and state-aid highway sections where the speed limit is 40 miles per hour or more.* The standard brick and mortar or flat composite risers beneath the manhole frame must be used at these locations.**

**3) Construction Requirements For The Use of Iron Manhole Ring Inserts**

**i. Wherever iron ring inserts are used to raise manhole top elevations, the rings shall be fastened to the existing manhole frame using liquid steel-filled epoxy. The liquid steel-filled epoxy shall be placed evenly around the entire manhole frame before placing the ring insert. *Unbonded ring inserts will not be allowed*. If the manufacturer's recommended construction practices result in loose or unacceptable manhole cover restraint, standard brick and mortar or flat composite risers beneath the manhole frame must be used at these locations.**

**e. Composite Riser Requirements Flat or beveled, doughnut-shaped, composite risers placed beneath the manhole frame to adjust slope and grade are allowed. The composite riser shall be fastened to both the top of the concrete cone and bottom of the manhole frame with the manufacturer's recommended epoxy. Composite risers may be used at all locations on state and state-aid highways under any legal speed limit without restriction.**

## SECTION 606
## GUARDRAIL

606.09 Basis of Payment Amend the first sentence of the eighth paragraph of this subsection by removing the word "meter" and replace it with "linear foot".

## SECTION 608
## SIDEWALKS

608.021 Sidewalk Materials Revise this section by removing the second paragraph which begins with "Portland cement concrete shall…" in its entirety and replace with **"Portland cement concrete shall be Class A and meet the requirements of Section 502, Structural Concrete."**

## SECTION 609
## CURB

609.03 Vertical Stone Curb, Terminal Section and Transition Sections and Portland Cement Concrete Curb, Terminal Sections and Transition Sections
Amend this section by adding the following paragraph to the end of it:
**"The Contractor may elect to substitute concrete to backfill Stone Curbing or Stone Edging at their option. If the concrete backfill option is elected, the following is added to Standard Specification 609 – Curb"**

609.02 Materials Amend this section by adding the following to it:

| | |
|---|---|
| **Portland cement and Portland Pozzolan Cement** | **701.01** |
| **Water** | **701.02** |
| **Fine Aggregate for Concrete** | **703.01** |
| **Coarse Aggregate for Concrete** | **703.02** |

**The Contractor shall submit a concrete mix design for the Portland Cement Concrete to the Resident, with a minimum designed compressive strength of 4000 psi Class A concrete.**

609.10 Basis of Payment Revise by changing the fifth paragraph which begins with "There will be no separate payment…" this section by removing the word "cement" and replacing it with "**concrete fill, mortar**".

## SECTION 619
## MULCH

619.07 Basis of Payment Amend this section by adding the words "**; Bark Mulch and Erosion Control Mix will be paid for by the Cubic Yard;**" into the first sentence so that it reads:

"The accepted areas mulched will be paid for at the contract price per unit**; Bark Mulch and Erosion Control Mix will be paid for by the Cubic Yard;** which shall be full compensation for furnishing and spreading the hay or straw and mulch binder, cellulose fiber mulch, bark mulch or erosion control mix.

Revise the second sentence by removing " **for pay item 619.1201"** So that it reads:

**"When Mulch is measured in Bales, each bale will be paid for at 60% of the contract price per Unit**".

Revise this section by removing all pay items and replace them with the following:

| | |
|---|---|
| **619.12 Mulch** | **Unit** |
| **619.13 Bark Mulch** | **Cubic Yard** |
| **619.14 Erosion Control Mix** | **Cubic Yard** |

## SECTION 621
## LANDSCAPING

621.0002 Materials - General
In the list of items change "Organic Humus" to "**Humus**".

621.0019 Plant Pits and Beds

c Class A Planting
In the third paragraph beginning with " The plant pit…" change "½ inch" to "**1 inch**"

## SECTION 626
## FOUNDATIONS, CONDUIT AND JUNCTION BOXES FOR HIGHWAY SIGNING, LIGHTING AND SIGNALS

626.02 General Amend the Material list by adding the following to the list:

| | |
|---|---|
| Gravel Borrow | 703.20 |

Revise the Material List by removing:

| | |
|---|---|
| Prewired Conduit | 715.04 |
| Metallic Junction and Fuse Box | 715.05 |

626.021 Miscellaneous Material Amend this section by adding the following to the end of it:

"**All concrete for concrete encasement of conduit shall be Fill Class concrete in accordance with the applicable requirements of Section 502 – Structural Concrete."**

Amend the third paragraph that begins with "If grouting is necessary…" by adding "**included on the Qualified Product List and**" after the word "material".

626.03 General Amend this section by adding the following section to the end of it

**"626.0301 Electrical Supply Lines and Service Connections The following requirements shall apply to Electric Supply Lines and Service Connections feeding traffic signalization equipment control boxes and lighting breaker boxes.**

**Whenever possible, the meter and breaker panel feeding traffic signal control boxes or lighting control boxes shall be constructed within 30 feet of the service drop pole.**

**All service connections to MaineDOT traffic signal control boxes or lighting breaker boxes constructed in trenches shall be in steel conduit or concrete encased PVC conduit.**

**Where trenchless technologies are employed to install the service connection conduit, Schedule 120 PVC conduit shall be used for the trenchless bore section of conduit. In addition, concrete encasement shall be used for any conduit placed in trench sections more than 10 feet before or after the limits of the trenchless bore conduit.**

**The construction practices described above shall be used for service connections up to a maximum of 600 feet. There may be rare exceptional cases where the service connection must exceed 600 feet. In these cases, the power companies may require primary power be run over 600 feet for the purpose of power consumption and dependable service. These cases will be evaluated on a case-by-case basis for alternate power feed methods and/or the need for steel or concrete encased conduit."**

626.031 Conduit Revise this section by removing the second paragraph which begins with "Trenches for conduits…" and replace it with the following:

"**Trenches for conduits shall be excavated to a width that will permit proper installation of the conduit and to a minimum depth of 3 feet below finish grade as measured from the top of the conduit. If deeper depths are required, the conduit shall be installed at the depth shown on the plans or as directed. Conduit shall not interfere with poles, guardrail posts, sign foundations or other objects."**

Amend the third paragraph which begins with "All junction or pull boxes…" by adding "**concrete, in accordance with the applicable requirements of Section 502 – Structural Concrete,**" after Class LP.

Revise the fifth paragraph which begins with "After the trench has been…" by adding the following to the end of it:

"**Where concrete encasement is required around the conduit, backfilling with approved material may begin adjacent to and above the encased conduit no sooner than 24 hours after concrete placement."**

Remove the following:

"**All underground conduit shall be placed to at least the depth shown on the plans and shall not interfere with poles, guardrail posts, sign foundations or other objects."**

Revise the paragraph beginning with "All conduit ends shall…" by removing "Prewired Conduit shall be sealed during construction to prevent entry of moisture, dirt, or rocks."

626.033 Polyvinylchloride Conduit Installation Amend the first paragraph of this section which begins with "Polyvinylchloride conduit and High Density…" by adding the following to the end of it:

"**In addition, PVC conduit used for Electrical Supply Lines and Services feeding control cabinets for traffic signalization equipment or highway lighting breaker boxes shall be concrete encased. When trenchless technologies are used to install PVC conduit, concrete encasement shall not be required.**

**Concrete encasement shall consist of a minimum of 4 inches of concrete above, below and on both sides of the conduit that shall have a minimum compressive strength of 3000 psi and a maximum aggregate size of 1-inch (Fill Class concrete). The concrete encasement may be backfilled no sooner than 24 hours after placement.** "

**"NON-METALLIC UNDER PAVEMENT CONDUIT INSTALLATION**

**Where noted on the drawings, non-metallic under pavement conduit of schedule 80 or greater rating shall be provided to facilitate conduit crossing of the existing highway and ramps without disruption to the existing highway and ramp pavement surface. The non-metallic under pavement conduit shall be hydraulically jacked or directional bored below the highway and ramp at a depth of not less than (36 inches). Under pavement conduit shall extend for a distance of (10 feet) beyond the highway or ramp edge at each side."**

Amend the sixth paragraph which begins with "Where PVC conduit runs are…" by changing "3 inch minimum bedding" to "**6 inch minimum bedding**".

626.034 Concrete Foundations

Revise this section by removing the third paragraph which begins with "In the absence of Design Requirements…" in its entirety and replace with the following:

**"In the absence of design requirements being provided on the plans, the Contractor shall prepare and submit the foundation design(s) to the Department for review. The Contractor may propose an alternate shallow spread footing or drilled shaft configuration/design than that set forth on the drawings. Design shall be in accordance with AASHTO LRFD Specifications for Structural Supports for Highway Sign, Luminaires and Traffic Signals, current edition; AASHTO LRFD Bridge Design Specifications, current edition; and FHWA-NHI-10-016 Drilled Shafts, Construction Procedures and Design Methods, current edition. Where conflicting requirements occur, the more stringent requirements shall govern. In addition to other design requirements, foundation design shall account for Torsion for which a minimum Factor of Safety equal to 1.2 shall be achieved. In evaluating axial capacity and torsional resistance in cohesionless soils, load transfer coefficient or side resistance coefficient (beta, β) will be used in accordance with Subsection 13.3.5.1 of FHWA-NHI-10-016, with beta determined in accordance with Equations 13-13 and 13-11 for silty sands to sandy silts (with varying amounts of gravel). The design criteria for the resistance of drilled shaft and spread footing foundations against overturning, sliding and bearing capacity failure shall meet the requirements of Section 4 of AASHTO LRFD Bridge Design Specifications, current edition. The structural design of foundations shall meet the requirements of AASHTO LRFD Bridge Design Specifications, current edition. The Contractor shall submit to the Department for review, three (3) copies of detailed plans and calculations of the proposed design. Design shall be prepared and sealed by a Professional Engineer licensed in the State of Maine. Construction of foundation(s) shall not commence until the Department has reviewed the foundation design."**

On Page 6-85, add the following paragraph before the paragraph beginning with "Drilled shafts shall not be…".

**" No foundation design will be required for 18- and 24-inch diameter foundations for structures less than 30-feet tall and with no projecting arms. A foundation design prepared by a Professional Engineer licensed in accordance with the laws of the State of Maine will be required for all other foundations Precast foundations will be permitted for 18 and 24-inch diameter foundations for structures less than 30-feet tall and with no projecting arms. Where precast foundations are permitted flowable concrete fill shall be used as backfill in the annular space, and placed from the bottom up. Construction of precast foundations shall conform to the Standard Details and all requirements of Section 712.061 except that the concrete shall have a minimum permeability of 17 kOhm-cm and the use of calcium nitrite will not be required. "**

On Page 6-86, Revise the paragraph beginning with "Concrete for drilled shafts…" so that a portion of it reads as follows:

"….The Contractor shall provide temporary dewatering of excavations for foundations such that concrete is placed in the dry. **Concrete for drilled shafts shall be placed in accordance with Section 502.10 as temporary casing is withdrawn to prevent debris from contaminating the foundation and to ensure concrete is cast against the surrounding soil. Concrete for drilled shafts and spread footings shall be Class LP in accordance with Section 502 - Structural Concrete. Precast foundations will not be permitted except as specified above in this Section.** Backfill for spread footing foundations shall be Gravel Borrow meeting the requirements of Section 703.20 - Gravel Borrow….."

626.05 Basis of Payment Amend this section by removing the following paragraphs:
The one which starts with "Payment will be made for the total number of linear feet of prewired conduit…"
The one which starts with "Prewired conduit within the foundations…"

Amend this subsection by adding the following paragraph and Pay Items:

"**Payment will be made for the total number of linear feet of under pavement conduit actually furnished, installed and accepted at the contract price per linear foot. This price shall include the cost of: furnishing and installing the conduit; excavating; furnishing special backfilling materials, pull wire, fittings, grounding and bonding; test cleaning interiors of conduits and all materials, labor, equipment and incidentals necessary to complete the work**."

| Pay Item | | PayUnit |
|---|---|---|
| **626.221** | **Non-metallic Conduit, Concrete Encased** | **Linear Foot** |
| **626.251** | **Non-Metallic Under pavement Conduit (Schedule 80 or greater rating)** | **Linear Foot** |

Remove the following Pay Items:

| | | |
|---|---|---|
| 626.23 | Prewired Conduit Secondary Wiring | Linear Foot |
| 626.24 | Prewired Conduit Primary Wiring | Linear Foot |

## SECTION 627
## PAVEMENT MARKINGS

Revise this section by removing it in its entirety and replacing with the following:

**627.01 Description This work shall consist of furnishing and placing reflectorized pavement lines and markings, removing pavement lines and markings, and furnishing and applying reflectorized paint to curbing in reasonably close conformity with the plans and as designated.**

**627.02 Materials Materials shall conform to the requirements specified in the following Sections of Division 700 - Materials.**

| | |
|---|---|
| **Pavement Marking Paint** | **708.03** |
| **Reflectorized Plastic Pavement Marking** | **712.05** |

**Temporary Bi-directional Yellow Delineators shall be Temporary Object Markers (T.O.M.) as manufactured by the Davidson Plastic Company, 18726 East Valley Highway, Kent, WA 98031 or an approved equal.**

**627.04 General All pavement lines and markings shall be applied in accordance with the latest edition of Manual on Uniform Traffic Control Devices.**

**Longitudinal lines placed on tangent roadway segments shall be straight and true. Longitudinal lines placed on curves shall be continuous smoothly curved lines consistent with the roadway alignment. All pavement markings placed shall meet the tolerance limits shown on the plans.**

**Unless otherwise shown on the plans, non-interstate lines shall be 4 inches wide and broken lines shall consist of alternate 10 foot painted line segments and 30 foot gaps. On controlled access divided highways and on the interstate system lines shall be 6 inches wide and broken lines shall consist of alternate 15 foot painted line segments and 25 foot gaps. Width tolerance shall be +/- ¼ inch.**

**Temporary pavement marking lines, defined in Special Provision Section 652, Maintenance of Traffic, Temporary Centerline, will be applied as many times as necessary to properly delineate traffic lanes for the safe passage of traffic. Bi-directional delineators may be used in place of temporary lines, except where specified otherwise in Special Provision 652 Maintenance of Traffic, Temporary Centerline. Delineators will be applied at 40 foot intervals.**

**In overnight lane closure areas that are not to be overlaid, temporary plastic lines or raised pavement markers shall be used through the length of the taper.**

**Newly painted lines, markings and curb shall be protected from traffic by the use of cones, stationary vehicles or other approved methods until the paint is dry.**

**627.05 Preparation of Surface Immediately before applying the pavement marking paint to the pavement or curb, the surface shall be dry and entirely free from dirt, grease, oil, or other foreign matter.**

**Surface preparation for application of plastic markings shall conform to the manufacturer's recommendations.**

**627.06 Application Prior to applying paint for final pavement lines, the Contractor shall perform a test for paint thickness by furnishing and placing a piece of smooth, clean metal with an area of at least 144 in² in the path of the striping truck. The striping truck shall be passed over the piece of metal, painting the surface as it passes, without applying beads. The result of this test will be used to determine the pressure setting and speed of the truck when applying paint to obtain the specified thickness. Additional paint thickness testing may be required on the final paint markings. The wet thickness of paint without beads on final pavement lines shall be a minimum of 16 mils.**

**On other final pavement markings and on curb, where the paint is applied by hand painting or spraying, application shall be in two uniform covering coats, each at least 10 mils thick. Before the second coat of paint has dried, the glass beads shall be applied by a pressure system that will force the glass beads onto the undried paint as uniformly as possible.**

**Glass beads shall be applied to the final and temporary pavement lines, marking and curb at a sufficient rate and in sufficient quantity to assure complete and uniform coverage of hand painted surfaces and achieve proper reflectivity.**

**Permanent and temporary white lines and markings shall have a minimum final reflectivity value of 250 millicandelas per square meter per lux (mcd/m²/lux) and permanent and temporary yellow lines and markings shall have a minimum final reflectivity value of 150 millicandelas per square meter per lux (mcd/m²/lux), as measured by the Department. Measurements taken to determine reflectivity shall be done within 4 weeks after final placement.**

**If the final reflectivity values are less than the described minimums, the Contractor shall repaint those areas not meeting required reflectivity at no cost to the Department. If the final reflectivity values are less than the described minimums after the second attempt, the Contractor will submit in writing a plan of action to meet the reflectivity minimums prior to continuing any work. Once the plan has been reviewed and approved by the Department, the Contractor shall re apply at no cost to the Department.**

**Temporary painted lines and markings shall be applied as specified for permanent painted lines, except that the thickness shall be a minimum of 16 mils.**

**Temporary pliant polymer marking material shall be used for temporary markings on the final pavement and on pavements not to be resurfaced when such pavement markings do not conform to the final pavement markings pattern.**

**The plastic final pavement lines and markings shall be applied in accordance with the manufacturer's recommendations by the inlay method of application.**

**627.07 Establishment Period Inlaid plastic pavement lines and marking material furnished and installed under this contract for final pavement markings shall still be subject to a six-month period of establishment.**

**The period of establishment shall commence as soon as the plastic pavement lines and markings are complete and in place and shall continue for six months. At the end of the establishment period, a minimum of 95% of the plastic pavement lines and markings shall still be in place to be acceptable.**

**If less than 95% of the plastic pavement lines and markings are in place after six months, the Contractor shall replace all unsatisfactory plastic pavement lines and markings on the project without additional payment. Plastic pavement lines and markings designated for replacement shall be installed according to these specifications, unless otherwise directed. Plastic pavement lines and markings replaced at the end of the six month establishment period will not be subject to a further establishment period.**

**627.08 Removing Lines and Markings When it is necessary to remove pavement lines and markings, it shall be done by high pressure water, grinding or other approved acceptable means. The method chosen must be capable of completely eradicating the existing line or marking without excessive damage to the pavement. Burning and the use of solvents to remove temporary markings from final pavement or from existing pavement not to be resurfaced will not be permitted.**

**627.09 Method of Measurement** **The quantity of pavement marking lines identified in the contract as a plan quantity pay item, the measurement of payment will be the number of feet shown in the Schedule of Items. This quantity will be considered final and no adjustments will be made except when changes resulting in increases or decreases are made by the Resident.**

**The accepted quantity of temporary or permanent pavement marking lines when identified in the contract as a linear foot item shall be measured and paid for at the contract unit price per linear foot for the total amount applied and accepted.**

**Double yellow centerline, broken or solid, will be considered one line for measurement purposes. The measurement of broken lines will include the gaps when painted and will not include the gaps when plastic. Double Yellow Centerline, broken or solid shall not be paid through intersections or side roads and will be paid for the actual length of painted line.**

**Broken white lines will include the gaps when painted and will not include the gaps when plastic inlaid pavement lines are applied. Yellow or white solid edge lines and will not be paid through intersections or side roads and will be measured by the actual length of painted line.**

**Temporary pavement marking lines shall not be paid through intersections or side roads and will be measured per linear foot of actual length of painted and accepted.**

**Reflectorized curb will be measured or computed by the square foot of curb surface actually painted and reflectorized.**

**The accepted quantity of removing existing pavement markings will be measured by the square foot.**

**Temporary Bi-directional Yellow Delineators will be measured by each unit, complete in place, maintained, and accepted.**

**627.10 Basis of Payment** **The accepted quantity of pavement marking lines identified in the contract as a plan quantity pay item will be paid for at the contract unit price for plan quantity. No adjustment will be made to the quantity for payment, except as described 627.09 Method of Measurement**

**The quantity of permanent or temporary pavement marking lines identified in the contract paid by the linear foot will be measured for payment as described under section 627.09 Method of Measurement.**

**All other permanent pavement markings will be paid for at the contract unit price per square foot in accordance with 627.09 Method of Measurement.**

**If allowed by Special Provision, the Contractor may utilize Temporary Bi-Directional Yellow and White (as required) Delineators. When utilized, payment will be made as temporary pavement marking lines, measured and paid at the contract unit price per linear foot. Such payment will include as many applications as required and removal.**

**Payment for final plastic pavement lines and markings will be made in two parts. The first payment of 75% will be made when plastic pavement lines and markings are placed. The payment of the remaining 25% will be made at the end of the establishment period for all plastic line and pavement markings accepted.**

**The accepted quantity of any pavement marking lines will be paid for at the contract unit price and will include as many applications as required and removal when required.**

