

00 01 01
Project Manual and Specifications

**BARN ENVELOPE AND INTERIOR RENOVATIONS AND PARK
UTILITY IMPROVEMENTS (BGS 3519)
AT LAMOINE STATE PARK IN LAMOINE MAINE**

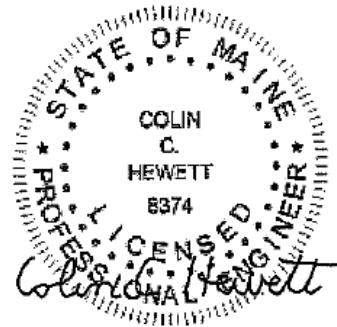
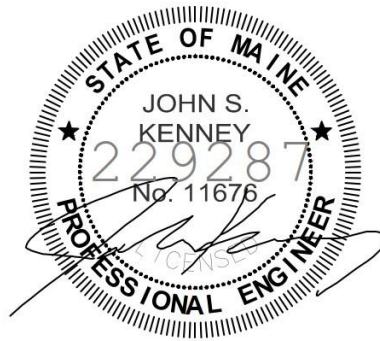
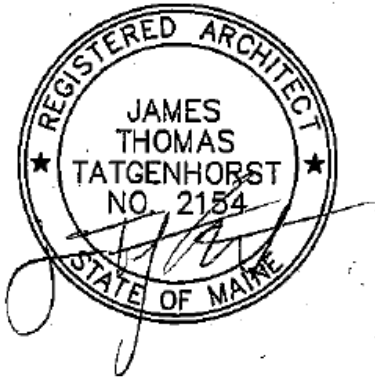
**Department of Agriculture, Conservation, and Forestry
Bangor, Maine**

Owner:
State of Maine

Prepared by:
Lewis + Malm Architecture
119 Main Street / P.O. Box 1459
Bucksport, Maine 04416

20. September, 2024

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SEALS PAGE



END OF SECTION 00 01 10

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DIVISION 49:	RESERVED (NOT USED)	0

Note: Since the Construction Specifications for this project are being distributed to bidders electronically, bidders shall confirm by email to jim@lewisandmalm.com that all Construction Specifications listed above have been transferred successfully at the time of Pre-Bid Construction Document distribution. Failure to provide said confirmation releases the Architect/Engineer team of any Contractor claims of missing Contract Documents.

END OF SECTION

SECTION 00 01 15
LIST OF DRAWING SHEETS

000 SERIES / GENERAL DRAWINGS:

Drawing 1 A0 MAIN COVER SHEET (6 Sub-Projects)

NOTE: Each Sub-Project Drawing Series is provided with its own A0 Cover Sheet for that specific group of drawings (these additional cover sheets are not listed herein).

GENERAL NOTES:

Drawing 2 C001 GENRAL SITE NOTES
Drawing 3 C002 EROSION CONTROL NOTES
Drawing 4 C003 SITE LOCATION
Drawing 5 NOT USED
Drawing 6 E001 LIGHTING FIXTURE SCHEDULE

100 SERIES / BARN RENOVATION DRAWINGS:

CIVIL:

Drawing 7 C100 SITE REMOVALS PLAN
Drawing 8 C101 SITE LAYOUT PLAN
Drawing 9 C102 SITE DETAILS

STRUCTURAL:

Drawing 10 S.000 MISCELLANEOUS DETAILS
Drawing 11 S.101 SECOND FLOOR FRAMING PLAN
Drawing 12 S.102 ROOF FRAMING PLAN
Drawing 13 S.110 TYPICAL X-SECTION @ INTERIOR ROOF TRUSS / MISC. DETAILS
Drawing 14 S.201 BASEMENT FOUNDATION PLAN (Price w/ Sub-Project #1: BARN RENO)
Drawing 15 S.202 FIRST FLOOR FRAMING PLAN (Price w/ Sub-Project #1: BARN RENO)
Drawing 16 S.210 MISCELLANEOUS DETAILS (Price w/ Sub-Project #1: BARN RENO)

ARCHITECTURAL:

Drawing 17 R100 REMOVALS – FIRST & SECOND FLOOR BARN PLANS
Drawing 18 R102 REMOVALS – OFFICE AREA (Price w/ Sub-Project #1: BARN RENO)
Drawing 19 A100 FIRST FLOOR BARN PLAN
Drawing 20 A101 SECOND FLOOR BARN PLAN
Drawing 21 A102 DOOR SCHEDULE, DOOR & WINDOW TYPES
Drawing 22 A103 ELEVATIONS
Drawing 23 A104 ELEVATIONS
Drawing 24 A105 BUILDING SECTION
Drawing 25 A106 BUILDING DETAILS
Drawing 26 A107 WINDOW DETAILS
Drawing 27 A108 WINDOW DETAILS
Drawing 28 A109 WALL SECTIONS

MECHANICAL & PLUMBING:

Drawing 29 M101 FIRST FLOOR HVAC PLANS

ELECTRICAL:

Drawing 30 E101 REMOVALS OFFICE AREA (Price w/ Sub-Project #1: BARN RENO)
Drawing 31 E102 SECOND FLOOR LIGHTING PLAN

200 SERIES / OFFICE RENOVATION DRAWINGS:

CIVIL: (Not Used)

STRUCTURAL: (Refer to BARN RENO)

ARCHITECTURAL:

Drawing 32	A200 OFFICE FLOOR PLAN & ELEVATIONS
Drawing 33	A201 DOOR SCHEDULE, DOOR & WINDOW TYPES
Drawing 34	A202 INTERIOR ELEVATIONS
Drawing 35	A203 ADA TYPICAL DIMENSIONS
Drawing 36	A204 DECK & RAMP FRAMING
Drawing 37	A205 FINISH SCHEDULE & FINISH FLOOR PLAN
Drawing 38	A206 DECK DETAILS

MECHANICAL:

Drawing 39	M201 FIRST FLOOR HVAC REMOVALS PLANS
Drawing 40	M202 FIRST FLOOR HVAC PLAN
Drawing 41	M203 SECOND FLOOR HVAC PLAN
Drawing 42	M204 HVAC SCHEDULE & DETAILS

ELECTRICAL:

Drawing 43	E200 FIRST FLOOR ELECTRICAL REMOVALS PLAN
Drawing 44	E201 FIRST FLOOR LIGHTING PLAN
Drawing 45	E202 FIRST FLOOR POWER & SYSTEMS PLAN
Drawing 46	E203 SECOND FLOOR POWER & SYSTEMS PLAN

PLUMBING:

Drawing 47	P201 BASEMENT & FIRST FLOOR REMOVALS PLAN
Drawing 48	P202 FIRST FLOOR & BASEMENT PLUMBING PLANS

300 SERIES / CAMPSITE INFRASTRUCTURE UPGRADE DRAWINGS:

CIVIL:

Drawing 49	C300 EXISTING CONDITIONS
Drawing 50	C301 WATER PLAN
Drawing 51	C302 WATER PLAN
Drawing 52	C303 WATER PLAN
Drawing 53	C304 SITE LAYOUT PLAN
Drawing 54	C305 SITE LAYOUT PLAN
Drawing 55	C306 SITE LAYOUT PLAN
Drawing 56	C307 SITE DETAILS

STRUCTURAL: (Not Used)

ARCHITECTURAL: (Not Used)

MECHANICAL: (Not Used)

ELECTRICAL:

Drawing 57	E300 ELECTRICAL SITE PLAN
Drawing 58	E301 SITE ELECTRICAL RISER DIAGRAM
Drawing 59	E302 CAMPSITE SCHEDULES & DETAILS
Drawing 60	E303 ELECTRICAL PLAN

PLUMBING:

2308.1 / LAMOINE STATE PARK - BGS 3519 - SECTION 000115

Drawing 61 P301 COMFORT STATION PLANS
Drawing 62 P302 PLUMBING SCHEDULES & DETAILS

400 SERIES / WELL SYSTEM UPGRADE DRAWINGS:

CIVIL: (Not Used, Refer to 300 Series for NEW PUMPHOUSE Location)

STRUCTURAL: (Not Used, Refer to Architectural)

ARCHITECTURAL:

Drawing 63 A401 WATER TREATMENT SYSTEM PUMPHOUSE BUILDING

MECHANICAL: (Not Used)

ELECTRICAL:

Drawing 64 E401 ELECTRICAL PLAN

PLUMBING:

Drawing 65 P401 PLUMBING SCHEDULES & DETAILS

500 SERIES / ENTRY GATEHOUSE & GATE DRAWINGS:

CIVIL:

Drawing 66 C500 SITE REMOVALS PLAN
Drawing 67 C501 SITE LAYOUT PLAN
Drawing 68 C502 SITE DETAILS

STRUCTURAL: (Not Used)

ARCHITECTURAL:

Drawing 69 R500 REMOVALS FLOOR PLAN
Drawing 70 R501 REMOVALS ELEVATION
Drawing 71 A500 FIRST FLOOR PLAN
Drawing 72 A501 ELEVATIONS
Drawing 73 A502 BUILDING SECTION, WINDOW & DOOR TYPES
Drawing 74 A503 FOUNDATION PLAN
Drawing 75 A504 FRAMING PLAN
Drawing 76 A505 WINDOW & DOOR DETAILS
Drawing 77 A506 INTERIOR ELEVATIONS
Drawing 78 A507 CASEWORK DETAILS
Drawing 79 A508 GATE DETAILS

MECHANICAL: (Not Used)

ELECTRICAL:

Drawing 80 E501 ELECTRICAL PLAN

PLUMBING:

Drawing 81 P501 PLUMBING PLANS, SCHEDULE & DETAILS

600 SERIES / POLE BARN DRAWINGS:

CIVIL:

Drawing 82	C600 POLE BARN SITE REMOVALS PLAN
Drawing 83	C601 POLE BARN SITE LAYOUT PLAN
Drawing 84	C602 POLE BARN SITE DETAILS

STRUCTURAL: (Not Used, Refer to Architectural)

ARCHITECTURAL:

Drawing 85	A600 PINNACLE HILL ENGINEERING COVER SHEET
Drawing 86	A601 FLOOR PLAN
Drawing 87	A602 ELEVATIONS
Drawing 88	A603 FOUNDATION PLAN
Drawing 89	A604 FOUNDATION SECTION
Drawing 90	A605 FOUNDATION DETAILS
Drawing 91	A606 FRONT & REAR WALL FRAMING – 5 BAY
Drawing 92	A607 END WALL FRAMING
Drawing 93	A608 BRACING DETAILS
Drawing 94	A609 ROOF DETAILS
Drawing 95	A610 GENERAL NOTES & TIMBER SCHEDULE
Drawing 96	A611 STAIRWAY OPTION ELEVATIONS
Drawing 97	A612 STAIR FRAMING & FOUNDATIONS
Drawing 98	A613 STAIRWAY DETAILS
Drawing 99	A614 FRONT WALL SLIDING DOOR TRACK DETAILS
Drawing 100	A615 SLIDING DOOR DETAILS
Drawing 101	A616 END WALL LOFT DOOR OPTION

MECHANICAL: (Not Used)

ELECTRICAL: (Not Used)

PLUMBING: (Not Used)

Total number of Drawings: 107 (including all cover sheets)

Note: Since the Construction Documents for this project are being distributed to bidders electronically, bidders shall confirm by email to jim@lewisandmalm.com that all Construction Drawings listed above have been transferred successfully upon receipt. Failure to provide said confirmation releases the Architect/Engineer team of any Contractor claims of missing Contract Documents.

END OF SECTION 00 01 15

00 11 13
Notice to Contractors

**BARN ENVELOPE AND INTERIOR RENOVATIONS AND PARK
UTILITY IMPROVEMENTS
AT LAMOINE STATE PARK IN LAMOINE MAINE**

(BGS PROJECT NUMBER 3519 = BGS 3519 + BGS 3660)

The Overall Project consists of six (6) sub-project construction areas that shall be individually priced.