**The accepted quantity of Temporary Bi-directional Yellow Delineators will be paid for at the contract unit price.**

**Payment will be made under:**

| Pay Item | | Pay Unit |
|---|---|---|
| 627.18 | 12 inch Solid White Pavement Marking Line | Linear Foot |
| 627.711 | White or Yellow Pavement Marking Line - Plan Quantity | Linear Foot |
| 627.733 | 4" White or Yellow Painted Pavement Marking Line | Linear Foot |
| 627.744 | 6" White or Yellow Painted Pavement Marking Line | Linear Foot |
| 627.75 | White or Yellow Pavement & Curb Marking | Square Foot |
| 627.77 | Removing Existing Pavement Marking | Square Foot |
| 627.78 | Temporary 4" Painted Pavement Marking Line, White or Yellow | Linear Foot |
| 627.781 | Temporary 6" Painted Pavement Marking Line, White or Yellow | Linear Foot |
| 627.407 | Reflectorized Plastic, White or Yellow Pavement Marking | Square Foot |
| 627.4071 | Reflectorized Plastic, White or Yellow Pavement Marking Line - Plan Quantity | Linear Foot |
| 627.811 | Temporary Bi-directional Yellow Delineators | Each |

## SECTION 639
## ENGINEERING FACILITIES

Revise this section by removing this section in its entirety and replace with the following:

**639.01 Description** **This work shall consist of providing, erecting, lighting, equipping and maintaining buildings to be solely used by the Resident and other assigned Department representatives as a field office. Upon completion of the work, the buildings and equipment shall remain the property of the Contractor.**

**639.02 Materials** **Materials for buildings shall be of good quality customarily used in standard frame house or office trailer construction.**

**639.03 General** **The building of the type called for shall be provided before the start of work, and shall remain until work is completed and accepted, unless earlier removal is authorized. The location shall be approved by the Resident and should be adjacent or virtually adjacent to the Project.**

**A fire extinguisher shall be provided in each building or office trailer for electrical and chemical fires and effective on all solvents used in the building.**

**Walls, roof, floor, windows, and doors shall be tightly constructed to the required area.**

**Furnishings shall be supplied as called for. Doors shall be equipped with locks and all keys shall be in the possession of the Resident. Windows shall be equipped with latches so they may be locked on the inside. Window screens and screen doors shall be supplied when necessary. Adequate desk and desk space shall be provided. If a portable table is supplied, it should be adjustable to accommodate the various heights of employees. A 5-way adjustable office chair shall be provided in the quantities listed.**

**639.04 Field Offices** **Field Offices are designated Type A, Type B, or Type C. Buildings, including trailers, may be provided if they substantially equal or exceed the following requirements. Air conditioning, appropriate to the building size, shall be provided in all field offices.**

**The walls, roof, and floor of the building shall be completely insulated with a minimum insulation value of R-15. Office trailers shall be either new or in very good used condition. The interior walls shall be covered with suitable wall paneling. The entire office trailer shall be for the exclusive use of the Resident. The office trailer shall be winterized and completely enclosed at the bottom, if the trailer will be used in cold weather.**

**Other types of buildings and facilities may be furnished of equal or better quality.**
**A public work area will be provided in the field office that shall be designed and constructed so that individuals with disabilities can approach, enter, and exit this area.**

**At least one accessible route to the field office shall be provided from accessible parking. The accessible route shall comply with the Americans with Disabilities Act Accessibility Guidelines (ADAAG) and this specification.**

**The minimum clear width of an accessible route shall be 36 inches except at doors. The least possible slope shall be used for an accessible route. An accessible route with a running slope greater than 1:20 shall be considered a ramp. Maximum ramp slope is 1:12. The maximum rise for any run of a ramp shall be 30 inches and the minimum clear width shall be 36 inches. Nowhere shall the cross slope of an accessible route exceed 1:50. Changes in level up to ¼ inch may be vertical and without edge treatment. Changes in level between ¼ inch and ½ inch shall be beveled with a slope no greater than 1:2. Ramp floor surfaces shall be stable, firm, and slip-resistant.**

**Ground floor surfaces along accessible routes and in accessible rooms and spaces including floors, walks, ramps, stairs, and curb ramps, shall be stable, firm, and slip-resistant.**

**The main door to the public work area shall have a minimum clear opening of 32 inches with the door opened 90 degrees, measured between the face of door and the opposite stop. Minimum maneuvering clearances at doors shall be provided. The floor or ground area within the required clearances shall be level and clear.**

**The handle and other operating devices on accessible doors shall have a shape that is easy to grasp with one hand and does not require tight grasping. Lever-operated mechanisms push type mechanisms, and U-shaped handles are acceptable designs. Hardware required for accessible door passage shall be mounted no higher than 48 inches above finished floor.**
**A minimum of 3 parking spaces will be supplied for Class B & C Field Offices and 6 for Class A. One wheelchair accessible parking space shall be located on the shortest accessible route of travel from adjacent parking to an accessible entrance.**

**Level landings shall be provided at bottom and top of each run. The landing shall be at least as wide as the ramp run leading to it with a minimum length of 60 inches.**

**If a ramp run has a rise greater than 6 inches or a horizontal projection greater than 72 inches, then it shall have handrails on both sides. Handrails shall have the following features:**

**1) Handrails shall be provided along both sides of ramp segments. The inside handrail on switchback ramps shall always be continuous.**

**2) If handrails are not continuous, they shall extend at least 12 inches beyond the top and bottom of the ramp segment and shall be parallel with the floor or ground surface.**

**3) The clear space between the handrail and the wall shall be 1½ inch.**

**4) Gripping surfaces shall be continuous.**

**5) Top of handrail gripping surfaces shall be mounted between 34 and 38 inches above ramp surfaces.**

**6) Ends of handrails shall be either rounded or returned smoothly to floor, wall, or post.**

**7) Handrails shall not rotate within their fittings.**

**8) The diameter or width of the gripping surfaces of a handrail shall be 1¼ to 1½ inch, or the shape shall provide an equivalent gripping surface.**

**Firm and sturdy steps shall also be provided with 7 inch maximum riser and 11 inch minimum depth, and at least one handrail extending from the top of the steps to a minimum 12 inches beyond the bottom of the steps.**

**The Contractor will make reasonable effort(s) to provide wheelchair accessible toilet facilities when "portable" facilities are provided.**

**The Contractor shall provide wheelchair accessible toilet facilities when flush type facilities, that is, those with running water, are provided; and the Contractor shall provide wheelchair accessible portable facilities, if used, when the contract duration exceeds two continuous construction seasons.**

**In addition to the facilities previously specified in this subsection, each field office shall meet the following minimum requirements:**

| Description | Quantity | | |
|---|---|---|---|
| | Type A | Type B | Type C |
| Floor Area (Outside Dimension) - $ft^2$ | 312 | 220 | 125 |
| Inside Wall Height – feet | 7 | 7 | 7 |
| Window Area - $ft^2$ | 55 | 35 | 35 |
| Drafting Table Surface Area - $ft^2$ | 15 | 15 | 15 |
| Drafting Stools - each | 2 | 1 | 1 |
| Office Desks - each | 2 | 1 | 1 |
| Ergonomic Swivel Chairs -ea (5-way adjustable) | 3 | 2 | 2 |
| Folding Chairs - each | 3 | 2 | 2 |
| Lighting Units - each | 4 | 2 | 2 |
| Electric Wall Outlets - each | 6 | 4 | 3 |
| Power Strip Surge Protectors - each | 3 | 2 | 1 |
| Wall Closets - each | 1 | 1 | 1 |
| Plan Rack for minimum of 6 sets of plans | 1 | 1 | 0 |
| Toilet Facility | 1 | 1 | 1 |
| Wastebaskets - each | 2 | 2 | 1 |

**All windows shall be provided with shades or blinds.**

**The toilet facility shall be for the exclusive use of State personnel. If requested, the Contractor will supply a lock to ensure exclusive use.**

**The Resident will have the option to reject any furniture or supplies provided to the field office based on general condition.**

**One hundred ten volt, 60 cycle, continuous electric service shall be supplied for lighting and 15 amp duplex wall outlets. Lighting shall consist of florescent light units with rapid start bulbs or LED shop style lights located over the work areas for a minimum of 50 foot candles overall. At least one external light source will be provided.**

**Drafting surfaces shall be 40 inches above the floor and have shelves beneath. Shelves for plans and rolls shall also be furnished overhead. Drafting stools shall be approximately 28 inches high.**

**Desks shall be single or double pedestal standard office type, and shall be in addition to "built-in" type desks in the office trailer.**

**Field offices shall be furnished with one four-drawer letter size metal filing cabinet.**

**Wall closets shall be 21 inches wide, 15 inches deep, and at least 4 feet high.**

**Each office shall be furnished with a broom, dustpan, sweeping compound, trash bags, and with cleaning material for cleaning glass. If the field office is carpeted, then a vacuum cleaner will be provided. The contractor will be responsible for disposing of trash from the field office.**

**The Contractor shall provide a fully functional wireless desktop copier/scanner/printer, capable of copying field books, for the Resident's use during the project. All maintenance and supplies, except paper, shall be the responsibility of the Contractor.**

**The Contractor shall provide bottled water and a microwave for the duration of the project. All maintenance and supplies shall be the responsibility of the Contractor. Alternate source of water, such as a water cooler, may be provided as approved by resident.**

**The Contractor shall provide a 4 cubic-foot refrigerator in the field office for the duration of the project.**

**Each office shall be furnished with a 10-person general-purpose first aid kit. The first aid kit shall be periodically inspected and refilled as necessary.**

**<u>639.08 Heat</u> Heat appropriate to the building size shall be supplied by the Contractor to maintain an acceptable room temperature during occupancy.**

**639.091 Broadband Connection** **The contractor will supply one computer broadband connection, modem lease and router. The router shall have wireless access and be 802.11n or newer capable. The type of connection supplied will be contingent upon the availability of services (i.e. DSL or Cable Broadband). It shall be the contractor's option to provide dynamic or static IP addresses through the service. The selected service will have a minimum download connection of 5.0 Mbps and 1.0 Mbps upload. The contractor shall be responsible for the installation charges and all reinstallation charges following suspended periods. Monthly service and maintenance charges shall be billed by the Internet Service Provider (ISP) directly to the contractor.**

**639.10 Method of Measurement** **Field office will be measured by the unit or lump sum for each building provided, equipped and maintained satisfactorily.**

**639.11 Basis of Payment** **The accepted quantity of field office will be paid for at the contract unit price each or lump sum which payment shall be full compensation for furnishing until contract completion, erecting, equipping, maintaining, furnishing electricity, heating, installing and maintaining toilet facilities and if necessary removing the buildings or office trailers.**

**Payment for these items will be made in 3 parts; the first payment of ½ to be made after the Contractor has supplied the building or office trailer and it has been approved. The remaining payments shall be made at intervals as follows:**

**A second payment of ¼ shall be made when one-half of the anticipated work has been completed.**

**The final payment of the remaining ¼ shall be made upon completion of the work.**

**Payment will be made under:**

| Pay Item | | Pay Unit |
|---|---|---|
| 639.18 | Field Office, Type A | Each |
| 639.19 | Field Office, Type B | Each |
| 639.20 | Field Office, Type C | Each |

## SECTION 652
## MAINTENANCE OF TRAFFIC

652.2.4 Other Devices Revise this Section by removing the following paragraph:
" STOP/SLOW paddles shall be the primary and preferred hand held signaling device. Flags shall be limited to Emergencies. The paddle shall have an octagonal shape and be at least 18 inches wide with letters at least 6 inches high and should be fabricated from semi-rigid material"

And replace with these two paragraphs
"**Flaggers shall use a STOP / SLOW hand held paddle as the primary and preferred hand signaling device. Use of flags shall be limited to emergency situations.**

**STOP / SLOW paddles shall have high intensity prismatic retro reflective sheeting Type XI, have an octagonal shape on a rigid handle and shall be at least 18 inches wide with letters at least 6 inches high and shall be constructed from light semi-rigid material. The STOP (R1-1) face shall have white letters and a white border on a red background. The SLOW (W20-8) face shall have black letters and a black border on an orange background. Paddles in existing stock meeting the current specification (Type VII, Type VIII, or Type IX) may be utilized until the end of the service life or until 12/31/18. All new paddles must meet the Type XI requirements."**

652.3.3 Submittal of Traffic Control Plan On page **6-148**, note **f,** in the last sentence revise the "105.2.2" to "105.2.3" so that the last sentence reads, "**For a related provision, see Section 105.2.3 – Project Specific Emergency Planning**.".

652.3.4 General Revise the eighth paragraph by removing "Earth Berm" and replace it with "**Concrete Barrier**".

Amend this section by adding the following paragraph before the paragraph beginning with "Special Detours and temporary structures…":

**"A temporary ramp shall be constructed with HMA at the ends of the roadway section paved or milled each day. The use of millings or RAP will not be allowed, but cold patch may be temporarily utilized until HMA plants are open for the season. The maximum ramp change in elevation shall not exceed 4" vertical. For Interstate Highways or roadways with speed limits equaling or exceeding 50 mph; temporary ramps shall be constructed at a length of eight feet per inch of transition depth. For roadways with speed limits less than 50 mph and greater than 25 mph, temporary ramps shall be constructed at a length of four feet per inch of transition depth. For roadways with speed limits 25 mph or less, temporary ramps shall be constructed at a length of two feet per inch of transition depth. Materials, placement, maintenance, and removal shall be incidental to contract items."**

652.4 Flaggers Revise this section by removing the first paragraph, and replace it with the following"

**"The Contractor shall furnish flaggers as required by the TCP or as otherwise specified by the Resident. All flaggers must have successfully completed a flagger test approved by the Department and administered by a Department-approved Flagger-Certifier. All flaggers must carry an official certification card with them at all times while flagging.**

**For daytime conditions, flaggers shall wear a top (vest, shirt or jacket) that is orange, yellow, yellow-green, or fluorescent versions of these colors meeting ANSI 107-2004, Class 2 or Class 3, along with a hardhat with 360 ° retro-reflectivity.**

**For nighttime conditions, flaggers shall wear all Class 3 apparel, meeting ANSI 107-2004, including a Class 3 top (vest, shirt or jacket) and a Class E bottom (pants or coveralls), shall be worn along with a hardhat with 360 ° retro-reflectivity and shall be visible at a minimum distance of 1000 ft. Flagger stations must be illuminated in nighttime conditions to assure visibility and will be specifically addressed in detail in the Contractor's TCP".**

652.41 TRAFFIC OFFICERS

Revise this subsection so that the subsection number and title is

"**652.4.1 TRAFFIC OFFICERS** "

## SECTION 656
## TEMPORARY SOIL EROSION AND WATER POLLUTION CONTROL

656.5.2 If No Pay Item Add the following to the end of the first paragraph:

**"Failure by the Contractor to follow Standard Specification or Special Provision - Section 656 will result in a violation letter and a reduction in payment as shown in the schedule list in 656.5.1. The Department's Resident or any other representative of The Department reserves the right to suspend the work at any time and request a meeting to discuss violations and remedies. The Department shall not be held responsible for any delay in the work due to any suspension under this item."**

## SECTION 660
## ON-THE-JOB TRAINING

660.06 Method of Measurement

Remove the first sentence in its entirety and replace with " **The OJT item will be measured by the number of OJT hours by a trainee who has successfully completed an approved training program.**"

660.07 Basis of payment to the Contractor

Remove the last word in the first sentence so that the first sentence reads " The OJT shall be paid for once successfully completed at the contract unit price per **hour**."

Payment will be made under

Change the Pay Item from "660.22" to "**660.21**" and change the Pay Unit from "Each" to "**Hour**".

## SECTION 672
## PRECAST CONCRETE BLOCK GRAVITY WALL

672.035 Backfill Material– Revise this section by adding the following after the second paragraph:

**Backfill materials shall meet the criteria in the following table.**

| Base Polymer | Property | Criteria | Test Method |
|---|---|---|---|
| Polyester (PET) | pH | 3< pH > 9 | AASHTO T-289 |
| Polyolefin (PP & HDPE) | pH | pH > 3 | AASHTO T-289 |

672.04 Design Requirements – Revise this section by replacing items 2 and 3 in the second paragraph with the following:

**2. FHWA-NHI-10-024 and FHWA-NHI-10-025, Design and Construction of Mechanically Stabilized Earth Walls and Reinforced Soil Slopes, Volumes I and II, current edition.**

**3. FHWA-NHI-09-087 Corrosion/Degradation of Soil Reinforcements for Mechanically Stabilized Earth Walls and Reinforced Soil Slopes, current edition.**

## SECTION 673
## WETCAST SMALL LANDSCAPE BLOCK WALL

673.035 Backfill Material – Revise this section by adding the following after the second paragraph:

**Backfill materials shall meet the criteria in the following table.**

| Base Polymer | Property | Criteria | Test Method |
|---|---|---|---|
| Polyester (PET) | pH | 3< pH > 9 | AASHTO T-289 |
| Polyolefin (PP & HDPE) | pH | pH > 3 | AASHTO T-289 |

673.04 Design Requirements – Revise this section by replacing items 2 and 3 in the second paragraph with the following:

**2. FHWA-NHI-10-024 and FHWA-NHI-10-025, Design and Construction of Mechanically Stabilized Earth Walls and Reinforced Soil Slopes, Volumes I and II, current edition.**

**3. FHWA-NHI-09-087 Corrosion/Degradation of Soil Reinforcements for Mechanically Stabilized Earth Walls and Reinforced Soil Slopes, current edition**

# SECTION 674
# PREFABRICATED CONCRETE MODULAR GRAVITY WALL

674.02 Materials
Amend this section by adding the following after "Concrete Units:" and before the paragraph beginning with "Tolerances ".

**Concrete shall be Class P. The concrete shall contain a minimum of 5.5 gallons per cubic yard of calcium nitrite solution.**

**The minimum permeability of the concrete as indicated by Surface Resistivity shall be 17 KOhm-cm.**

**Defects Defects which may cause rejection of precast units include, but are not limited to, the following:**
**Any discontinuity (crack, rock pocket, etc.) of the concrete which could allow moisture to reach the reinforcing steel.**
**Rock pockets or honeycomb over 6 square inches in area or over 1 inch deep.**
**Edge or corner breakage exceeding 12 inches in length or 1 inch in depth.**
**Any other defect that clearly and substantially impacts the quality, durability, or maintainability of the structure, as determined by the Fabrication Engineer.**

**Repair honeycombing, ragged or irregular edges and other non-structural or cosmetic defects using a patching material from the MaineDOT Qualified Products List (QPL). The repair, including preparation of the repair area, mixing and application and curing of the patching material, shall be in accordance with the manufacturer's product data sheet. Corners that are not exposed in the final product may be ground smooth with no further repair necessary if the depth of the defect does not exceed 1/2 inch. Remove form ties and other hardware to a depth of not less than 1 inch from the face of the concrete and patch the holes using a patching material from the MaineDOT QPL.**

**Repair structural defects only with the approval of the Fabrication Engineer. Submit a nonconformance report (NCR) to the Fabrication Engineer with a proposed repair procedure. Do not perform structural repairs without an NCR that has been reviewed by the Fabrication Engineer. Structural defects include, but are not be limited to, exposed reinforcing steel or strand, cracks in bearing areas, through cracks and cracks 0.013 inch in width that extend more than 12 inches in length in any direction. Give the QAI adequate notice prior to beginning any structural repairs.**

# SECTION 677
# MECHANICALLY STABILIZED EARTH RETAINING WALL

677.03 Design Requirements – Revise this section by replacing items 6, 7 and 8 in the second paragraph with the following:

**6. FHWA-NHI-10-024, Design and Construction of Mechanically Stabilized Earth Walls and Reinforced Soil Slopes, Volumes I, current edition.**

**7. FHWA-NHI-10-025, Design and Construction of Mechanically Stabilized Earth Walls and Reinforced Soil Slopes, Volumes II, current edition.**

**8. FHWA-NHI-09-087 Corrosion/Degradation of Soil Reinforcements for Mechanically Stabilized Earth Walls and Reinforced Soil Slopes, current edition**

On page 6 - 203 change "636.041" to "677.041"

**Amend 677.042 Precast Panel Tolerances and Surface Finish by the addition of the following:**

**Defects Defects which may cause rejection of precast units include, but are not limited to, the following:**

**Any discontinuity (crack, rock pocket, etc.) of the concrete which could allow moisture to reach the reinforcing steel.**
**Rock pockets or honeycomb over 6 square inches in area or over 1 inch deep.**
**Edge or corner breakage exceeding 12 inches in length or 1 inch in depth.**
**Any other defect that clearly and substantially impacts the quality, durability, or maintainability of the structure, as determined by the Fabrication Engineer.**

**Repair honeycombing, ragged or irregular edges and other non-structural or cosmetic defects using a patching material from the MaineDOT Qualified Products List (QPL). The repair, including preparation of the repair area, mixing and application and curing of the patching material, shall be in accordance with the manufacturer's product data sheet. Corners that are not exposed in the final product may be ground smooth with no further repair necessary if the depth of the defect does not exceed 1/2 inch. Remove form ties and other hardware to a depth of not less than 1 inch from the face of the concrete and patch the holes using a patching material from the MaineDOT QPL.**

**Repair structural defects only with the approval of the Fabrication Engineer. Submit a nonconformance report (NCR) to the Fabrication Engineer with a proposed repair procedure. Do not perform structural repairs without an NCR that has been reviewed by the Fabrication Engineer. Structural defects include, but are not be limited to, exposed reinforcing steel or strand, cracks in bearing areas, through cracks and cracks 0.013 inch in width that extend more than 12 inches in length in any direction. Give the QAI adequate notice prior to beginning any structural repairs.**

## SECTION 702
## BITUMINOUS MATERIAL

702.01 Asphalt Cement - Remove this section in its entirety and replace with the following:
**Performance-Graded Asphalt Binder (PGAB) that has not been modified with polymer shall**

**conform to the requirements of AASHTO M 320. Polymer modified binder shall meet the requirements of AASHTO M 332 (including Appendix X1), except that the percent difference in nonrecoverable creep compliance, Jnrdiff, shall not be enforced. Performance-Graded Asphalt Binder shall not contain re-refined engine oil bottoms (REOB).**
**The Contractor shall arrange for the Supplier to furnish the following items to the Department's Asphalt Pavement Engineer:**
**a. A Quality Control Plan that conforms to the requirements of AASHTO R 26 "Certifying Suppliers of Performance-Graded Asphalt Binders" and**

**b. A CERTIFICATE OF ANALYSIS for all asphalt materials furnished for use on the project. The Certificate shall include the actual test results of the material in storage from which the shipments are being made. Certificates shall be supplied for each lot, batch, or blend of each type and grade of material. A new certificate shall be issued at least every 30 days or upon receiving or manufacture of a new material. The original of each Certificate of Analysis shall be mailed to the Departments Asphalt Pavement Engineer.**

**The Contractor shall give the supplier sufficient notice of orders to permit testing and certification. Material not certified will not be accepted for use.**
**Deliveries of asphalt materials shall be accompanied by a Bill of Lading containing the information required under Section l08.1.3 f. The Bill of Lading shall include the applicable certificate number and shall include a printed or stamped statement such as the following: "THIS IS TO CERTIFY THAT THE ASPHALT MATERIAL REPRESENTED BY THIS LOADING INVOICE CONFORMS TO THE SPECIFICATIONS OF THE PURCHASER FOR THE MATERIAL TYPE AND GRADE STATED THEREON."**
**In the event an intermediate hauler of the asphalt material is involved, a copy of their own delivery slip shall be furnished, as well as a copy of the supplier's loading invoice. The hauler's delivery slip and the supplier's loading invoice shall be cross-referenced by use of their respective serial numbers.**
**All non-bituminous components added to the binder prior to the sampling point for binder certification shall be included on the asphalt binder Certificate of Analysis identifying their presence. All non-bituminous components added after the certification sampling point and prior to transport shall be included on the Bill of Lading. All non-bituminous components added to the binder at the HMA plant shall be identified on the mix plant documentation and accompanied by test results and certification showing the effect of the additives introduced, if any.**

702.04 Emulsified Asphalt

Revise this Section by removing the first paragraph in its entirety and replace with the following:

**Emulsified Asphalt shall conform to the requirements of AASHTO M 140. Cationic emulsified asphalt shall conform to the requirements of AASHTO M 208. Anionic emulsified asphalt Grade RS-1h shall conform to the requirements in the following table:**

| Type | Rapid-Setting | |
|---|---|---|
| Grade | RS-1h | |
| Tests on Emulsions | min | max |
| Viscosity, Saybolt Furol at 25°C SFS | 20 | 100 |
| Storage Stability test, 24-h, %[A] | - | 1.0 |
| Demulsibility, 35 ml, 0.02 *N* $CaCl_2$, % | 60 | - |
| Sieve Test, %[A] | - | 0.10 |
| Residue by distillation, % | 55 | - |
| Tests on Residue from Distillation Test | min | max |
| Penetration, 25°C 100g, 5 s | 40 | 90 |
| Ductility, 25°C 5 cm/min, cm | 40 | - |
| Solubility in trichloroethylene or n-propyl bromide, % | 97.5 | - |

[A] **This requirement is waived if successful application of material has been achieved in the field.**

## SECTION 703
## AGGREGATES

703.01 Fine Aggregate for Concrete Replace the second paragraph with the following:

**"All fine aggregate shall be free from injurious amounts of organic impurities. Should the fine aggregate, when subjected to the colorimetric test for organic impurities, AASHTO T 21, produce a color darker than organic plate number 3, the fine aggregate shall be rejected."**

**703.0201 Alkali Silica Reactive Aggregates.** Remove this section in its entirety and replace with the following:

**All coarse and fine aggregates proposed for use in concrete shall be tested for Alkali Silica Reactivity (ASR) potential under AASHTO T 303 (ASTM C 1260), Accelerated Detection of Potentially Deleterious Expansion of Mortar Bars Due to Alkali-Silica Reaction, prior to being accepted for use. Acceptance will be based on testing performed by an accredited independent lab submitted to the Department. Aggregate submittals will be required on a 5-year cycle, unless the source or character of the aggregate in question has changed within 5 years from the last test date.**

**As per AASHTO T 303 (ASTM C 1260): Use of a particular coarse or fine aggregate will be allowed with no restrictions when the mortar bars made with this aggregate expand less than or equal to 0.10 percent at 30 days from casting. Use of a particular coarse or fine aggregate will be classified as potentially reactive when the mortar bars made with this aggregate expand greater than 0.10 percent at 30 days from casting. Use of this aggregate will only be allowed with the use of cement-pozzolan blends and/or chemical admixtures that result in mortar bar expansion of less than 0.10 percent at 30 days from casting as tested under ASTM C 1567.**

**Acceptable pozzolans and chemical admixtures that may be used when an aggregate is classified as potentially reactive include, but are not limited to the following:**

**Class F Coal Fly Ash meeting the requirements of AASHTO M 295.**
**Ground Granulated Blast Furnace Slag (Grade 100 or 120) meeting the requirements of AASHTO M 302.**

**Densified Silica Fume meeting the requirements of AASHTO M 307.**
**Lithium based admixtures**
**Metakaolin**

**Pozzolans or chemical admixtures required to offset the effects of potentially reactive aggregates will be incorporated into the concrete at no additional cost to the Department.**

703.06 Aggregate for Base and Subbase - Remove the first two paragraphs in their entirety and replace with these:
"**The following shall apply to Sections (a.) and (c.) below. The material shall have a Micro-Deval value of 25.0 or less as determined by AASHTO T 327. If the Micro- Deval value exceeds 25.0, the Washington State Degradation DOT Test Method T113, Method of Test for Determination of Degradation Value (January 2009 version) shall be performed, except that the test shall be performed on the portion of the sample that passes the ½ in sieve and is retained on the No. 10 sieve. If the material has a Washington Degradation value of less than 15, the material shall be rejected.**

**The material used in Section (b.) below shall have a Micro-Deval value of 25.0 or less as determined by AASHTO T 327. If the Micro-Deval value exceeds 25.0 the material may be used if it does not exceed 25 percent loss on AASHTO T 96, Resistance to Degradation of Small-Size Coarse Aggregate by Abrasion and Impact in the Los Angeles Machine.** "

703.081 RAP for Asphalt Pavement
Remove this section in its entirety and replace with the following:

**703.081 RAP for Asphalt Pavement Recycled Asphalt Pavement (RAP) may be introduced into hot-mix asphalt pavement at percentages approved by the Department according to the MaineDOT Policies and Procedures for HMA Sampling and Testing.**

**If approved by the Department, the Contractor shall provide documentation stating the source, test results for average residual asphalt content, and stockpile gradations showing RAP materials have been sized to meet the maximum aggregate size requirements of each mix designation. The Department will obtain samples for verification and approval prior to its use.**

**The maximum allowable percent of RAP shall be determined by the asphalt content, the percent passing the 0.075 mm sieve, the ratio between the percent passing the 0.075 mm sieve and the asphalt content, and Coarse Micro-Deval loss values as tested by the Department. The maximum percentage of RAP allowable shall be the lowest percentage as determined according to Table 4 below:**

**Table 4: Maximum Percent RAP According to Test Results**

| Classification | Maximum RAP Percentage Allowed | Asphalt content standard deviation | Percent passing 0.075 mm sieve standard deviation | Percent passing 0.075 mm sieve / asphalt content ratio | Residual aggregate M-D loss value |
|---|---|---|---|---|---|
| Class III | 10% | ≤ 1.0 | N/A | ≤ 4.0 | ≤ 18 |
| Class II | 20% | ≤ 0.5 | ≤ 1.0 | ≤ 2.8 | |
| Class I | 30% | ≤ 0.3 | ≤ 0.5 | ≤ 1.8 | |

**The Department will monitor RAP asphalt content and gradation during production by testing samples from the stockpile at approximately 15,000 T intervals (in terms of mix production). The allowable variance limits (from the numerical average values used for mix designs) for this testing are determined based upon the maximum allowable RAP percentage, and are shown below in Table 5.**

**Table 5: RAP Verification Limits**

| Classification | Asphalt content (compared to aim) | Percent passing 0.075 mm sieve (compared to aim) |
|---|---|---|
| Class III | ± 1.5 | ± 2.0 |
| Class II | ± 1.0 | ± 1.5 |
| Class I | ± 0.5 | ± 0.7 |

**For specification purposes, RAP will be categorized as follows:**

**Class III – A maximum of 10.0 percent of Class III RAP may be used in any base, intermediate base, surface, or shim mixture. A maximum of 20.0 percent of Class III RAP may be used in hand-placed mixes for item 403.209.**

**Class II – A maximum of 20.0 percent Class II RAP in any base, binder, surface, or shim course.**

**Class I – A maximum of 20.0 percent Class I RAP may be used in any base, intermediate base, surface, or shim mixture without requiring a change to the specified asphalt binder. A maximum of 30.0 percent Class I RAP may be used in in any base or intermediate base mixture provided that a PG 58-28 asphalt binder is used. A maximum of 30.0 percent Class I RAP may be used in any surface or shim mixture provided that PG 58-34 or 52-34 asphalt binder is used. Mixtures exceeding 20.0 percent Class I RAP must be evaluated and approved by the Department.**

**The Contractor may use up to two different RAP sources in any one mix design. The total RAP percentage of the mix shall not exceed the maximum allowed for the highest classification RAP source used (i.e. if a Class I & Class III used, total RAP must not exceed 30.0%). The blended RAP material must meet all the requirements of the classification for which the RAP is entered (i.e. 10% Class III with 20% Class I, blend must meet Class I criteria). The Department may take belt cuts of the blended RAP to verify the material meets these requirements. If the Contractor elects to use more than one RAP source in a design, the Contractor shall provide an acceptable point of sampling blended RAP material from the feed belt.**

**In the event that RAP source or properties change, the Contractor shall notify the Department of the change and submit new documentation stating the new source or properties a minimum of 72 hours prior to the change to allow for obtaining new samples and approval.**

703.19 Granular Borrow

Remove the gradation requirements table, and replace with the following:

| Sieve Designation | Percentage by Weight Passing Square Mesh Sieves | |
|---|---|---|
| | Material for Underwater Backfill | Material for Embankment Construction |
| 6 inch | 100 | |
| No. 40 | 0-70 | 0-70 |
| No. 200 | 0-7.0 | 0-20.0 |

703.33 Stone Ballast - In the third paragraph, remove the words " less than" before 2.60 and add the words "or greater" after 2.60.

## SECTION 708
## PAINTS AND PRESERVATIVES

708.05 Timber Preservative Revise this section by removing it in its entirety and replacing with: "**Timber preservatives shall conform to the requirements of AASHTO M 133 and AWPA Standard U1. All preservatives shall meet the requirements of the US EPA regulations under the Federal Insecticide, Fungicide and Rodenticide Act."**

## SECTION 710
## FENCE AND GUARDRAIL

710.07 Guardrail Posts Amend subsection 'a' by removing the words "white oak", "cedar", "tamarack", "maple", "beech", "birch" and "red oak" from the first sentence. Also in the first sentence, place an "**or**" between "pine" and "eastern hemlock". In the second sentence remove the words "well seasoned". Remove the sentence beginning with "Wood posts and offset brackets…" and replace it with: "**Wood posts and offset brackets shall be preservative treated in accordance with the requirements of AASHTO M 133 and AWPA U1, UC4A Commodity Specification A: Sawn Products**."

## SECTION 712
## MISCELLANEOUS HIGHWAY MATERIAL

712.061- Structural Precast Concrete Units

Under the heading, Quality Control and Quality Assurance, revise the fourth paragraph to read:

**"Acceptance is the prerogative of the Department. The Department will conduct Quality Assurance (QA) in accordance with Standard Specification Subsection 106.5. Testing deemed necessary by the Department that is in addition to the minimum testing requirements will be scheduled to minimize interference with the production schedule. The QAI will perform acceptance sampling and testing and will witness or review documentation, workmanship and testing to assure the Work is being performed in accordance with the Contract Documents."**

Under the heading, Concrete Testing, revise the first paragraph to read as the following two paragraphs:

**"Concrete Testing Acceptance of structural precast units, for each day's production, will be determined by the Department, based on compliance with this specification and satisfactory concrete testing results.**

**At least once per week, the QAI will make 2 concrete cylinders (6 cylinders when the Contract includes permeability requirements) for use by the Department; cylinders shall be standard cured in accordance with AASHTO T23 (ASTM C31). The QAI will perform entrained air content and slump flow testing, determine water-cement ratio and determine temperature of the sampled concrete at the time of cylinder casting. All testing equipment required by the QAI to perform this testing shall be in accordance with Standard Specification Section 502.041, Testing Equipment. In addition, the Contractor shall provide a slump cone meeting the requirements of AASHTO T 119. Providing and maintaining testing and curing equipment shall be considered incidental to the work and no additional payment will be made.**

**Quality Control test cylinders shall be made and tested in accordance with the following standards:**

**AASHTO T 22 (ASTM C39) Test Method for Compressive Strength of Cylindrical Concrete Specimens**

**AASHTO T23 (ASTM C31) Practice for Making and Curing Concrete Test Specimens in Field**

**AASHTO T141 (ASTM C172) Practice for Sampling Freshly Mixed Concrete**
**AASHTO T152 (ASTM C231) Test Method for Air Content of Freshly Mixed Concrete by the Pressure Method**
**AASHTO T196 (ASTM C173) Standard Test Method for Air Content of Freshly Mixed Concrete by the Volumetric Method**
**ASTM C1064 Test Method for Temperature of Freshly mixed Portland Cement Concrete**
**ASTM C1611 Standard Test Method for Slump Flow of Self-Consolidating Concrete"**

Under the heading, Concrete Testing, **delete** the paragraph that begins:
"At least once per week, the Contractor shall make 2 concrete cylinders..…for use by the Department….."

## SECTION 713
## STRUCTURAL STEEL AND RELATED MATERIAL

Section 713.01- Structural Steel Revise this Section by removing the sentence:
" Impact test sampling and testing procedures shall be in accordance with AASHTO T."
And replace it with: **"Impact test sampling and testing procedures shall be in accordance with AASHTO T 243 M/T 243 and AASHTO T 244."**

## SECTION 717
## ROADSIDE IMPROVEMENT MATERIAL

717.02 Agricultural Ground Limestone

In the table after the third paragraph which starts with "Liquid lime…" change the Specification for Nitrogen (N) from "15.5 percent of which 1% is from ammoniac nitrogen and 14.5 /5 is from Nitrate Nitrogen" to read "**15.5 % of which 1% is from Ammoniacal Nitrogen and 14.5 % is from Nitrate Nitrogen**"

717.061 Erosion Control Blankets Revise this section by removing it in its entirety and replacing it with the following:

"**717.061 Erosion Control Blankets Shall consist of a machine produced rolled blanket of biodegradable fibers, evenly distributed over the entire area of blanket, of a consistent thickness, sewn into a biodegradable mesh on the top and bottom surface using a cotton blend thread. The blanket shall remain in place when subject to shear stress of 1.55 lb/ft$^2$. The blanket shall remain intact until grass is established. The blanket shall be a product currently listed on the department's Qualified Products List (QPL) of Erosion Control Products. See Section 618.10 - Seeding, Maintenance and Acceptance."**

## SECTION 720
## STRUCTURAL SUPPORTS FOR HIGHWAY SIGNS, LUMINAIRES AND TRAFFIC SIGNALS

720.10 Wood Utility Pole Amend the first sentence in this section by adding "**, Red Pine**" after "Douglas Fir".

Replace the paragraph beginning with "Wood Utility poles…" with:
"**Wood Utility poles shall be pressure treated, after fabrication in accordance with AASHTO Specifications M 133 and AWPA U1, UC4B, Commodity Specification D: Poles**."

720.12 Wood Sign Posts Remove the first sentence and replace with "**Wood sign posts shall be rectangular, straight and sound timber, cut from live growing native spruce, red pine, hemlock or cedar trees, free from loose knots or other structurally weakening defects of importance, such as shake or holes or heart rot**."

Remove the paragraph beginning with "When pressure treated sign posts are called for on the plans …" with "**When pressure treated sign posts are called for on the plans, the wood shall be Yellow Pine, Number 2 or better, or the species listed above. The pressure treated wood shall meet AASHTO M 133 and AWPA Standard U1, UC4A, Commodity Specification A: Sawn Products.**"

# APPENDIX A TO DIVISION 100

## SECTION 1 - BIDDING PROVISIONS

A. Federally Required Certifications By signing and delivering a Bid, the Bidder certifies as provided in all certifications set forth in this Appendix A - Federal Contract Provisions Supplement including:

- Certification Regarding No Kickbacks to Procure Contract as provided on this page 1 below.
- Certification Regarding Non-collusion as provided on page 1 below.
- Certification Regarding Non-segregated Facilities as provided by FHWA Form 1273, section III set forth on page 21 below.
- "Certification Regarding Debarment, Suspension, Ineligibility and Voluntary Exclusion" as provided by FHWA Form 1273, section XI set forth on page 32 below.
- "Certification Regarding Use of Contract Funds for Lobbying" as provided by FHWA Form 1273, section XII set forth on page 35 below.

Unless otherwise provided below, the term "Bidder", for the purposes of these certifications, includes the Bidder, its principals, and the person(s) signing the Bid. Upon execution of the Contract, the Bidder (then called the Contractor) will again make all the certifications indicated in this paragraph above.

CERTIFICATION REGARDING NO KICKBACKS TO PROCURE CONTRACT Except expressly stated by the Bidder on sheets submitted with the Bid (if any), the Bidder hereby certifies, to the best of its knowledge and belief, that it has not:

(A) employed or retained for a commission, percentage, brokerage, contingent fee, or other consideration, any firm or person (other then a bona fide employee working solely for me) to solicit or secure this contract;

(B) agreed, as an express or implied condition for obtaining this contract, to employ or retain the services of any firm or person in connection with carrying out the contract, or;

C) paid, or agreed to pay, to any firm, organization, or person (other than a bona fide employee working solely for me) any fee, contribution, donation, or consideration of any kind for, or in connection with, procuring or carrying out the contract;

By signing and submitting a Bid, the Bidder acknowledges that this certification is to be furnished to the Maine Department of Transportation and the Federal Highway Administration, U.S. Department of Transportation in connection with this contract in anticipation of federal aid highway funds and is subject to applicable state and federal laws, both criminal and civil.

CERTIFICATION REGARDING NONCOLLUSION Under penalty of perjury as provided by federal law (28 U.S.C. §1746), the Bidder hereby certifies, to the best of its knowledge and belief, that:

> the Bidder has not, either directly or indirectly, entered into any agreement, participated in any collusion, or otherwise taken any action in restraint of competitive bidding in connection with the Contract.

For a related provisions, see Section 102.7.2 (C) of the Standard Specifications - "Effects of Signing and Delivery of Bids" - "Certifications", Section 3 of this Appendix A entitled "Other Federal Requirements" including section XI - "Certification Regarding Debarment, Suspension, Ineligibility, and Voluntary Exclusion" and section XII. - "Certification Regarding Use of Contract Funds for Lobbying."