The Base bid shall include the sum of the six (6) sub-project amounts, plus Allowances, General Contractor markup costs (General Conditions, Overhead & Profit, Insurance & Bonds):

<i>Drawing Series 100</i>	<i>Barn Renovations (RENO / BGS-3519)</i>
<i>Drawing Series 200</i>	<i>DMR Office Fit-Out (RENO /BGS-3660)</i>
<i>Drawing Series 300</i>	<i>Campsite Infrastructure Upgrades (RENO + NC / BGS-3519)</i>
<i>Drawing Series 400</i>	<i>Well System Upgrades & Pumphouse (RENO +NC / BGS-3519)</i>
<i>Drawing Series 500</i>	<i>Entry Building Expansion & Gate (RENO &+ NC / BGS-3519)</i>
<i>Drawing Series 600</i>	<i>5-Bay Pole Barn (NC / BGS-3519)</i>

Note: BGS Project Numbers 3519 + 3660 are for the Owner's funding monitoring use. The GC is advised that two (2) Schedules of Values will therefore be required at all Requisitions.

The contract shall designate the Substantial Completion Date on or before 15. December, 2025, and the Contract Final Completion Date on or before 31. December, 2025.

Submit bids on a completed Contractor Bid Form (section 00 41 13), provided in the Bid Documents, include bid security as required, for the overall combined bid amount, and scan each item as an attachment to an email addressed to: BGS.Architect@Maine.gov, so as to be received no later than **2:00:00 p.m. on 22. October, 2024**. The email subject line shall be marked "**Bid for BARN ENVELOPE AND INTERIOR RENOVATIONS AND PARK UTILITY IMPROVEMENTS AT LAMOINE STATE PARK IN LAMOINE MAINE**".

Bid submissions will be opened and read aloud at the time and date noted above at the Bureau of General Services office, accessible as a video conference call. Those who wish to participate in the call must submit a request for access to BGS.Architect@Maine.gov.

Any bid received after the noted time will not be considered a valid bid and will remain unopened. Any bid submitted by any other means will not be considered a valid bid. In certain circumstances, the Bureau of General Services may require the Bidder to surrender a valid paper copy of the bid form or the bid security document. The Owner reserves the right to accept or reject any or all bids as may best serve the interest of the Owner.

1. Questions and comments on the *bid opening process* shall be addressed to: Division of Planning, Design & Construction, Bureau of General Services, 77 State House Station, Augusta, Maine 04333-0077, BGS.Architect@Maine.gov.

00 11 13
Notice to Contractors

2. Questions and comments regarding the *project* design specifications or drawings shall be directed in writing by email to the Consultant during the bid period prior to the question and comment deadline of 5:00 p.m. on Wednesday 16. October, 2024.

Lewis + Malm Architecture

James T. Tatgenhorst

and

Charles Earley

Architect

Project Manager/Sr. Designer

jim@lewisandmalm.com

charles@lewisandmalm.com

Please copy both Jim & Charles with each email inquiry simultaneously.

NOTE: For clarity, all written inquiries shall include references to:

- Sub-Project Number;
- Drawing Series/Page Number; and/or
- Specification Section/Page/Paragraph.

3. Bid security *is required* on this project.

The Bidder shall include a satisfactory Bid Bond (section 00 43 13) or a certified or cashier's check for 5% of the overall combined bid amount with the completed bid form submitted to the Owner. The Bid Bond form is available on the BGS website.

4. Performance and Payment Bonds *are required* on this project.

If noted above as required, or if any combination of Base Bid and Alternate Bids amounts selected in the award of the contract exceeds \$125,000.00, the selected Contractor shall furnish a 100% contract Performance Bond (section 00 61 13.13) and a 100% contract Payment Bond (section 00 61 13.16) in the contract amount to cover the execution of the Work. Bond forms are available on the BGS website.

5. Filed Sub-bids *are not required* on this project.

6. Pre-qualified General Contractors *are not utilized* on this project.

7. A non-mandatory on-site pre-bid conference *will be conducted* for this project on Wednesday 09. October, 2024 at 10:00 am at Lamoine State Park in Lamoine, Maine. Interested General Contractors and Sub-Contractors are invited to meet at the park entry parking Lot.