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B. Bid Rigging Hotline To report bid rigging activities call: **1-800-424-9071**

The U.S. Department of Transportation (DOT) operates the above toll-free "hotline" Monday through Friday, 8:00 a.m. to 5:00 p.m., eastern time. Anyone with knowledge of possible bid rigging, bidder collusion, or other fraudulent activities should use the "hotline" to report such activities.

The "hotline" is part of the DOT's continuing effort to identify and investigate highway construction contract fraud and abuse and is operated under the direction of the DOT Inspector General. All information will be treated confidentially and caller anonymity will be respected.

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## SECTION 2 - FEDERAL EEO AND CIVIL RIGHTS REQUIREMENTS

Unless expressly otherwise provided in the Bid Documents, the provisions contained in this Section 2 of this "Federal Contract Provisions Supplement" are hereby incorporated into the Bid Documents and Contract.

A. Nondiscrimination & Civil Rights - Title VI The Contractor and its subcontractors shall not discriminate on the basis of race, color, national origin, or sex in the performance of this Contract. The Contractor shall carry out applicable requirements of 49 CFR Part 26 in the award and administration of DOT assisted contracts. Failure by the Contractor to carry out these requirements is a material breach of this contract, which may result in the termination of this contract or such other remedy as the Department deems appropriate. The Contractor and subcontractors shall comply with Title VI of the Civil Rights Act of 1964, as amended, and with all State of Maine and other Federal Civil Rights laws.

For related provisions, see Subsection B - "Nondiscrimination and Affirmative Action - Executive Order 11246" of this Section 2 and Section 3 - Other Federal Requirements of this "Federal Contract Provisions Supplement" including section II - "Nondiscrimination" of the "Required Contract Provisions, Federal Aid Construction Contracts", FHWA-1273.

B. Nondiscrimination and Affirmative Action - Executive Order 11246 Pursuant to Executive Order 11246, which was issued by President Johnson in 1965 and amended in 1967 and 1978, this Contract provides as follows.

The Contractor shall take specific affirmative actions to ensure equal employment opportunity. The evaluation of the Contractor's compliance with these specifications shall be based upon its efforts to achieve maximum results from its actions. The Contractor shall document these efforts fully, and shall implement affirmative action steps at least as extensive as the following:

Ensure and maintain a working environment free of harassment, intimidations, and coercion at all sites, and in all facilities at which the Contractor's employees are assigned to work. The Contractor, where possible, will assign two or more women to each construction project. The Contractor shall specifically ensure that all forepersons, superintendents, and other on-site supervisory personnel are aware of and carry out the Contractor's obligation to maintain such a working environment, with specific attention to minority or female individuals working at such sites or in such facilities.

Establish and maintain a current list of minority and female recruitment sources, provide written notification to minority and female recruitment sources and to community organizations when the Contractor or its union have employment opportunities available, and to maintain a record of the organization's responses.

Maintain a current file of the names, addresses and telephone numbers of each minority and female off-the-street applicant and minority or female referral from a union, a recruitment source or community organization and of what action was taken with respect to each such individual. If such individual was sent to the union hiring hall for referral and was not referred back to the Contractor by the union or, if referred, not employed by the Contractor, this shall be documented in the file with the reason therefore, along with whatever additional actions the Contractor may have taken.

Provide immediate written notification to the Department's Civil Rights Office when the union or unions with which the Contractor has a collective bargaining agreement has not referred to the Contractor a minority person or woman sent by the Contractor, or when the Contractor has other information that the union referral process has impeded the Design-Builder's efforts to meet its obligations.

Develop on-the-job training opportunities and/or participate in training programs for the area which expressly include minorities and women, including upgrading programs and apprenticeship and trainee programs relevant to the Contractor's employment needs, especially those programs funded or approved by the Department of Labor. The Contractor shall provide notice of these programs to the sources compiled under B above.

Disseminate the Contractor's EEO policy by providing notice of the policy to unions and training programs and requesting their cooperation in assisting the Contractor in meeting its EEO obligation; by including it in any policy manual and collective bargaining agreement; by publicizing it in the company newspaper, annual report, etc.; by specific review of the policy with all management personnel and with all minority and female employees at least once a year; and by posting the company EEO policy on bulletin boards accessible to all employees at each location where construction work is performed.

Review, at least annually, the company's EEO policy and affirmative action obligations under these specifications with all employees having any responsibility for hiring, assignment, layoff, termination, or other employment decisions including specific review of these items with on-site supervisory personnel such as Superintendents, General Forepersons, etc., prior to the initiation of construction work at any job site. A written record shall be made and maintained identifying the time and place of these meetings, persons attending, subject matter discussed, and disposition of the subject matter.

Disseminate the Contractor's EEO policy externally by including it in any advertising in the news media, specifically including minority and female news media, and providing written notification to and discussing the Contractor's EEO policy with other Contractor's and Subcontractors with whom the Contractor does or anticipates doing business.

Direct its recruitment efforts, both orally and written to minority, female and community organizations, to schools with minority and female students and to minority and female recruitment and training organizations serving the Contractor's recruitment area and employment needs. Not later that one month prior to the date for the acceptance of applications for apprenticeship or other training by any recruitment source, the Contractor shall send written notification to organizations such as the above describing the openings, screenings, procedures, and test to be used in the selection process.

Encourage present minority and female employees to recruit other minority persons and women and, where reasonable, provide after school, summer and vacation employment to minority and female youth, both on the site and in other areas of a Contractor's workforce.

Validate all tests and other selection requirements.

Conduct, at least annually, an inventory and evaluation at least of all minority and female personnel for promotional opportunities and encourage these employees to seek or to prepare for, through appropriate training, etc., such opportunities.

Ensure that seniority practices, job classifications, work assignments and other personnel practices, do not have a discriminatory effect by continually monitoring all personnel and employment related activities to ensure that the EEO policy and the Contractor's obligations under these specifications are being carried out.

Ensure that all facilities and company activities are non segregated except that separate or single-user toilet and necessary changing facilities shall be provided to assure privacy between the sexes.

Document and maintain a record of all solicitations of offers for subcontracts from minority and female construction Contractor's and suppliers, including circulation of solicitations to minority and female Contractor associations and other business associations.

Conduct a review, at least annually, of all supervisors' adherence to and performance under the Contractor's EEO policies and affirmative action obligations.

C. Goals for Employment of Women and Minorities Per Executive Order 11246, craft tradesperson goals are 6.9% women and .5% minorities employed. However, goals may be adjusted upward at the mutual agreement of the Contractor and the Department. Calculation of these percentages shall not include On-the-Job Training Program trainees, and shall not include clerical or field clerk position employees.

For a more complete presentation of requirements for such Goals, see the federally required document "Goals for Employment of Females and Minorities" set forth in the next 6 pages below.

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Start of GOALS FOR EMPLOYMENT OF FEMALES AND MINORITIES
Federally Required Contract Document

§60-4.2 Solicitations

(d) The following notice shall be included in, and shall be part of, all solicitations for offers and bids on all Federal and federally assisted construction contracts or subcontracts in excess of $10,000 to be performed in geographical areas designated by the Director pursuant to §60-4.6 of this part (see 41 CFR 60-4.2(a)):

Notice of Requirement for Affirmative Action to Ensure Equal Opportunity (Executive Order 11246)

1. The Offeror's or bidder's attention is called to the "Equal Opportunity Clause" and the "Standard Federal Equal Employment Specifications" set forth herein.

2. The goals and timetables for minority and female participation, expressed in percentage terms for the Contractor's aggregate work force in each trade on all construction work in the covered area, are as follows:

| | |
|---|---|
| Goals for female participation in each trade | 6.9% |

Goals for minority participation for each trade

| | |
|---|---|
| Maine | |
| 001 Bangor, ME | 0.8% |
| Non-SMSA Counties (Aroostook, Hancock, Penobscot, Piscataquis, Waldo, Washington) | |
| 002 Portland-Lewiston, ME | |
| SMSA Counties: 4243 Lewiston-Auburn, ME (Androscoggin) | 0.5% |
| 6403 Portland, ME (Cumberland, Sagadahoc) | 0.6% |

Non-SMSA Counties: 0.5%
(Franklin, Kennebec, Knox, Lincoln, Oxford, Somerset, York)

These goals are applicable to all the Contractor's construction work (whether or not it is Federal or federally assisted) performed in the covered area. If the contractor performs construction work in a geographical area located outside of the covered area, it shall apply the goals established for such geographical area where the work is actually performed. With regard to this second area, the contractor also is subject to the goals for both its federally involved and non federally involved construction.

The contractor's compliance with the Executive Order and the regulations in 41 CFR Part 60-4 shall be based on its implementation of the Equal Opportunity Clause, specific affirmative action obligations required by the specifications set forth in 41 CFR 60-4.3(a), and its efforts to meet the goals. The hours of minority and female employment and training must be substantially uniform throughout the length of the contract, and in each trade, and the contractor shall make a good faith effort to employ minorities and women evenly on each of its projects. The transfer of minority or female employees or trainees from Contractor to Contractor or from project to project for the sole purpose of meeting the Contractor's goals shall be in violation of the contract, the Executive Order and the regulations in 41 CFR Part 60-4. Compliance with the goals will be measured against the total work hours performed.

3. The Contractor shall provide written notification to the Director of the Office of Federal Contract Compliance Programs within 10 working days of award of any construction subcontract in excess of $10,000 at any tier for construction work under the contract resulting from this solicitation. The notification shall list the name, address and telephone number of the subcontractor, employer identification number of the subcontractor, estimated dollar amount of the subcontract; estimated started and completion dates of the subcontract; and the geographical area in which the subcontract is to be performed.

4. As used in this Notice, and in the Contract resulting from this solicitation, the "covered area" is (insert description of the geographical areas where the contract is to be performed giving the state, county and city, if any).

## STANDARD FEDERAL EQUAL EMPLOYMENT OPPORTUNITY CONSTRUCTION CONTRACT SPECIFICATIONS (EXECUTIVE ORDER 11246)

1. As used in these specifications:

   a. "Covered area" means the geographical area described in the solicitation from which this contract resulted;

   b. "Director" means Director, Office of Federal Contract Compliance Programs, United States Department of Labor, or any person to whom the Director delegates authority;

   c. "Employer identification number" means the Federal Social Security number used on the Employer's Quarterly Federal Tax Return, U.S. Treasury Department form 941;

   d. "Minority" includes:

(i) Black (all persons having origins in any of the Black African racial groups not of Hispanic origin);
(ii) Hispanic (all persons of Mexican, Puerto Rican, Cuban, Central or South American or other Spanish Culture or origin, regardless of race);
(iii) Asian and Pacific Islander (all persons having origins in any of the original peoples of the Far East, Southeast Asia, the Indian Subcontinent, or the Pacific Islands); and
(iv) American Indian or Alaskan Native (all persons having origins in any of the original peoples of the North America and maintaining identifiable tribal affiliations through membership and participation or community identification).

2. Whenever the Contractor, or any subcontractor at any tier, subcontracts a portion of the work involving any construction trade, it shall physically include in each subcontract in excess of $10,000 the provisions of these specifications and the Notice which contains the applicable goals for minority and female participation and which is set forth in the solicitations from which this contract resulted.

3. If the contractor, is participating (pursuant to 41 CFR 60-4.5) in a Hometown Plan approved by the U.S. Department of Labor in the covered area either individually or through an association, its affirmative action obligations on all work in the Plan area (including goals and timetables) shall be in accordance with that Plan for those trades which have unions participating in the Plan. Contractors must be able to demonstrate their participation in and compliance with the provisions of any such Hometown Plan. Each Contractor or Subcontractor participating in an approved Plan is individually required to comply with its obligations under the EEO clause, and to make a good faith effort to achieve each goal under the Plan in each trade in which it has employees. The overall good faith performance by other Contractors for Subcontractors toward a goal in an approved Plan does not excuse any covered Contractor's or Subcontractor's failure to take good faith efforts to achieve the Plan goals and timetables.

4. The Contractor shall implement the specific affirmative action standards provided in paragraphs 7 a. through p. of these specifications. The goals set forth in the solicitation from which this contract resulted are expressed as percentages of the total hours of employment and training of minority and female utilization the Contractor should reasonably be able to achieve in each construction trade in which it has employees in contractors performing construction work in geographical areas where they do not have a Federal or federally assisted construction contract shall apply the minority and female goals established for the geographical areas where the work is being performed. Goals are published periodically in the Federal Register in notice form and such notices may be obtained from any Office of Federal Contract Compliance Programs office or from Federal procurement contracting officers. The Contractor is expected to make substantially uniform progress in meeting its goals in each craft during the period specific.

5. Neither the provisions of any collective bargaining agreement, nor the failure by a union with whom the Contractor has a collective bargaining agreement, to refer either minorities or women shall excuse the Contractor's obligations under these specifications, Executive Order 11246, or the regulations promulgated pursuant, thereto.

6. In order for the non working training hours of apprentices and trainees to be counted in meeting the goals, such apprentices and trainees must be employed by the Contractor during the training period, and the Contractor must have made a commitment to employ the apprentices and trainees at the completion of their training, subject to the availability of employment opportunities. Trainees must be trained pursuant to training programs approved by the U.S. Department of Labor.

7. The Contractor shall take specific affirmative actions to ensure equal employment opportunity. The evaluation of the Contractor's compliance with these specifications shall be based upon its effort to achieve maximum results from its actions. The Contractor shall document these efforts fully, and shall implement affirmative action steps at least as expensive as the following:

   a. Ensure and maintain a working environment free of harassment, intimidation, coercion at all sites, and in all facilities at which the Contractor's employees are assigned to work. The Contractor, when possible, will assign two or more women to each construction project. The Contractor shall specifically ensure that all foremen, superintendents, and other on-site supervisory personnel are aware of and carry out the Contractor's obligation to maintain such a working environment, with specific attention to minority or female individuals working at such sites or in such facilities.

   b. Establish and maintain a current list of minority and female recruitment sources provide written notification to minority and female recruitment sources and to community organizations when the Contractor or its unions have employment opportunities available, and maintain a record of the organization's responses.

   c. Maintain a current file of the names, addresses and telephone numbers of each minority and female off-the-street applicant and minority or female referral from a union, a recruitment sources or community organization and of what action was taken with respect to each such individual. If such individual was sent to the union hiring hall for referral and was not referred back to the Contractor by the union or, if referred, not employed by the Contractor, this shall be documented in the file with the reason therefore, along with whatever additional actions the Contractor may have taken.

   d. Provide immediate written notification to the Director when the union or unions with which the Contractor has a collective bargaining agreement has not referred to the Contractor a minority person or woman sent by the Contractor, or when the Contractor has other information that the union referral process has impeded the Contractor's efforts to meet its obligations.

   e. Develop on-the-job training opportunities and/or participate in training programs for the area which expressly include minorities and women, including upgrading programs and apprenticeship and trainee programs relevant to the Contractor's employment needs, especially those programs funded or approved by the Department of Labor. The Contractor shall provide notice of these programs to the sources complied under 7b above.

f. Disseminate the Contractor's EEO policy by providing notice of the policy to unions and training programs and requesting their cooperation in assisting the Contractor in meeting its EEO obligations; by including in any policy manual and collective bargaining agreement; by publicizing it in the company newspaper, annual report, etc.; by specific review of the policy with all management personnel and with all minority and female employees at least once a year; and by posting the company EEO policy on bulletin boards accessible to all employees at each location where construction work is performed.

g. Review, at least annually, the company's EEO policy and affirmative action obligations under these specifications with all employees having any responsibility for hiring, assignment, layoff, termination or other employment decisions including specific review of these items with on-site supervisory personnel such as Superintendents, General Foremen, etc., prior to the initiation of construction work at any job site. A written record shall be made and maintained identifying the time and place of these meetings, persons attending, subject matter discussed, and disposition of the subject matter.

h. Disseminate the Contractor's EEO policy externally by including it in any advertising in the news media, specifically including minority and female news media, and providing written notification to and discussing the Contractor's EEO policy with other Contractors and Subcontractors with whom the Contractor does or anticipates doing business.

i. Direct its recruitment, efforts, both oral and written, to minority, female and community organizations, to schools with minority and female students and to minority and female recruitment and training organizations serving the Contractor's recruitment area and employment needs. Not later than one month other training by any recruitment source, the Contractor shall send written notification to organizations such as the above, describing prior to the date for the acceptance of applications for apprenticeship or the openings, screening procedures, and tests to be used in the selection process.

j. Encourage present minority and female employees to recruit other minority persons and women and, where reasonable, provide after school, summer and vacation employment to minority and female youth both on site and in other areas of a Contractor's work force.

k. Validate all tests and other selection requirements where there is an obligation to do so under 41 CFR Part 60-3.

l. Conduct, at least annually, an inventory and evaluation at least of all minority and female personnel for promotional opportunities and encourage these employees to seek or to prepare for, through appropriate training, etc., such opportunities.

m. Ensure that seniority practices, job classifications, work assignments and other personnel practices, do not have a discriminatory effect by continually monitoring all personnel and employment related activities to ensure that the EEO policy and the Contractor's obligations under these specifications are being carried out.

n. Ensure that all facilities and company activities are non segregated except that separate or single-user toilet and necessary changing facilities shall be provided to assure privacy between the sexes.

o. Document and maintain a record of all solicitations of offers for subcontracts from minority and female construction contractors and suppliers, including circulation of solicitation to minority and female contractor associations and other business associations.

p. Conduct a review, at least annually, of all supervisor's adherence to and performance under the Contractor's EEO policies and affirmative action obligations.

8. Contractors are encouraged to participate in voluntary associations which assist in fulfilling one or more of their affirmative action obligations (7 a through p.). The efforts of a contractor association, joint contractor-union, contractor-community, or other similar group of which the contractor is a member and participant, may be asserted as fulfilling any one or more of its obligations under 7 a through p. of these specifications provided that the contractor actively participates in the group, makes every effort to assure that the group has a positive impact on the employment of minorities and women in the industry, ensures that the concrete benefits of the program and reflected in the Contractor's minority and female work force participation, makes a good faith effort to meet its individual goals and timetables, and can provide access to documentation which demonstrates the effectiveness of actions take on behalf of the Contractor. The obligation to comply, however, is the Contractor's and failure of such a group to fulfill an obligation shall not be a defense for the Contractor's noncompliance.

9. A single goal for minorities and a separate single goal for women have been established. The Contractor, however, is required to provide equal employment opportunity and to take affirmative action for all minority groups, both make and female, and all women, both minority and non-minority. Consequently, the Contractor may be in violation of the Executive Order if a particular group is employed in a substantially disparate manner (for example, specific minority group of women is underutilized.)

10. The Contractor shall not use the goals and timetables or affirmative action even through the Contractor has achieved its goals for women generally, the Contractor may be in violation of the Executive Order if standards to discriminate against any person because of race, color, religion, sex, or national origin.

11. The Contractor shall not enter into any Subcontract with any person or firm debarred from Government contracts pursuant to Executive Order 11246.

12. The Contractor shall carry out such sanctions and penalties for violation of these specifications and of the Equal Opportunity Clause, including suspension, termination and cancellation of existing subcontracts as may be imposed or ordered pursuant to Executive Order 11246, as amended, and its implementation regulations by the Office of Federal Contract Compliance Programs. Any Contractor who fails to carry out such sanctions and penalties shall be in violation of these specifications and Executive Order 11246, as amended.

13. The Contractor, in fulfilling its obligations under these specifications, shall implement specific affirmative action steps, at least as extensive as those standards prescribed in paragraph 7 of these specifications, so as to achieve maximum results from its efforts to ensure equal employment opportunity. If the Contractor fails to comply with the requirements of the Executive Order, the implementing regulations, or these specifications, the Director shall proceed in accordance with 41 CFR 60-4.6.

14. The Contractor shall designate a responsible official to monitor all employment related activity to ensure that the company EEO policy is being carried out, to submit reports relating to the provisions hereof as may be required by the Government and to keep records. Records shall at least include for each employee the name, address, telephone numbers, construction trade, union affiliation if any, employee identification number when assigned, social security number, race, sex, status (e.g. mechanic, apprentice, trainee, helper, or laborer), dates of changes in status, hours worked per week in the indicated trade, rate of pay, and location sat which the work was performed. Records be maintained in an easily understandable and retrievable form; however, to the degree that existing records satisfy this requirement, contractors shall not be required to maintain separate records.

15. Nothing herein provided shall be construed as a limitation upon the application of other laws which establish different standards of compliance or upon the application of requirements for the hiring of local or other area residents (e.g., those under the Public Works Employment Act of 1977 and the Community Development Block Grant Program).

End of GOALS FOR EMPLOYMENT OF FEMALES AND MINORITIES
Federally Required Contract Document

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D. Section '**D Disadvantaged Business Enterprise (DBE) Requirements**' is removed in its entirety. The DBE material is in:

**Section 105.10 EQUAL OPPORTUNITY AND CIVIL RIGHTS**.

SECTION 3 - OTHER FEDERAL REQUIREMENTS

Unless expressly otherwise provided in the Bid Documents, the provisions contained in this Section 3 of this "Federal Contract Provisions Supplement" are hereby incorporated into the Bid Documents and Contract.

A. Buy America

If the cost of products purchased for permanent use in this project which are manufactured of steel, iron or the application of any coating to products of these materials exceeds 0.1 percent of the contract amount, or $2,500.00, whichever is greater, the products shall have been manufactured and the coating applied in the United States. The coating materials are not subject to this clause, only the application of the coating. In computing that amount, only the cost of the product and coating application cost will be included.

Ore, for the manufacture of steel or iron, may be from outside the United States; however, all other manufacturing processes of steel or iron must be in the United States to qualify as having been manufactured in the United States.

United States includes the 50 United States and any place subject to the jurisdiction thereof.

Products of steel include, but are not limited to, such products as structural steel, piles, guardrail, steel culverts, reinforcing steel, structural plate and steel supports for signs, luminaries and signals.

Products of iron include, but are not limited to, such products as cast iron grates.

Application of coatings include, but are not limited to, such applications as epoxy, galvanized and paint.

To assure compliance with this section, the Contractor shall submit a certification letter on its letterhead to the Department stating the following:

> "This is to certify that products made of steel, iron or the application of any coating to products of these materials whose costs are in excess of $2,500.00 or 0.1 percent of the original contract amount, whichever is greater, were manufactured and the coating, if one was required, was applied in the United States."

B. Materials

a. Convict Produced Materials References: 23 U.S.C. 114(b)(2), 23 CFR 635.417
Applicability: FHWA's prohibition against the use of convict material only applies to Federal-aid highways. Materials produced after July 1, 1991, by convict labor may only be incorporated in a Federal-aid highway construction project if: 1) such materials have been produced by convicts who are on parole, supervised release, or probation from a prison; or
2) such material has been produced in a qualified prison facility, e.g., prison industry, with the amount produced during any 12-month period, for use in Federal-aid projects, not exceeding the amount produced, for such use, during the 12-month period ending July 1, 1987.

Materials obtained from prison facilities (e.g., prison industries) are subject to the same requirements for Federal-aid participation that are imposed upon materials acquired from other sources. Materials manufactured or produced by convict labor will be given no preferential treatment.

The preferred method of obtaining materials for a project is through normal contracting procedures which require the contractor to furnish all materials to be incorporated in the work. The contractor selects the source, public or private, from which the materials are to be obtained (23 CFR 635.407). Prison industries are prohibited from bidding on projects directly (23 CFR 635.112e), but may act as material supplier to construction contractors.

Prison materials may also be approved as State-furnished material. However, since public agencies may not bid in competition with private firms, direct acquisition of materials from a

prison industry for use as State-furnished material is subject to a public interest finding with the Division Administrator's concurrence (23 CFR 635.407d). Selection of materials produced by convict labor as State-furnished materials for mandatory use should be cleared prior to the submittal of the Plans Specifications & Estimates (PS&E).

b. Patented/Proprietary Products References: 23 U.S.C. 112, 23 CFR 635.411

FHWA will not participate, directly or indirectly, in payment for any premium or royalty on any patented or proprietary material, specification, or process specifically set forth in the plans and specifications for a project, unless:

- the item is purchased or obtained through competitive bidding with equally suitable unpatented items,
- the STA certifies either that the proprietary or patented item is essential for synchronization with the existing highway facilities or that no equally suitable alternative exists, or
- the item is used for research or for a special type of construction on relatively short sections of road for experimental purposes. States should follow FHWA's procedures for "Construction Projects Incorporating Experimental Features" (expermnt.htm) for the submittal of work plans and evaluations.

The primary purpose of the policy is to have competition in selection of materials and allow for development of new materials and products. The policy further permits materials and products that are judged equal may be bid under generic specifications. If only patented or proprietary products are acceptable, they shall be bid as alternatives with all, or at least a reasonable number of, acceptable materials or products listed; and the Division Administrator may approve a single source if it can be found that its utilization is in the public interest.

Trade names are generally the key to identifying patented or proprietary materials. Trade name examples include 3M, Corten, etc. Generally, products identified by their brand or trade name are not to be specified without an "or equal" phrase, and, if trade names are used, all, or at least a reasonable number of acceptable "equal" materials or products should be listed. The licensing of several suppliers to produce a product does not change the fact that it is a single product and should not be specified to the exclusion of other equally suitable products.

c. State Preference References: 23 U.S.C. 112, 23 CFR 635.409

Materials produced within Maine shall not be favored to the exclusion of comparable materials produced outside of Maine. State preference clauses give particular advantage to the designated source and thus restrict competition. Therefore, State preference provisions shall not be used on any Federal-aid construction projects.

This policy also applies to State preference actions against materials of foreign origin, except as otherwise permitted by Federal law. Thus, States cannot give preference to in-State material sources over foreign material sources. Under the Buy America provisions, the States are

permitted to expand the Buy America restrictions provided that the STA is legally authorized under State law to impose more stringent requirements.

d. State Owned/Furnished/Designated Materials References: 23 U.S.C. 112, 23 CFR 635.407

Current FHWA policy requires that the contractor must furnish all materials to be incorporated in the work, and the contractor shall be permitted to select the sources from which the materials are to be obtained. Exceptions to this requirement may be made when there is a definite finding, by MaineDOT and concurred in by Federal Highway Administration's (FHWA) Division Administrator, that it is in the public interest to require the contractor to use materials furnished by the MaineDOT or from sources designated by MaineDOT. The exception policy can best be understood by separating State-furnished materials into the categories of manufactured materials and local natural materials.

Manufactured Materials When the use of State-furnished manufactured materials is approved based on a public interest finding, such use must be made mandatory. The optional use of State-furnished manufactured materials is in violation of our policy prohibiting public agencies from competing with private firms. Manufactured materials to be furnished by MaineDOT must be acquired through competitive bidding, unless there is a public interest finding for another method, and concurred in by FHWA's Division Administrator.

Local Natural Materials When MaineDOT owns or controls a local natural materials source such as a borrow pit or a stockpile of salvaged pavement material, etc., the materials may be designated for either optional or mandatory use; however, mandatory use will require a public interest finding (PIF) and FHWA's Division Administrator's concurrence.

In order to permit prospective bidders to properly prepare their bids, the location, cost, and any conditions to be met for obtaining materials that are made available to the contractor shall be stated in the bidding documents.

Mandatory Disposal Sites Normally, the disposal site for surplus excavated materials is to be of the contractor's choosing; although, an optional site(s) may be shown in the contract provisions. A mandatory site shall be specified when there is a finding by MaineDOT, with the concurrence of the Division Administrator, that such placement is the most economical or that the environment would be substantially enhanced without excessive cost. Discussion of the mandatory use of a disposal site in the environmental document may serve as the basis for the public interest finding.

Summarizing FHWA policy for the mandatory use of borrow or disposal sites:

- mandatory use of either requires a public interest finding and FHWA's Division Administrator's concurrence,
- mandatory use of either may be based on environmental consideration where the environment will be substantially enhanced without excessive additional cost, and
- where the use is based on environmental considerations, the discussion in the environmental document may be used as the basis for the public interest finding.

Factors to justify a public interest finding should include such items as cost effectiveness, system integrity, and local shortages of material.

C. Standard FHWA Contract Provisions - FHWA 1273

Unless expressly otherwise provided in the Bid Documents, the following "Required Contract Provisions, Federal Aid Construction Contracts", FHWA-1273, are hereby incorporated into the Bid Documents and Contract.

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**Cargo Preference Act :** Contractor and Subcontractor Clauses. "Use of United States-flag vessels: The contractor agrees—"(1) To utilize privately owned United States-flag commercial vessels to ship at least 50 percent of the gross tonnage (computed separately for dry bulk carriers, dry cargo liners, and tankers) involved, whenever shipping any equipment, material, or commodities pursuant to this contract, to the extent such vessels are available at fair and reasonable rates for United States-flag commercial vessels."(2) To furnish within 20 days following the date of loading for shipments originating within the United States or within 30 working days following the date of loading for shipments originating outside the United States, a legible copy of a rated, 'on-board' commercial ocean bill-of-lading in English for each shipment of cargo described in paragraph (1) of this section to both the Contracting Officer (through the prime contractor in the case of subcontractor bills-of-lading) and to the Division of National Cargo, Office of Market Development, Maritime Administration, Washington, DC 20590."(3) To insert the substance of the provisions of this clause in all subcontracts issued pursuant to this contract."(Reorganization Plans No. 21 of 1950 (64 Stat. 1273) and No. 7 of 1961 (75 Stat. 840) as amended by Pub. L. 91-469 (84 Stat. 1036) and Department of Commerce Organization Order 10-8 (38 FR 19707, July 23, 1973)) [42 FR 57126, Nov. 1, 1977]

The Cargo Preference Act requirements apply to materials or equipment that are acquired for a specific Federal-aid highway project. In general, the requirements are not applicable to goods or materials that come into inventories independent of an FHWA funded-contract. For example, the requirements would not apply to shipments of Portland cement, asphalt cement, or aggregates, as industry suppliers and contractors use these materials to replenish existing inventories. In general, most of the materials used for highway construction originate from existing inventories and are not acquired solely for a specific Federal-aid project. However, if materials or equipment are acquired solely for a Federal-aid project, then the Cargo Preference Act requirements apply."

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Start of FHWA 1273 REQUIRED CONTRACT PROVISIONS
FEDERAL-AID CONSTRUCTION CONTRACTS (As revised through May 1, 2012)

FHWA-1273 -- Revised May 1, 2012

**REQUIRED CONTRACT PROVISIONS**
**FEDERAL-AID CONSTRUCTION CONTRACTS**

I. General
II. Nondiscrimination
III. Nonsegregated Facilities
IV. Davis-Bacon and Related Act Provisions
V. Contract Work Hours and Safety Standards Act Provisions
VI. Subletting or Assigning the Contract
VII. Safety: Accident Prevention
VIII. False Statements Concerning Highway Projects
IX. Implementation of Clean Air Act and Federal Water Pollution Control Act
X. Compliance with Governmentwide Suspension and Debarment Requirements
XI. Certification Regarding Use of Contract Funds for Lobbying

ATTACHMENTS

A. Employment and Materials Preference for Appalachian Development Highway System or Appalachian Local Access Road Contracts (included in Appalachian contracts only)

## I. GENERAL

1. Form FHWA-1273 must be physically incorporated in each construction contract funded under Title 23 (excluding emergency contracts solely intended for debris removal). The contractor (or subcontractor) must insert this form in each subcontract and further require its inclusion in all lower tier subcontracts (excluding purchase orders, rental agreements and other agreements for supplies or services).

The applicable requirements of Form FHWA-1273 are incorporated by reference for work done under any purchase order, rental agreement or agreement for other services. The prime contractor shall be responsible for compliance by any subcontractor, lower-tier subcontractor or service provider.

Form FHWA-1273 must be included in all Federal-aid design-build contracts, in all subcontracts and in lower tier subcontracts (excluding subcontracts for design services, purchase orders, rental agreements and other agreements for supplies or services). The design-builder shall be responsible for compliance by any subcontractor, lower-tier subcontractor or service provider.

Contracting agencies may reference Form FHWA-1273 in bid proposal or request for proposal documents, however, the Form FHWA-1273 must be physically incorporated (not referenced) in all contracts, subcontracts and lower-tier subcontracts (excluding purchase orders, rental agreements and other agreements for supplies or services related to a construction contract).

2. Subject to the applicability criteria noted in the following sections, these contract provisions shall apply to all work performed on the contract by the contractor's own organization and with the assistance of workers under the contractor's immediate superintendence and to all work performed on the contract by piecework, station work, or by subcontract.

3. A breach of any of the stipulations contained in these Required Contract Provisions may be sufficient grounds for withholding of progress payments, withholding of final payment,

termination of the contract, suspension / debarment or any other action determined to be appropriate by the contracting agency and FHWA.

4. Selection of Labor: During the performance of this contract, the contractor shall not use convict labor for any purpose within the limits of a construction project on a Federal-aid highway unless it is labor performed by convicts who are on parole, supervised release, or probation. The term Federal-aid highway does not include roadways functionally classified as local roads or rural minor collectors.

## II. NONDISCRIMINATION

The provisions of this section related to 23 CFR Part 230 are applicable to all Federal-aid construction contracts and to all related construction subcontracts of $10,000 or more. The provisions of 23 CFR Part 230 are not applicable to material supply, engineering, or architectural service contracts.

In addition, the contractor and all subcontractors must comply with the following policies: Executive Order 11246, 41 CFR 60, 29 CFR 1625-1627, Title 23 USC Section 140, the Rehabilitation Act of 1973, as amended (29 USC 794), Title VI of the Civil Rights Act of 1964, as amended, and related regulations including 49 CFR Parts 21, 26 and 27; and 23 CFR Parts 200, 230, and 633.

The contractor and all subcontractors must comply with: the requirements of the Equal Opportunity Clause in 41 CFR 60-1.4(b) and, for all construction contracts exceeding $10,000, the Standard Federal Equal Employment Opportunity Construction Contract Specifications in 41 CFR 60-4.3.

Note: The U.S. Department of Labor has exclusive authority to determine compliance with Executive Order 11246 and the policies of the Secretary of Labor including 41 CFR 60, and 29 CFR 1625-1627. The contracting agency and the FHWA have the authority and the responsibility to ensure compliance with Title 23 USC Section 140, the Rehabilitation Act of 1973, as amended (29 USC 794), and Title VI of the Civil Rights Act of 1964, as amended, and related regulations including 49 CFR Parts 21, 26 and 27; and 23 CFR Parts 200, 230, and 633.

The following provision is adopted from 23 CFR 230, Appendix A, with appropriate revisions to conform to the U.S. Department of Labor (US DOL) and FHWA requirements.

**1. Equal Employment Opportunity:** Equal employment opportunity (EEO) requirements not to discriminate and to take affirmative action to assure equal opportunity as set forth under laws, executive orders, rules, regulations (28 CFR 35, 29 CFR 1630, 29 CFR 1625-1627, 41 CFR 60 and 49 CFR 27) and orders of the Secretary of Labor as modified by the provisions prescribed herein, and imposed pursuant to 23 U.S.C. 140 shall constitute the EEO and specific affirmative action standards for the contractor's project activities under this contract. The provisions of the Americans with Disabilities Act of 1990 (42 U.S.C. 12101 et seq.) set forth under 28 CFR 35 and 29 CFR 1630 are incorporated by reference in this contract. In the execution of this contract, the contractor agrees to comply with the following minimum specific requirement activities of EEO:

a. The contractor will work with the contracting agency and the Federal Government to ensure that it has made every good faith effort to provide equal opportunity with respect to all of its terms and conditions of employment and in their review of activities under the contract.

b. The contractor will accept as its operating policy the following statement:

"It is the policy of this Company to assure that applicants are employed, and that employees are treated during employment, without regard to their race, religion, sex, color, national origin, age or disability. Such action shall include: employment, upgrading, demotion, or transfer; recruitment or recruitment advertising; layoff or termination; rates of pay or other forms of compensation; and selection for training, including apprenticeship, pre-apprenticeship, and/or on-the-job training."

**2. EEO Officer:** The contractor will designate and make known to the contracting officers an EEO Officer who will have the responsibility for and must be capable of effectively administering and promoting an active EEO program and who must be assigned adequate authority and responsibility to do so.

**3. Dissemination of Policy:** All members of the contractor's staff who are authorized to hire, supervise, promote, and discharge employees, or who recommend such action, or who are substantially involved in such action, will be made fully cognizant of, and will implement, the contractor's EEO policy and contractual responsibilities to provide EEO in each grade and classification of employment. To ensure that the above agreement will be met, the following actions will be taken as a minimum:

a. Periodic meetings of supervisory and personnel office employees will be conducted before the start of work and then not less often than once every six months, at which time the contractor's EEO policy and its implementation will be reviewed and explained. The meetings will be conducted by the EEO Officer.

b. All new supervisory or personnel office employees will be given a thorough indoctrination by the EEO Officer, covering all major aspects of the contractor's EEO obligations within thirty days following their reporting for duty with the contractor.

c. All personnel who are engaged in direct recruitment for the project will be instructed by the EEO Officer in the contractor's procedures for locating and hiring minorities and women.

d. Notices and posters setting forth the contractor's EEO policy will be placed in areas readily accessible to employees, applicants for employment and potential employees.

e. The contractor's EEO policy and the procedures to implement such policy will be brought to the attention of employees by means of meetings, employee handbooks, or other appropriate means.

**4. Recruitment:** When advertising for employees, the contractor will include in all advertisements for employees the notation: "An Equal Opportunity Employer." All such advertisements will be placed in publications having a large circulation among minorities and women in the area from which the project work force would normally be derived.

a. The contractor will, unless precluded by a valid bargaining agreement, conduct systematic and direct recruitment through public and private employee referral sources likely to yield qualified minorities and women. To meet this requirement, the contractor will identify sources of potential minority group employees, and establish with such identified sources procedures whereby minority and women applicants may be referred to the contractor for employment consideration.

b. In the event the contractor has a valid bargaining agreement providing for exclusive hiring hall referrals, the contractor is expected to observe the provisions of that agreement to the extent that the system meets the contractor's compliance with EEO contract provisions. Where implementation of such an agreement has the effect of discriminating against minorities or women, or obligates the contractor to do the same, such implementation violates Federal nondiscrimination provisions.

c. The contractor will encourage its present employees to refer minorities and women as applicants for employment. Information and procedures with regard to referring such applicants will be discussed with employees.

**5. Personnel Actions:** Wages, working conditions, and employee benefits shall be established and administered, and personnel actions of every type, including hiring, upgrading, promotion, transfer, demotion, layoff, and termination, shall be taken without regard to race, color, religion, sex, national origin, age or disability.

The following procedures shall be followed:

a. The contractor will conduct periodic inspections of project sites to insure that working conditions and employee facilities do not indicate discriminatory treatment of project site personnel.

b. The contractor will periodically evaluate the spread of wages paid within each classification to determine any evidence of discriminatory wage practices.

c. The contractor will periodically review selected personnel actions in depth to determine whether there is evidence of discrimination. Where evidence is found, the contractor will promptly take corrective action. If the review indicates that the discrimination may extend beyond the actions reviewed, such corrective action shall include all affected persons.

d. The contractor will promptly investigate all complaints of alleged discrimination made to the contractor in connection with its obligations under this contract, will attempt to resolve such complaints, and will take appropriate corrective action within a reasonable time. If the investigation indicates that the discrimination may affect persons other than the complainant, such corrective action shall include such other persons. Upon completion of each investigation, the contractor will inform every complainant of all of their avenues of appeal.

**6. Training and Promotion:**

a. The contractor will assist in locating, qualifying, and increasing the skills of minorities and women who are applicants for employment or current employees. Such efforts should be aimed at developing full journey level status employees in the type of trade or job classification involved.

b. Consistent with the contractor's work force requirements and as permissible under Federal and State regulations, the contractor shall make full use of training programs, i.e., apprenticeship, and on-the-job training programs for the geographical area of contract performance. In the event a special provision for training is provided under this contract, this subparagraph will be superseded as indicated in the special provision. The contracting agency may reserve training positions for persons who receive welfare assistance in accordance with 23 U.S.C. 140(a).

c. The contractor will advise employees and applicants for employment of available training programs and entrance requirements for each.

d. The contractor will periodically review the training and promotion potential of employees who are minorities and women and will encourage eligible employees to apply for such training and promotion.

**7. Unions:** If the contractor relies in whole or in part upon unions as a source of employees, the contractor will use good faith efforts to obtain the cooperation of such unions to increase opportunities for minorities and women.

Actions by the contractor, either directly or through a contractor's association acting as agent, will include the procedures set forth below:

a. The contractor will use good faith efforts to develop, in cooperation with the unions, joint training programs aimed toward qualifying more minorities and women for membership in the unions and increasing the skills of minorities and women so that they may qualify for higher paying employment.

b. The contractor will use good faith efforts to incorporate an EEO clause into each union agreement to the end that such union will be contractually bound to refer applicants without regard to their race, color, religion, sex, national origin, age or disability.

c. The contractor is to obtain information as to the referral practices and policies of the labor union except that to the extent such information is within the exclusive possession of the labor union and such labor union refuses to furnish such information to the contractor, the contractor shall so certify to the contracting agency and shall set forth what efforts have been made to obtain such information.

d. In the event the union is unable to provide the contractor with a reasonable flow of referrals within the time limit set forth in the collective bargaining agreement, the contractor will, through independent recruitment efforts, fill the employment vacancies without regard to race, color, religion, sex, national origin, age or disability; making full efforts to obtain qualified and/or qualifiable minorities and women. The failure of a union to provide sufficient referrals (even

though it is obligated to provide exclusive referrals under the terms of a collective bargaining agreement) does not relieve the contractor from the requirements of this paragraph. In the event the union referral practice prevents the contractor from meeting the obligations pursuant to Executive Order 11246, as amended, and these special provisions, such contractor shall immediately notify the contracting agency.

**8. Reasonable Accommodation for Applicants / Employees with Disabilities:** The contractor must be familiar with the requirements for and comply with the Americans with Disabilities Act and all rules and regulations established there under. Employers must provide reasonable accommodation in all employment activities unless to do so would cause an undue hardship.

**9. Selection of Subcontractors, Procurement of Materials and Leasing of Equipment:** The contractor shall not discriminate on the grounds of race, color, religion, sex, national origin, age or disability in the selection and retention of subcontractors, including procurement of materials and leases of equipment. The contractor shall take all necessary and reasonable steps to ensure nondiscrimination in the administration of this contract.

a. The contractor shall notify all potential subcontractors and suppliers and lessors of their EEO obligations under this contract.

b. The contractor will use good faith efforts to ensure subcontractor compliance with their EEO obligations.

**10. Assurance Required by 49 CFR 26.13(b):**

a. The requirements of 49 CFR Part 26 and the State DOT's U.S. DOT-approved DBE program are incorporated by reference.

b. The contractor or subcontractor shall not discriminate on the basis of race, color, national origin, or sex in the performance of this contract. The contractor shall carry out applicable requirements of 49 CFR Part 26 in the award and administration of DOT-assisted contracts. Failure by the contractor to carry out these requirements is a material breach of this contract, which may result in the termination of this contract or such other remedy as the contracting agency deems appropriate.

**11. Records and Reports:** The contractor shall keep such records as necessary to document compliance with the EEO requirements. Such records shall be retained for a period of three years following the date of the final payment to the contractor for all contract work and shall be available at reasonable times and places for inspection by authorized representatives of the contracting agency and the FHWA.

a. The records kept by the contractor shall document the following:

(1) The number and work hours of minority and non-minority group members and women employed in each work classification on the project;

(2) The progress and efforts being made in cooperation with unions, when applicable, to increase employment opportunities for minorities and women; and

(3) The progress and efforts being made in locating, hiring, training, qualifying, and upgrading minorities and women;

b. The contractors and subcontractors will submit an annual report to the contracting agency each July for the duration of the project, indicating the number of minority, women, and non-minority group employees currently engaged in each work classification required by the contract work. This information is to be reported on Form FHWA-1391. The staffing data should represent the project work force on board in all or any part of the last payroll period preceding the end of July. If on-the-job training is being required by special provision, the contractor will be required to collect and report training data. The employment data should reflect the work force on board during all or any part of the last payroll period preceding the end of July.

## III. NONSEGREGATED FACILITIES

This provision is applicable to all Federal-aid construction contracts and to all related construction subcontracts of $10,000 or more.

The contractor must ensure that facilities provided for employees are provided in such a manner that segregation on the basis of race, color, religion, sex, or national origin cannot result. The contractor may neither require such segregated use by written or oral policies nor tolerate such use by employee custom. The contractor's obligation extends further to ensure that its employees are not assigned to perform their services at any location, under the contractor's control, where the facilities are segregated. The term "facilities" includes waiting rooms, work areas, restaurants and other eating areas, time clocks, restrooms, washrooms, locker rooms, and other storage or dressing areas, parking lots, drinking fountains, recreation or entertainment areas, transportation, and housing provided for employees. The contractor shall provide separate or single-user restrooms and necessary dressing or sleeping areas to assure privacy between sexes.

## IV. DAVIS-BACON AND RELATED ACT PROVISIONS

This section is applicable to all Federal-aid construction projects exceeding $2,000 and to all related subcontracts and lower-tier subcontracts (regardless of subcontract size). The requirements apply to all projects located within the right-of-way of a roadway that is functionally classified as Federal-aid highway. This excludes roadways functionally classified as local roads or rural minor collectors, which are exempt. Contracting agencies may elect to apply these requirements to other projects.

The following provisions are from the U.S. Department of Labor regulations in 29 CFR 5.5 “Contract provisions and related matters” with minor revisions to conform to the FHWA-1273 format and FHWA program requirements.

### 1. Minimum wages

a. All laborers and mechanics employed or working upon the site of the work, will be paid unconditionally and not less often than once a week, and without subsequent deduction or rebate on any account (except such payroll deductions as are permitted by regulations issued by the Secretary of Labor under the Copeland Act (29 CFR part 3)), the full amount of wages and bona fide fringe benefits (or cash equivalents thereof) due at time of payment computed at rates not less than those contained in the wage determination of the Secretary of Labor which is attached hereto and made a part hereof, regardless of any contractual relationship which may be alleged to exist between the contractor and such laborers and mechanics.

Contributions made or costs reasonably anticipated for bona fide fringe benefits under section 1(b)(2) of the Davis-Bacon Act on behalf of laborers or mechanics are considered wages paid to such laborers or mechanics, subject to the provisions of paragraph 1.d. of this section; also, regular contributions made or costs incurred for more than a weekly period (but not less often than quarterly) under plans, funds, or programs which cover the particular weekly period, are deemed to be constructively made or incurred during such weekly period. Such laborers and mechanics shall be paid the appropriate wage rate and fringe benefits on the wage determination for the classification of work actually performed, without regard to skill, except as provided in 29 CFR 5.5(a)(4). Laborers or mechanics performing work in more than one classification may be compensated at the rate specified for each classification for the time actually worked therein: Provided, That the employer's payroll records accurately set forth the time spent in each classification in which work is performed. The wage determination (including any additional classification and wage rates conformed under paragraph 1.b. of this section) and the Davis-Bacon poster (WH–1321) shall be posted at all times by the contractor and its subcontractors at the site of the work in a prominent and accessible place where it can be easily seen by the workers.

b. (1) The contracting officer shall require that any class of laborers or mechanics, including helpers, which is not listed in the wage determination and which is to be employed under the contract shall be classified in conformance with the wage determination. The contracting officer shall approve an additional classification and wage rate and fringe benefits therefore only when the following criteria have been met:

(i) The work to be performed by the classification requested is not performed by a classification in the wage determination; and

(ii) The classification is utilized in the area by the construction industry; and

(iii) The proposed wage rate, including any bona fide fringe benefits, bears a reasonable relationship to the wage rates contained in the wage determination.

(2) If the contractor and the laborers and mechanics to be employed in the classification (if known), or their representatives, and the contracting officer agree on the classification and wage rate (including the amount designated for fringe benefits where appropriate), a report of the action taken shall be sent by the contracting officer to the Administrator of the Wage and Hour Division, Employment Standards Administration, U.S. Department of Labor, Washington, DC 20210. The Administrator, or an authorized representative, will approve, modify, or disapprove every additional classification action within 30 days of receipt and so advise the contracting officer or will notify the contracting officer within the 30-day period that additional time is necessary.

(3) In the event the contractor, the laborers or mechanics to be employed in the classification or their representatives, and the contracting officer do not agree on the proposed classification and wage rate (including the amount designated for fringe benefits, where appropriate), the contracting officer shall refer the questions, including the views of all interested parties and the recommendation of the contracting officer, to the Wage and Hour Administrator for determination. The Wage and Hour Administrator, or an authorized representative, will issue a determination within 30 days of receipt and so advise the contracting officer or will notify the contracting officer within the 30-day period that additional time is necessary.

(4) The wage rate (including fringe benefits where appropriate) determined pursuant to paragraphs 1.b.(2) or 1.b.(3) of this section, shall be paid to all workers performing work in the classification under this contract from the first day on which work is performed in the classification.

c. Whenever the minimum wage rate prescribed in the contract for a class of laborers or mechanics includes a fringe benefit which is not expressed as an hourly rate, the contractor shall either pay the benefit as stated in the wage determination or shall pay another bona fide fringe benefit or an hourly cash equivalent thereof.

d. If the contractor does not make payments to a trustee or other third person, the contractor may consider as part of the wages of any laborer or mechanic the amount of any costs reasonably anticipated in providing bona fide fringe benefits under a plan or program, Provided, That the Secretary of Labor has found, upon the written request of the contractor, that the applicable standards of the Davis-Bacon Act have been met. The Secretary of Labor may require the contractor to set aside in a separate account assets for the meeting of obligations under the plan or program.

**2. Withholding**

The contracting agency shall upon its own action or upon written request of an authorized representative of the Department of Labor, withhold or cause to be withheld from the contractor under this contract, or any other Federal contract with the same prime contractor, or any other federally-assisted contract subject to Davis-Bacon prevailing wage requirements, which is held by the same prime contractor, so much of the accrued payments or advances as may be considered necessary to pay laborers and mechanics, including apprentices, trainees, and helpers, employed by the contractor or any subcontractor the full amount of wages required by the contract. In the event of failure to pay any laborer or mechanic, including any apprentice, trainee, or helper, employed or working on the site of the work, all or part of the wages required by the contract, the contracting agency may, after written notice to the contractor, take such action as may be necessary to cause the suspension of any further payment, advance, or guarantee of funds until such violations have ceased.

**3. Payrolls and basic records**

a. Payrolls and basic records relating thereto shall be maintained by the contractor during the course of the work and preserved for a period of three years thereafter for all laborers and mechanics working at the site of the work. Such records shall contain the name, address, and social security number of each such worker, his or her correct classification, hourly rates of wages paid (including rates of contributions or costs anticipated for bona fide fringe benefits or cash equivalents thereof of the types described in section 1(b)(2)(B) of the Davis-Bacon Act),

daily and weekly number of hours worked, deductions made and actual wages paid. Whenever the Secretary of Labor has found under 29 CFR 5.5(a)(1)(iv) that the wages of any laborer or mechanic include the amount of any costs reasonably anticipated in providing benefits under a plan or program described in section 1(b)(2)(B) of the Davis-Bacon Act, the contractor shall maintain records which show that the commitment to provide such benefits is enforceable, that the plan or program is financially responsible, and that the plan or program has been communicated in writing to the laborers or mechanics affected, and records which show the costs anticipated or the actual cost incurred in providing such benefits. Contractors employing apprentices or trainees under approved programs shall maintain written evidence of the registration of apprenticeship programs and certification of trainee programs, the registration of the apprentices and trainees, and the ratios and wage rates prescribed in the applicable programs.

b. (1) The contractor shall submit weekly for each week in which any contract work is performed a copy of all payrolls to the contracting agency. The payrolls submitted shall set out accurately and completely all of the information required to be maintained under 29 CFR 5.5(a)(3)(i), except that full social security numbers and home addresses shall not be included on weekly transmittals. Instead the payrolls shall only need to include an individually identifying number for each employee ( e.g. , the last four digits of the employee's social security number). The required weekly payroll information may be submitted in any form desired. Optional Form WH–347 is available for this purpose from the Wage and Hour Division Web site at http://www.dol.gov/esa/whd/forms/wh347instr.htm or its successor site. The prime contractor is responsible for the submission of copies of payrolls by all subcontractors. Contractors and subcontractors shall maintain the full social security number and current address of each covered worker, and shall provide them upon request to the contracting agency for transmission to the State DOT, the FHWA or the Wage and Hour Division of the Department of Labor for purposes of an investigation or audit of compliance with prevailing wage requirements. It is not a violation of this section for a prime contractor to require a subcontractor to provide addresses and social security numbers to the prime contractor for its own records, without weekly submission to the contracting agency..

(2) Each payroll submitted shall be accompanied by a “Statement of Compliance,” signed by the contractor or subcontractor or his or her agent who pays or supervises the payment of the persons employed under the contract and shall certify the following:

(i) That the payroll for the payroll period contains the information required to be provided under §5.5 (a)(3)(ii) of Regulations, 29 CFR part 5, the appropriate information is being maintained under §5.5 (a)(3)(i) of Regulations, 29 CFR part 5, and that such information is correct and complete;

(ii) That each laborer or mechanic (including each helper, apprentice, and trainee) employed on the contract during the payroll period has been paid the full weekly wages earned, without rebate, either directly or indirectly, and that no deductions have been made either directly or indirectly from the full wages earned, other than permissible deductions as set forth in Regulations, 29 CFR part 3;

(iii) That each laborer or mechanic has been paid not less than the applicable wage rates and fringe benefits or cash equivalents for the classification of work performed, as specified in the applicable wage determination incorporated into the contract.

(3) The weekly submission of a properly executed certification set forth on the reverse side of Optional Form WH–347 shall satisfy the requirement for submission of the "Statement of Compliance" required by paragraph 3.b.(2) of this section.

(4) The falsification of any of the above certifications may subject the contractor or subcontractor to civil or criminal prosecution under section 1001 of title 18 and section 231 of title 31 of the United States Code.

c. The contractor or subcontractor shall make the records required under paragraph 3.a. of this section available for inspection, copying, or transcription by authorized representatives of the contracting agency, the State DOT, the FHWA, or the Department of Labor, and shall permit such representatives to interview employees during working hours on the job. If the contractor or subcontractor fails to submit the required records or to make them available, the FHWA may, after written notice to the contractor, the contracting agency or the State DOT, take such action as may be necessary to cause the suspension of any further payment, advance, or guarantee of funds. Furthermore, failure to submit the required records upon request or to make such records available may be grounds for debarment action pursuant to 29 CFR 5.12.

**4. Apprentices and trainees**

a. Apprentices (programs of the USDOL).

Apprentices will be permitted to work at less than the predetermined rate for the work they performed when they are employed pursuant to and individually registered in a bona fide apprenticeship program registered with the U.S. Department of Labor, Employment and Training Administration, Office of Apprenticeship Training, Employer and Labor Services, or with a State Apprenticeship Agency recognized by the Office, or if a person is employed in his or her first 90 days of probationary employment as an apprentice in such an apprenticeship program, who is not individually registered in the program, but who has been certified by the Office of Apprenticeship Training, Employer and Labor Services or a State Apprenticeship Agency (where appropriate) to be eligible for probationary employment as an apprentice.

The allowable ratio of apprentices to journeymen on the job site in any craft classification shall not be greater than the ratio permitted to the contractor as to the entire work force under the registered program. Any worker listed on a payroll at an apprentice wage rate, who is not registered or otherwise employed as stated above, shall be paid not less than the applicable wage rate on the wage determination for the classification of work actually performed. In addition, any apprentice performing work on the job site in excess of the ratio permitted under the registered program shall be paid not less than the applicable wage rate on the wage determination for the work actually performed. Where a contractor is performing construction on a project in a locality other than that in which its program is registered, the ratios and wage rates (expressed in percentages of the journeyman's hourly rate) specified in the contractor's or subcontractor's registered program shall be observed.

Every apprentice must be paid at not less than the rate specified in the registered program for the apprentice's level of progress, expressed as a percentage of the journeymen hourly rate specified in the applicable wage determination. Apprentices shall be paid fringe benefits in accordance with the provisions of the apprenticeship program. If the apprenticeship program does not specify fringe benefits, apprentices must be paid the full amount of fringe benefits listed on the wage determination for the applicable classification. If the Administrator determines that a

different practice prevails for the applicable apprentice classification, fringes shall be paid in accordance with that determination.

In the event the Office of Apprenticeship Training, Employer and Labor Services, or a State Apprenticeship Agency recognized by the Office, withdraws approval of an apprenticeship program, the contractor will no longer be permitted to utilize apprentices at less than the applicable predetermined rate for the work performed until an acceptable program is approved.

b. Trainees (programs of the USDOL).

Except as provided in 29 CFR 5.16, trainees will not be permitted to work at less than the predetermined rate for the work performed unless they are employed pursuant to and individually registered in a program which has received prior approval, evidenced by formal certification by the U.S. Department of Labor, Employment and Training Administration.

The ratio of trainees to journeymen on the job site shall not be greater than permitted under the plan approved by the Employment and Training Administration.

Every trainee must be paid at not less than the rate specified in the approved program for the trainee's level of progress, expressed as a percentage of the journeyman hourly rate specified in the applicable wage determination. Trainees shall be paid fringe benefits in accordance with the provisions of the trainee program. If the trainee program does not mention fringe benefits, trainees shall be paid the full amount of fringe benefits listed on the wage determination unless the Administrator of the Wage and Hour Division determines that there is an apprenticeship program associated with the corresponding journeyman wage rate on the wage determination which provides for less than full fringe benefits for apprentices. Any employee listed on the payroll at a trainee rate who is not registered and participating in a training plan approved by the Employment and Training Administration shall be paid not less than the applicable wage rate on the wage determination for the classification of work actually performed. In addition, any trainee performing work on the job site in excess of the ratio permitted under the registered program shall be paid not less than the applicable wage rate on the wage determination for the work actually performed.

In the event the Employment and Training Administration withdraws approval of a training program, the contractor will no longer be permitted to utilize trainees at less than the applicable predetermined rate for the work performed until an acceptable program is approved.

c. Equal employment opportunity. The utilization of apprentices, trainees and journeymen under this part shall be in conformity with the equal employment opportunity requirements of Executive Order 11246, as amended, and 29 CFR part 30.

d. Apprentices and Trainees (programs of the U.S. DOT).

Apprentices and trainees working under apprenticeship and skill training programs which have been certified by the Secretary of Transportation as promoting EEO in connection with Federal-aid highway construction programs are not subject to the requirements of paragraph 4 of this Section IV. The straight time hourly wage rates for apprentices and trainees under such programs will be established by the particular programs. The ratio of apprentices and trainees to journeymen shall not be greater than permitted by the terms of the particular program.

**5. Compliance with Copeland Act requirements.** The contractor shall comply with the requirements of 29 CFR part 3, which are incorporated by reference in this contract.

**6. Subcontracts.** The contractor or subcontractor shall insert Form FHWA-1273 in any subcontracts and also require the subcontractors to include Form FHWA-1273 in any lower tier subcontracts. The prime contractor shall be responsible for the compliance by any subcontractor or lower tier subcontractor with all the contract clauses in 29 CFR 5.5.

**7. Contract termination: debarment.** A breach of the contract clauses in 29 CFR 5.5 may be grounds for termination of the contract, and for debarment as a contractor and a subcontractor as provided in 29 CFR 5.12.

**8. Compliance with Davis-Bacon and Related Act requirements.** All rulings and interpretations of the Davis-Bacon and Related Acts contained in 29 CFR parts 1, 3, and 5 are herein incorporated by reference in this contract.

**9. Disputes concerning labor standards.** Disputes arising out of the labor standards provisions of this contract shall not be subject to the general disputes clause of this contract. Such disputes shall be resolved in accordance with the procedures of the Department of Labor set forth in 29 CFR parts 5, 6, and 7. Disputes within the meaning of this clause include disputes between the contractor (or any of its subcontractors) and the contracting agency, the U.S. Department of Labor, or the employees or their representatives.

**10. Certification of eligibility.**

a. By entering into this contract, the contractor certifies that neither it (nor he or she) nor any person or firm who has an interest in the contractor's firm is a person or firm ineligible to be awarded Government contracts by virtue of section 3(a) of the Davis-Bacon Act or 29 CFR 5.12(a)(1).

b. No part of this contract shall be subcontracted to any person or firm ineligible for award of a Government contract by virtue of section 3(a) of the Davis-Bacon Act or 29 CFR 5.12(a)(1).

c. The penalty for making false statements is prescribed in the U.S. Criminal Code, 18 U.S.C. 1001.

## V. CONTRACT WORK HOURS AND SAFETY STANDARDS ACT

The following clauses apply to any Federal-aid construction contract in an amount in excess of $100,000 and subject to the overtime provisions of the Contract Work Hours and Safety Standards Act. These clauses shall be inserted in addition to the clauses required by 29 CFR 5.5(a) or 29 CFR 4.6. As used in this paragraph, the terms laborers and mechanics include watchmen and guards.

**1. Overtime requirements.** No contractor or subcontractor contracting for any part of the contract work which may require or involve the employment of laborers or mechanics shall require or permit any such laborer or mechanic in any workweek in which he or she is employed on such work to work in excess of forty hours in such workweek unless such laborer or mechanic receives compensation at a rate not less than one and one-half times the basic rate of pay for all hours worked in excess of forty hours in such workweek.

**2. Violation; liability for unpaid wages; liquidated damages**. In the event of any violation of the clause set forth in paragraph (1.) of this section, the contractor and any subcontractor responsible therefor shall be liable for the unpaid wages. In addition, such contractor and subcontractor shall be liable to the United States (in the case of work done under contract for the District of Columbia or a territory, to such District or to such territory), for liquidated damages. Such liquidated damages shall be computed with respect to each individual laborer or mechanic, including watchmen and guards, employed in violation of the clause set forth in paragraph (1.) of this section, in the sum of $10 for each calendar day on which such individual was required or permitted to work in excess of the standard workweek of forty hours without payment of the overtime wages required by the clause set forth in paragraph (1.) of this section.

**3. Withholding for unpaid wages and liquidated damages.** The FHWA or the contacting agency shall upon its own action or upon written request of an authorized representative of the Department of Labor withhold or cause to be withheld, from any moneys payable on account of work performed by the contractor or subcontractor under any such contract or any other Federal contract with the same prime contractor, or any other federally-assisted contract subject to the Contract Work Hours and Safety Standards Act, which is held by the same prime contractor, such sums as may be determined to be necessary to satisfy any liabilities of such contractor or subcontractor for unpaid wages and liquidated damages as provided in the clause set forth in paragraph (2.) of this section.

**4. Subcontracts.** The contractor or subcontractor shall insert in any subcontracts the clauses set forth in paragraph (1.) through (4.) of this section and also a clause requiring the subcontractors to include these clauses in any lower tier subcontracts. The prime contractor shall be responsible for compliance by any subcontractor or lower tier subcontractor with the clauses set forth in paragraphs (1.) through (4.) of this section.

## VI. SUBLETTING OR ASSIGNING THE CONTRACT

This provision is applicable to all Federal-aid construction contracts on the National Highway System.

1. The contractor shall perform with its own organization contract work amounting to not less than 30 percent (or a greater percentage if specified elsewhere in the contract) of the total original contract price, excluding any specialty items designated by the contracting agency. Specialty items may be performed by subcontract and the amount of any such specialty items performed may be deducted from the total original contract price before computing the amount of work required to be performed by the contractor's own organization (23 CFR 635.116).

a. The term “perform work with its own organization” refers to workers employed or leased by the prime contractor, and equipment owned or rented by the prime contractor, with or without operators. Such term does not include employees or equipment of a subcontractor or lower tier subcontractor, agents of the prime contractor, or any other assignees. The term may include payments for the costs of hiring leased employees from an employee leasing firm meeting all relevant Federal and State regulatory requirements. Leased employees may only be included in this term if the prime contractor meets all of the following conditions:

(1) the prime contractor maintains control over the supervision of the day-to-day activities of the leased employees;
(2) the prime contractor remains responsible for the quality of the work of the leased employees;
(3) the prime contractor retains all power to accept or exclude individual employees from work on the project; and
(4) the prime contractor remains ultimately responsible for the payment of predetermined minimum wages, the submission of payrolls, statements of compliance and all other Federal regulatory requirements.

b. "Specialty Items" shall be construed to be limited to work that requires highly specialized knowledge, abilities, or equipment not ordinarily available in the type of contracting organizations qualified and expected to bid or propose on the contract as a whole and in general are to be limited to minor components of the overall contract.

2. The contract amount upon which the requirements set forth in paragraph (1) of Section VI is computed includes the cost of material and manufactured products which are to be purchased or produced by the contractor under the contract provisions.

3. The contractor shall furnish (a) a competent superintendent or supervisor who is employed by the firm, has full authority to direct performance of the work in accordance with the contract requirements, and is in charge of all construction operations (regardless of who performs the work) and (b) such other of its own organizational resources (supervision, management, and engineering services) as the contracting officer determines is necessary to assure the performance of the contract.

4. No portion of the contract shall be sublet, assigned or otherwise disposed of except with the written consent of the contracting officer, or authorized representative, and such consent when given shall not be construed to relieve the contractor of any responsibility for the fulfillment of the contract. Written consent will be given only after the contracting agency has assured that each subcontract is evidenced in writing and that it contains all pertinent provisions and requirements of the prime contract.

5. The 30% self-performance requirement of paragraph (1) is not applicable to design-build contracts; however, contracting agencies may establish their own self-performance requirements.

**VII. SAFETY: ACCIDENT PREVENTION**

This provision is applicable to all Federal-aid construction contracts and to all related subcontracts.

1. In the performance of this contract the contractor shall comply with all applicable Federal, State, and local laws governing safety, health, and sanitation (23 CFR 635). The contractor shall provide all safeguards, safety devices and protective equipment and take any other needed actions as it determines, or as the contracting officer may determine, to be reasonably necessary to protect the life and health of employees on the job and the safety of the public and to protect property in connection with the performance of the work covered by the contract.

2. It is a condition of this contract, and shall be made a condition of each subcontract, which the contractor enters into pursuant to this contract, that the contractor and any subcontractor shall not permit any employee, in performance of the contract, to work in surroundings or under conditions which are unsanitary, hazardous or dangerous to his/her health or safety, as determined under construction safety and health standards (29 CFR 1926) promulgated by the Secretary of Labor, in accordance with Section 107 of the Contract Work Hours and Safety Standards Act (40 U.S.C. 3704).

3. Pursuant to 29 CFR 1926.3, it is a condition of this contract that the Secretary of Labor or authorized representative thereof, shall have right of entry to any site of contract performance to inspect or investigate the matter of compliance with the construction safety and health standards and to carry out the duties of the Secretary under Section 107 of the Contract Work Hours and Safety Standards Act (40 U.S.C.3704).

## VIII. FALSE STATEMENTS CONCERNING HIGHWAY PROJECTS

This provision is applicable to all Federal-aid construction contracts and to all related subcontracts.

In order to assure high quality and durable construction in conformity with approved plans and specifications and a high degree of reliability on statements and representations made by engineers, contractors, suppliers, and workers on Federal-aid highway projects, it is essential that all persons concerned with the project perform their functions as carefully, thoroughly, and honestly as possible. Willful falsification, distortion, or misrepresentation with respect to any facts related to the project is a violation of Federal law. To prevent any misunderstanding regarding the seriousness of these and similar acts, Form FHWA-1022 shall be posted on each Federal-aid highway project (23 CFR 635) in one or more places where it is readily available to all persons concerned with the project:

18 U.S.C. 1020 reads as follows:

"Whoever, being an officer, agent, or employee of the United States, or of any State or Territory, or whoever, whether a person, association, firm, or corporation, knowingly makes any false statement, false representation, or false report as to the character, quality, quantity, or cost of the material used or to be used, or the quantity or quality of the work performed or to be performed, or the cost thereof in connection with the submission of plans, maps, specifications, contracts, or costs of construction on any highway or related project submitted for approval to the Secretary of Transportation; or

Whoever knowingly makes any false statement, false representation, false report or false claim with respect to the character, quality, quantity, or cost of any work performed or to be performed, or materials furnished or to be furnished, in connection with the construction of any highway or related project approved by the Secretary of Transportation; or

Whoever knowingly makes any false statement or false representation as to material fact in any statement, certificate, or report submitted pursuant to provisions of the Federal-aid Roads Act approved July 1, 1916, (39 Stat. 355), as amended and supplemented;

Shall be fined under this title or imprisoned not more than 5 years or both."

## IX. IMPLEMENTATION OF CLEAN AIR ACT AND FEDERAL WATER POLLUTION CONTROL ACT

This provision is applicable to all Federal-aid construction contracts and to all related subcontracts.

By submission of this bid/proposal or the execution of this contract, or subcontract, as appropriate, the bidder, proposer, Federal-aid construction contractor, or subcontractor, as appropriate, will be deemed to have stipulated as follows:

1. That any person who is or will be utilized in the performance of this contract is not prohibited from receiving an award due to a violation of Section 508 of the Clean Water Act or Section 306 of the Clean Air Act.
2. That the contractor agrees to include or cause to be included the requirements of paragraph (1) of this Section X in every subcontract, and further agrees to take such action as the contracting agency may direct as a means of enforcing such requirements.

## X. CERTIFICATION REGARDING DEBARMENT, SUSPENSION, INELIGIBILITY AND VOLUNTARY EXCLUSION

This provision is applicable to all Federal-aid construction contracts, design-build contracts, subcontracts, lower-tier subcontracts, purchase orders, lease agreements, consultant contracts or any other covered transaction requiring FHWA approval or that is estimated to cost $25,000 or more – as defined in 2 CFR Parts 180 and 1200.

1**. Instructions for Certification – First Tier Participants:**

a. By signing and submitting this proposal, the prospective first tier participant is providing the certification set out below.

b. The inability of a person to provide the certification set out below will not necessarily result in denial of participation in this covered transaction. The prospective first tier participant shall submit an explanation of why it cannot provide the certification set out below. The certification or explanation will be considered in connection with the department or agency's determination whether to enter into this transaction. However, failure of the prospective first tier participant to furnish a certification or an explanation shall disqualify such a person from participation in this transaction.

c. The certification in this clause is a material representation of fact upon which reliance was placed when the contracting agency determined to enter into this transaction. If it is later determined that the prospective participant knowingly rendered an erroneous certification, in addition to other remedies available to the Federal Government, the contracting agency may terminate this transaction for cause of default.

d. The prospective first tier participant shall provide immediate written notice to the contracting agency to whom this proposal is submitted if any time the prospective first tier participant learns that its certification was erroneous when submitted or has become erroneous by reason of changed circumstances.

e. The terms "covered transaction," "debarred," "suspended," "ineligible," "participant," "person," "principal," and "voluntarily excluded," as used in this clause, are defined in 2 CFR Parts 180 and 1200. “First Tier Covered Transactions” refers to any covered transaction between a grantee or subgrantee of Federal funds and a participant (such as the prime or general contract). “Lower Tier Covered Transactions” refers to any covered transaction under a First Tier Covered Transaction (such as subcontracts). “First Tier Participant” refers to the participant who has entered into a covered transaction with a grantee or subgrantee of Federal funds (such as the prime or general contractor). “Lower Tier Participant” refers any participant who has entered into a covered transaction with a First Tier Participant or other Lower Tier Participants (such as subcontractors and suppliers).

f. The prospective first tier participant agrees by submitting this proposal that, should the proposed covered transaction be entered into, it shall not knowingly enter into any lower tier covered transaction with a person who is debarred, suspended, declared ineligible, or voluntarily excluded from participation in this covered transaction, unless authorized by the department or agency entering into this transaction.

g. The prospective first tier participant further agrees by submitting this proposal that it will include the clause titled "Certification Regarding Debarment, Suspension, Ineligibility and Voluntary Exclusion-Lower Tier Covered Transactions," provided by the department or contracting agency, entering into this covered transaction, without modification, in all lower tier covered transactions and in all solicitations for lower tier covered transactions exceeding the $25,000 threshold.

h. A participant in a covered transaction may rely upon a certification of a prospective participant in a lower tier covered transaction that is not debarred, suspended, ineligible, or voluntarily excluded from the covered transaction, unless it knows that the certification is erroneous. A participant is responsible for ensuring that its principals are not suspended, debarred, or otherwise ineligible to participate in covered transactions. To verify the eligibility of its principals, as well as the eligibility of any lower tier prospective participants, each participant may, but is not required to, check the Excluded Parties List System website (https://www.epls.gov/), which is compiled by the General Services Administration.

i. Nothing contained in the foregoing shall be construed to require the establishment of a system of records in order to render in good faith the certification required by this clause. The knowledge and information of the prospective participant is not required to exceed that which is normally possessed by a prudent person in the ordinary course of business dealings.

j. Except for transactions authorized under paragraph (f) of these instructions, if a participant in a covered transaction knowingly enters into a lower tier covered transaction with a person who is suspended, debarred, ineligible, or voluntarily excluded from participation in this transaction, in addition to other remedies available to the Federal Government, the department or agency may terminate this transaction for cause or default.

* * * * *

**2. Certification Regarding Debarment, Suspension, Ineligibility and Voluntary Exclusion – First Tier Participants:**

a. The prospective first tier participant certifies to the best of its knowledge and belief, that it and its principals:

(1) Are not presently debarred, suspended, proposed for debarment, declared ineligible, or voluntarily excluded from participating in covered transactions by any Federal department or agency;

(2) Have not within a three-year period preceding this proposal been convicted of or had a civil judgment rendered against them for commission of fraud or a criminal offense in connection with obtaining, attempting to obtain, or performing a public (Federal, State or local) transaction or contract under a public transaction; violation of Federal or State antitrust statutes or commission of embezzlement, theft, forgery, bribery, falsification or destruction of records, making false statements, or receiving stolen property;

(3) Are not presently indicted for or otherwise criminally or civilly charged by a governmental entity (Federal, State or local) with commission of any of the offenses enumerated in paragraph (a)(2) of this certification; and

(4) Have not within a three-year period preceding this application/proposal had one or more public transactions (Federal, State or local) terminated for cause or default.

b. Where the prospective participant is unable to certify to any of the statements in this certification, such prospective participant shall attach an explanation to this proposal.

2. **Instructions for Certification - Lower Tier Participants:**

(Applicable to all subcontracts, purchase orders and other lower tier transactions requiring prior FHWA approval or estimated to cost $25,000 or more - 2 CFR Parts 180 and 1200)

a. By signing and submitting this proposal, the prospective lower tier is providing the certification set out below.

b. The certification in this clause is a material representation of fact upon which reliance was placed when this transaction was entered into. If it is later determined that the prospective lower tier participant knowingly rendered an erroneous certification, in addition to other remedies available to the Federal Government, the department, or agency with which this transaction originated may pursue available remedies, including suspension and/or debarment.

c. The prospective lower tier participant shall provide immediate written notice to the person to which this proposal is submitted if at any time the prospective lower tier participant learns that its certification was erroneous by reason of changed circumstances.

d. The terms "covered transaction," "debarred," "suspended," "ineligible," "participant," "person," "principal," and "voluntarily excluded," as used in this clause, are defined in 2 CFR Parts 180 and 1200. You may contact the person to which this proposal is submitted for assistance in obtaining a copy of those regulations. “First Tier Covered Transactions” refers to any covered transaction between a grantee or subgrantee of Federal funds and a participant (such as the prime or general contract). “Lower Tier Covered Transactions” refers to any covered transaction under a First Tier Covered Transaction (such as subcontracts). “First Tier Participant” refers to the participant who has entered into a covered transaction with a grantee or subgrantee of Federal funds (such as the prime or general contractor). “Lower Tier Participant” refers any participant who has entered into a covered transaction with a First Tier Participant or other Lower Tier Participants (such as subcontractors and suppliers).

e. The prospective lower tier participant agrees by submitting this proposal that, should the proposed covered transaction be entered into, it shall not knowingly enter into any lower tier covered transaction with a person who is debarred, suspended, declared ineligible, or voluntarily excluded from participation in this covered transaction, unless authorized by the department or agency with which this transaction originated.

f. The prospective lower tier participant further agrees by submitting this proposal that it will include this clause titled "Certification Regarding Debarment, Suspension, Ineligibility and Voluntary Exclusion-Lower Tier Covered Transaction," without modification, in all lower tier covered transactions and in all solicitations for lower tier covered transactions exceeding the $25,000 threshold.

g. A participant in a covered transaction may rely upon a certification of a prospective participant in a lower tier covered transaction that is not debarred, suspended, ineligible, or voluntarily excluded from the covered transaction, unless it knows that the certification is erroneous. A participant is responsible for ensuring that its principals are not suspended, debarred, or otherwise ineligible to participate in covered transactions. To verify the eligibility of its principals, as well as the eligibility of any lower tier prospective participants, each participant may, but is not required to, check the Excluded Parties List System website (https://www.epls.gov/), which is compiled by the General Services Administration.

h. Nothing contained in the foregoing shall be construed to require establishment of a system of records in order to render in good faith the certification required by this clause. The knowledge and information of participant is not required to exceed that which is normally possessed by a prudent person in the ordinary course of business dealings.

i. Except for transactions authorized under paragraph e of these instructions, if a participant in a covered transaction knowingly enters into a lower tier covered transaction with a person who is suspended, debarred, ineligible, or voluntarily excluded from participation in this transaction, in addition to other remedies available to the Federal Government, the department or agency with which this transaction originated may pursue available remedies, including suspension and/or debarment.

* * * * *

**Certification Regarding Debarment, Suspension, Ineligibility and Voluntary Exclusion--Lower Tier Participants:**

1. The prospective lower tier participant certifies, by submission of this proposal, that neither it nor its principals is presently debarred, suspended, proposed for debarment, declared ineligible, or voluntarily excluded from participating in covered transactions by any Federal department or agency.

2. Where the prospective lower tier participant is unable to certify to any of the statements in this certification, such prospective participant shall attach an explanation to this proposal.

* * * * *

## XI. CERTIFICATION REGARDING USE OF CONTRACT FUNDS FOR LOBBYING

This provision is applicable to all Federal-aid construction contracts and to all related subcontracts which exceed $100,000 (49 CFR 20).

1. The prospective participant certifies, by signing and submitting this bid or proposal, to the best of his or her knowledge and belief, that:

a. No Federal appropriated funds have been paid or will be paid, by or on behalf of the undersigned, to any person for influencing or attempting to influence an officer or employee of any Federal agency, a Member of Congress, an officer or employee of Congress, or an employee of a Member of Congress in connection with the awarding of any Federal contract, the making of any Federal grant, the making of any Federal loan, the entering into of any cooperative agreement, and the extension, continuation, renewal, amendment, or modification of any Federal contract, grant, loan, or cooperative agreement.

b. If any funds other than Federal appropriated funds have been paid or will be paid to any person for influencing or attempting to influence an officer or employee of any Federal agency, a Member of Congress, an officer or employee of Congress, or an employee of a Member of Congress in connection with this Federal contract, grant, loan, or cooperative agreement, the undersigned shall complete and submit Standard Form-LLL, "Disclosure Form to Report Lobbying," in accordance with its instructions.

2. This certification is a material representation of fact upon which reliance was placed when this transaction was made or entered into. Submission of this certification is a prerequisite for making or entering into this transaction imposed by 31 U.S.C. 1352. Any person who fails to file the required certification shall be subject to a civil penalty of not less than $10,000 and not more than $100,000 for each such failure.

3. The prospective participant also agrees by submitting its bid or proposal that the participant shall require that the language of this certification be included in all lower tier subcontracts, which exceed $100,000 and that all such recipients shall certify and disclose accordingly.

**ATTACHMENT A - EMPLOYMENT AND MATERIALS PREFERENCE FOR APPALACHIAN DEVELOPMENT HIGHWAY SYSTEM OR APPALACHIAN LOCAL ACCESS ROAD CONTRACTS**

This provision is applicable to all Federal-aid projects funded under the Appalachian Regional Development Act of 1965.

1. During the performance of this contract, the contractor undertaking to do work which is, or reasonably may be, done as on-site work, shall give preference to qualified persons who regularly reside in the labor area as designated by the DOL wherein the contract work is situated, or the subregion, or the Appalachian counties of the State wherein the contract work is situated, except:

a. To the extent that qualified persons regularly residing in the area are not available.

b. For the reasonable needs of the contractor to employ supervisory or specially experienced personnel necessary to assure an efficient execution of the contract work.

c. For the obligation of the contractor to offer employment to present or former employees as the result of a lawful collective bargaining contract, provided that the number of nonresident persons employed under this subparagraph (1c) shall not exceed 20 percent of the total number of employees employed by the contractor on the contract work, except as provided in subparagraph (4) below.

2. The contractor shall place a job order with the State Employment Service indicating (a) the classifications of the laborers, mechanics and other employees required to perform the contract work, (b) the number of employees required in each classification, (c) the date on which the participant estimates such employees will be required, and (d) any other pertinent information required by the State Employment Service to complete the job order form. The job order may be placed with the State Employment Service in writing or by telephone. If during the course of the contract work, the information submitted by the contractor in the original job order is substantially modified, the participant shall promptly notify the State Employment Service.

3. The contractor shall give full consideration to all qualified job applicants referred to him by the State Employment Service. The contractor is not required to grant employment to any job applicants who, in his opinion, are not qualified to perform the classification of work required.

4. If, within one week following the placing of a job order by the contractor with the State Employment Service, the State Employment Service is unable to refer any qualified job applicants to the contractor, or less than the number requested, the State Employment Service will forward a certificate to the contractor indicating the unavailability of applicants. Such certificate shall be made a part of the contractor's permanent project records. Upon receipt of this certificate, the contractor may employ persons who do not normally reside in the labor area to fill positions covered by the certificate, notwithstanding the provisions of subparagraph (1c) above.

5. The provisions of 23 CFR 633.207(e) allow the contracting agency to provide a contractual preference for the use of mineral resource materials native to the Appalachian region.

6. The contractor shall include the provisions of Sections 1 through 4 of this Attachment A in every subcontract for work which is, or reasonably may be, done as on-site work.

End of FHWA 1273

**The United States Department of Transportation (USDOT)**

**FHWA STANDARD TITLE VI/NONDISCRIMINATION ASSURANCES**

**DOT Order No. 1050.2A**

The Maine Department of Transportation (herein referred to as the "Recipient"), **HEREBY AGREES THAT**, as a condition to receiving any Federal financial assistance from the U.S. Department of Transportation (DOT), through The Federal Highway Administration (FHWA), is subject to and will comply with the following:

**Statutory/Regulatory Authorities**

- Title VI of the Civil Rights Act of 1964 (42 U.S.C. § 2000d *et seq*., 78 stat. 252), (prohibits discrimination on the basis of race, color, national origin);
- 49 C.F.R. Part 21 (entitled *Nondiscrimination In Federally-Assisted Programs Of The Department Of Transportation—Effectuation Of Title VI Of The Civil Rights Act Of 1964*);
- 28 C.F.R. section 50.3 (U.S. Department of Justice Guidelines for Enforcement of Title VI of the Civil Rights Act of 1964);

***FHWA may include additional Statutory/Regulatory Authorities here.***

The preceding statutory and regulatory cites hereinafter are referred to as the "Acts" and "Regulations," respectively.

**General Assurances**

In accordance with the Acts, the Regulations, and other pertinent directives, circulars, policy, memoranda, and/or guidance, the Recipient hereby gives assurance that it will promptly take any measures necessary to ensure that:

*No person in the United States shall, on the grounds of race, color, or national origin, be excluded from participation in, be denied the benefits of, or be otherwise subjected to discrimination under any program or activity," for which the Recipient receives Federal financial assistance from DOT, including FHWA.*.

The Civil Rights Restoration Act of 1987 clarified the original intent of Congress, with respect to Title VI and other Nondiscrimination requirements (The Age Discrimination Act of 1975, and Section 504 of the Rehabilitation Act of 1973), by restoring the broad, institutional-wide scope and coverage of these nondiscrimination statutes and requirements to include all programs and activities of the Recipient, so long as any portion of the program is Federally assisted.

***FHWA may include additional General Assurances in this section, or reference an addendum here.***

**Specific Assurances**

More specifically, and without limiting the above general Assurance, the Recipient agrees with and gives the following Assurances with respect to its federally assisted programs:

1. The Recipient agrees that each "activity," "facility," or "program," as defined in §§ 21.23 (b) and 21.23 (e) of 49 C.F.R. § 21 will be (with regard to an "activity") facilitated, or will be (with regard to a "facility") operated, or will be (with regard to a "program") conducted in compliance with all requirements imposed by, or pursuant to the Acts and the Regulations.
2. The Recipient will insert the following notification in all solicitations for bids, Requests For Proposals for work, or material subject to the Acts and the Regulations made in connection with all Federal Highway Programs and, in adapted form, in all proposals for negotiated agreements regardless of funding source:

   *The (Agency), in accordance with the provisions of Title VI of the Civil Rights Act of 1964 (78 Stat. 252, 42 U.S.C. §§ 2000d to 2000d-4) and the Regulations, hereby notifies all bidders that it will affirmatively insure that any contract entered into pursuant to this advertisement, disadvantaged business enterprises will be afforded full opportunity to submit bids in response to this invitation and will not be discriminated against on the grounds of race, color, or national origin in consideration for an award.*

3. The Recipient will insert the clauses of Appendix A and E of this Assurance in every contract or agreement subject to the Acts and the Regulations.
4. The Recipient will insert the clauses of Appendix B of this Assurance, as a covenant running with the land, in any deed from the United States effecting or recording a transfer of real property, structures, use, or improvements thereon or interest therein to a Recipient.
5. That where the Recipient receives Federal financial assistance to construct a facility, or part of a facility, the Assurance will extend to the entire facility and facilities operated in connection therewith.
6. That where the Recipient receives Federal financial assistance in the form, or for the acquisition of real property or an interest in real property, the Assurance will extend to rights to space on, over, or under such property.
7. That the Recipient will include the clauses set forth in Appendix C and Appendix D of this Assurance, as a covenant running with the land, in any future deeds, leases, licenses, permits, or similar instruments entered into by the Recipient with other parties:
   a. for the subsequent transfer of real property acquired or improved under the applicable activity, project, or program; and
   b. for the construction or use of, or access to, space on, over, or under real property acquired or improved under the applicable activity, project, or program.
8. That this Assurance obligates the Recipient for the period during which Federal financial assistance is extended to the program, except where the Federal financial assistance is to provide, or is in the form of, personal property, or real property, or interest therein, or structures or improvements thereon, in which case the Assurance obligates the Recipient, or any transferee for the longer of the following periods:

a. the period during which the property is used for a purpose for which the Federal financial assistance is extended, or for another purpose involving the provision of similar services or benefits; or
b. the period during which the Recipient retains ownership or possession of the property.

9. The Recipient will provide for such methods of administration for the program as are found by the Secretary of Transportation or the official to whom he/she delegates specific authority to give reasonable guarantee that it, other recipients, sub-recipients, sub-grantees, contractors, subcontractors, consultants, transferees, successors in interest, and other participants of Federal financial assistance under such program will comply with all requirements imposed or pursuant to the Acts, the Regulations, and this Assurance.
10. The Recipient agrees that the United States has a right to seek judicial enforcement with regard to any matter arising under the Acts, the Regulations, and this Assurance.

***FHWA may include additional Specific Assurances in this section.***

By signing this ASSURANCE, Maine Department of Transportation also agrees to comply (and require any subrecipients, sub-grantees, contractors, successors, transferees, and/or assignees to comply) with all applicable provisions governing the FHWA access to records, accounts, documents, information, facilities, and staff. You also recognize that you must comply with any program or compliance reviews, and/or complaint investigations conducted by *FHWA*. You must keep records, reports, and submit the material for review upon request to FHWA, or their designees in a timely, complete, and accurate way. Additionally, you must comply with all other reporting, data collection, and evaluation requirements, as prescribed by law or detailed in program guidance.

Maine Department of Transportation gives this ASSURANCE in consideration of and for obtaining any Federal grants, loans, contracts, agreements, property, and/or discounts, or other Federal-aid and Federal financial assistance extended after the date hereof to the recipients by the U.S. Department of Transportation. This ASSURANCE is binding on Maine Department of Transportation, other recipients, sub-recipients, sub-grantees, contractors, subcontractors and their subcontractors', transferees, successors in interest, and any other participants in it programs. . The person(s) signing below is authorized to sign this ASSURANCE on behalf of the Recipient.

***Name of Recipient: Maine Department of Transportation***



***David Bernhardt, Commissioner***

DATED: 9/18/14

# APPENDIX A

During the performance of this contract, the contractor, for itself, its assignees, and successors in interest (hereinafter referred to as the "contractor") agrees as follows:

1. **Compliance with Regulations:** The contractor (hereinafter includes consultants) will comply with the Acts and the Regulations relative to Nondiscrimination in Federally-assisted programs of the U.S. Department of Transportation, **Federal Highway Administration**, as they may be amended from time to time, which are herein incorporated by reference and made a part of this contract.

2. **Nondiscrimination:** The contractor, with regard to the work performed by it during the contract, will not discriminate on the grounds of race, color, or national origin in the selection and retention of subcontractors, including procurements of materials and leases of equipment. The contractor will not participate directly or indirectly in the discrimination prohibited by the Acts and the Regulations as set forth in Appendix E, including employment practices when the contract covers any activity, project, or program set forth in Appendix B of 49 CFR Part 21.

3. **Solicitations for Subcontracts, Including Procurements of Materials and Equipment:** In all solicitations, either by competitive bidding, or negotiation made by the contractor for work to be performed under a subcontract, including procurements of materials, or leases of equipment, each potential subcontractor or supplier will be notified by the contractor of the contractor's obligations under this contract and the Acts and the Regulations relative to Non-discrimination on the grounds of race, color, or national origin.

4. **Information and Reports:** The contractor will provide all information and reports required by the Acts, the Regulations and directives issued pursuant thereto and will permit access to its books, records, accounts, other sources of information, and its facilities as may be determined by the Recipient or the **Federal Highway Administration**, to be pertinent to ascertain compliance with such Acts, Regulations, and instructions. Where any information required of a contractor is in the exclusive possession of another who fails or refuses to furnish the information, the contractor will so certify to the Recipient or the **Federal Highway Administration**,, as appropriate, and will set forth what efforts it has made to obtain the information.

5. **Sanctions for Noncompliance:** In the event of a contractor's noncompliance with the Non-discrimination provisions of this contract, the Recipient will impose such contract sanctions as it or the **Federal Highway Administration**, may determine to be appropriate, including, but not limited to:

    a. withholding payments to the contractor under the contract until the contractor complies; and/or
    b. cancelling, terminating, or suspending a contract, in whole or in part.

**Incorporation of Provisions:** The contractor will include the provisions of paragraphs one through six in every subcontract, including procurements of materials and leases of equipment, unless exempt by the Acts, the Regulations and directives issued pursuant thereto. The contractor will take action with respect to any subcontract or procurement as the Recipient or the **Federal Highway Administration**, may direct as a means of enforcing such provisions including sanctions for noncompliance. Provided, that if the contractor becomes involved in, or is threatened with litigation by a subcontractor, or supplier because of such direction, the contractor may request the Recipient to enter into any litigation to protect the interests of the Recipient. In addition, the contractor may request the United States to enter into the litigation to protect the interests of the United States.

**(APPENDIX C TO MAINEDOT TITLE VI ASSURANCE)**

**FEDERAL HIGHWAY ADMINISTRATION ASSISTED PROGRAMS**

The following clauses shall be included in all deeds, licenses, leases, permits, or similar instruments entered into

by the Maine Department of Transportation pursuant to the provisions of Assurance 7(a).

The (grantee, licensee, lessee, permitee, etc., as appropriate) for herself/himself, his/her heirs, personal representatives, successors in interest, and assigns, as a part of the consideration hereof, does hereby covenant and agree [in the case of deeds and leases add "as a covenant running with the land"] that in the event facilities are constructed, maintained, or otherwise operated on the said property described in this (deed, license, lease, permit, etc.) for a purpose for which a Department of Transportation program or activity is extended or for another purpose involving the provision of similar services or benefits, the (grantee, licensee lessee, permitee, etc.) shall maintain and operate such facilities and services in compliance with all other requirements imposed pursuant to Title 49, Code of Federal Regulations, Department of Transportation, Subtitle A, Office of the Secretary, Part 21, Nondiscrimination of Federally-Assisted Programs of the Department of Transportation - Effectuation of Title VI of the Civil Rights Act of 1964, and as said Regulations may be amended.

[Include in licenses, leases, permits, etc.]*

That in the event of breach of any of the above nondiscrimination covenants, Maine Department of Transportation shall have the right to terminate the [license, lease, permit, etc.] and to re-enter and repossess said land and the facilities thereon, and hold the same as if said [licenses, lease, permit, etc.] had never been made or issued.

[Include in deeds]*

That in the event of breach of any of the above nondiscrimination covenants, Maine Department of Transportation shall have the right to re-enter said lands and facilities thereon, and the above described lands and facilities shall thereupon revert to and vest in and become the absolute property of Maine Department of Transportation and its assigns.

The following shall be included in all deeds, licenses, leases, permits, or similar agreements entered into by Maine Department of Transportation pursuant to the provisions of Assurance 7(b).

The (grantee, licensee, lessee, permitee, etc., as appropriate) for herself/himself, his/her personal representatives, successors in interest, and assigns, as a part of the consideration hereof, does hereby covenant and agree (in case of deeds, and leases add "as a covenant running with the land") that (1) no person on the grounds of race, color, or national origin shall be excluded from participation in, be denied the benefits of, or be otherwise subjected to discrimination in the use of said facilities, (2) that in the construction of any improvements on, over or under such land and the furnishing services thereon, no person on the grounds of race, color, or national origin shall be excluded from the participation in, be denied the benefits of, or be otherwise subjected to discrimination, and (3) that the (grantee, licensee, lessee, permitee, etc.) shall use the premises in compliance with all other requirements imposed by or pursuant to Title 49, Code of Federal Regulations, Department of Transportation, Subtitle A, Office of the Secretary, Part 21, Nondiscrimination in Federally-Assisted Programs of the Department of Transportation - Effectuation of Title VI of the Civil Rights Act of 1964, and as said Regulations may be amended.

[Include in licenses, leases, permits, etc.]*

That in the event of breach of any of the above nondiscrimination covenants, Maine Department of Transportation shall have the right to terminate the [license, lease, permit, etc.] and to re-enter and repossess said land and the facilities thereon, and hold the same as if said [license, lease, permit, etc.] had never been made or issued.

[Include in deeds]*

That in the event of breach of any of the above nondiscrimination covenants, Maine Department of Transportation shall have the right to re-enter said land and facilities thereon, and the above described lands and facilities shall thereupon revert to and vest in and become the absolute property of Maine Department of Transportation and its assigns.

* Reverter clause and related language to be used only when it is determined that such a clause is necessary inorder to effectuate the purpose of Title VI of the Civil Rights Act of 1964.

# APPENDIX D

## CLAUSES FOR CONSTRUCTION/USE/ACCESS TO REAL PROPERTY ACQUIRED UNDER THE ACTIVITY, FACILITY OR PROGRAM

The following clauses will be included in deeds, licenses, permits, or similar instruments/agreements entered into by The Maine Department of Transportation pursuant to the provisions of Assurance 7(b):

A. The (grantee, licensee, permittee, etc., as appropriate) for himself/herself, his/her heirs, personal representatives, successors in interest, and assigns, as a part of the consideration hereof, does hereby covenant and agree (in the case of deeds and leases add, "as a covenant running with the land") that (1) no person on the ground of race, color, or national origin, will be excluded from participation in, denied the benefits of, or be otherwise subjected to discrimination in the use of said facilities, (2) that in the construction of any improvements on, over, or under such land, and the furnishing of services thereon, no person on the ground of race, color, or national origin, will be excluded from participation in, denied the benefits of, or otherwise be subjected to discriminations, (3) that the (grantee, licensees, lessee, permittee, etc.) will use the premises in compliance with all other requirements imposed by or pursuant to the Acts and Regulations, as amended, set forth in this Assurance.

B. With respect to (licenses, leases, permits, etc.), in the event of breach of any of the above Non-discrimination covenants, (***The Maine Department of Transportation***) will have the right to terminate the (license, permit, etc., as appropriate) and to enter or re-enter and repossess said land and the facilities thereon, and hold the same as if said (license, permit, etc., as appropriate) had never been made or issued.*

C. With respect to deeds, in the event of breach of any of the above Non-discrimination covenants, (***The Maine Department of Transportation***) will there upon revert to and vest in and become the absolute property of (***The Maine Department of Transportation***) and its assigns.*

(*Reverter clause and related language to be used only when it is determined that such a clause is necessary to make clear the purpose of Title VI.)

# APPENDIX E

During the performance of this contract, the contractor, for itself, its assignees, and successors in interest (hereinafter referred to as the "contractor") agrees to comply with the following non-discrimination statutes and authorities; including but not limited to:

**Pertinent Non-Discrimination Authorities:**

- Title VI of the Civil Rights Act of 1964 (42 U.S.C. §2000d *et seq*., 78 stat. 252), (prohibits discrimination on the basis of race, color, national origin); and 49 CFR Part 21.
- The Uniform Relocation Assistance and Real Property Acquisition Policies Act of 1970, (42 U.S.C. §4601), (prohibits unfair treatment of persons displaced or whose property has been acquired because of Federal or Federal-aid programs and projects);
- Federal-Aid Highway Act of 1973, (23 U.S.C. §324 *et seq*.), (prohibits discrimination on the basis of sex);
- Section 504 of the Rehabilitation Act of 1973, (29 U.S.C. §794 *et seq*.), as amended, (prohibits discrimination on the basis of disability); and 49 CFR Part 27;
- The Age Discrimination Act of 1975, as amended, (42 U.S.C. §6101 *et seq*.), (prohibits discrimination on the basis of age);
- Airport and Airway Improvement Act of 1982, (49 U.S.C. §471, Section 47123), as amended, (prohibits discrimination based on race, creed, color, national origin, or sex);
- The Civil Rights Restoration Act of 1987, (PL 100-209), (Broadened the scope, coverage and applicability of Title VI of the Civil Rights Act of 1964, The Age Discrimination Act of 1975 and Section 504 of the Rehabilitation Act of 1973, by expanding the definition of the terms "programs or activities" to include all of the programs or activities of the Federal-aid recipients, sub-recipients and contractors, whether such programs or activities are Federally funded or not);
- Titles II and III of the Americans with Disabilities Act, which prohibit discrimination on the basis of disability in the operation of public entities, public and private transportation systems, places of public accommodation, and certain testing entities (42 U.S.C. §§12131-12189) as implemented by Department of Transportation regulations at 49 C.F.R. Parts 37 and 38;
- The Federal Aviation Administration's Non-discrimination statute (49 U.S.C. §47123) (prohibits discrimination on the basis of race, color, national origin and sex);
- Executive Order 12898, Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations, which ensures discrimination against minority populations by discouraging programs, policies, and activities with disproportionately high and adverse human health or environmental effects on minority and low-income populations;
- Executive Order 13166, Improving Access to Services for Persons with Limited English Proficiency, and resulting agency guidance, national origin discrimination includes discrimination because of limited English proficiency (LEP). To ensure compliance with Title VI, you must take reasonable steps to ensure that LEP persons have meaningful access to your programs (70 Fed. Reg. at 74087 to 74100);
- Title IX of the Education Amendments of 1972, as amended, which prohibits you from discriminating of sex in education programs or activities (20 U.S.C. 1681 et seq.).

# Environmental Summary Sheet

**WIN: 21942.02** **Date Submitted: 2/13/18**
**Town: Portland**
**CPD Team Leader:** Kristen Chamberlain
**ENV Field Contact: Peter Newkirk**

**NEPA Complete: 1/3/18-Programmatic CE (FHWA); 1/23/18 (MARAD)**

☒ **Section 106**
SHPO Concurrence -No Effect
Section 106 Resources: None

☒ **Section 4(f) and 6(f)**
Section 4(f)
Review Complete - No 4(f) Properties
Section 6(f)
Not Applicable

☒ **Maine Department of Inland Fisheries and Wildlife Essential Habitat**

Not Applicable Timing Window: Not Applicable

☒ **Section 7**

**Species of Concern: Atlantic Salmon DPS - No Effect**
**Comments/References:** No in-water work

**Species of Concern: Northern Long-Eared Bat – No Effect**
**Comments/References:** No tree removal

☒ **Essential Fish Habitat**
**No Effect-No in-water work**

☒ **Maine Department of Conservation/Public Lands, Submerged Land Lease**
Not Applicable

☒ **Maine Land Use Regulation Commission**
N/A

☒ **Maine Department of Environmental Protection**
No Natural Resource Permits required. **Stormwater Notice of Intent to Comply with Maine Construction General Permit submitted 1/4/18.**

**Applicable Standards and Permits are included with the contract*

☒ **Army Corps of Engineers, Section 10 of the Rivers and Harbors Act and Section 404 of the Clean Water Act.**
**Category 2**

**Applicable Standards and Permits are included with the contract*

☒ **Stormwater Review**
**City of Portland Site Plan Approval and Maine DEP NOI to Comply with ME CGP by Woodard & Curran**

☒ **Special Provisions Required**

| | | |
|---|---|---|
| **Special Provision 105-Timing of Work Restriction** | N/A☒ | Applicable☐ |
| **Special Provision 656-Minor Soil Disturbance** | N/A☒ | Applicable☐ |
| **Standard Specification 656-Erosion Control Plan** | N/A☐ | **Applicable**☒ |
| **Special Provision 203-Dredge Spec** | N/A☒ | Applicable☐ |
| **General Note for Hazardous Waste** | N/A☐ | **Applicable**☒ |
| **Special Provision 203-Hazardous Waste** | N/A☒ | Applicable☐ |
| **Special Provision 105.9** | N/A☒ | Applicable☐ |

**All permits and approvals based on plans/scope as of: 1/8/18*