8. Bid Documents - full sets only - will be available on or about 23. September, 2024 and may be obtained at no cost (electronic Bid Documents only) from:

Lewis + Malm Architecture

119 Main Street, Suite C

Bucksport, Maine 04416

Phone: 207.469.7440 or 207.356.8369 (Jim Tatgenhorst) 207.659.6683 (Charles Earley cell)

00 11 13
Notice to Contractors

9. Bid Documents may be examined at:

AGC Maine

188 Whitten Road, Augusta, ME 04330

207-622-4741

Construction Summary

734 Chestnut Street, Manchester, NH 03104

603-627-8856



Reference: 2308.1 / LAMOINE – BGS 3519

**BARN ENVELOPE AND INTERIOR RENOVATIONS AND PARK UTILITY IMPROVEMENTS
AT LAMOINE STATE PARK IN LAMOINE, MAINE**

Electronic Documents

Prospective Bidders,

Should your company wish to obtain electronic versions of the BID-DOCUMENTS (Drawings & Specifications), for the above referenced project, we encourage you to register as a Plan Holder / Prospective Bidder by filling out, signing a .pdf copy of the

NOTICE OF AGREEMENT FOR ELECTRONIC PLANS & SPECIFICATIONS

by return email to:

Jim Tatgenhorst, Architect at jim@lewisandmalm.com

Upon receipt of the above mentioned completed agreement document, we will provide you with a DropBox link for downloading purposes. DropBox links cannot be forwarded.

For more information, please contact:

Lewis + Malm Architecture

Jim Tatgenhorst, Architect
119 Main Street, Suite C
Bucksport, Maine 04416
Mobile: 207.356.8369

NOTICE OF AGREEMENT FOR ELECTRONIC PLANS & SPECIFICATIONS

In accepting and utilizing any drawings, reports and data on any form of electronic media generated and furnished by the Architect, the Recipient agrees that all such electronic files are instruments of service of the Architect, who shall be deemed the author, and shall retain all common law, statutory law and other rights, without limitation, including copyrights.

The Recipient agrees not to reuse these electronic files, in whole or in part, for any purpose other than for the Project. The recipient agrees not to transfer these electronic files to others without the prior written consent of the Architect. Should the Recipient use web-based methods, such as an FTP or Sharepoint site, allowing other parties to access the electronic documents, said access shall be managed/controlled by the Recipient by means of requiring applicants to register prior to accessing the electronic documents. The Recipient further agrees that Architect shall have no responsibility or liability to Recipient or others for any changes made by anyone other than the Architect or for any reuse of the electronic files without the prior written consent of the Architect.

In addition, the Recipient agrees, to the fullest extent permitted by law, to indemnify and hold harmless the Architect, its officers, directors, employees and sub-consultants (collectively, Consultant) against all damages, liabilities or costs, including reasonable attorneys' fees and defense costs, arising from any changes made by anyone other than the Architect or from any use or reuse of the electronic files without the prior written consent of the Architect.

Under no circumstances shall delivery of electronic files for use by the Recipient be deemed a sale by the Architect, and the Architect makes no warranties, either express or implied, of merchantability and fitness for any particular purpose. In no event shall the Architect be liable for indirect or consequential damages as a result of the Recipient's unauthorized use or reuse of the electronic files.

Signature of Recipient of Electronic Plans & Specifications
For 2308 / LAMOINE – BGS 3519

Date

Recipient's Name

Company Name

Phone

Email

PLEASE USE BLOCK SCRIPT

Return signed/dated .pdf of this page by email to:

Jim Tatgenhorst, Architect at jim@lewisandmalm.com

Cell: 207.356.8369

00 21 13
Instructions to Bidders

1. Bidder Requirements

- 1.1 A bidder is a Contractor which is evidently qualified, or has been specifically pre-qualified by the Bureau of General Services, to bid on the proposed project described in the Bid Documents.
- 1.2 Contractors and Subcontractors bidding on projects that utilize Filed Sub-bids shall follow the requirements outlined in these Bid Documents for such projects. See Section 00 22 13 for additional information.
- 1.3 Contractors and Subcontractors are not eligible to bid on the project when their access to project design documents prior to the bid period distribution of documents creates an unfair bidding advantage. Prohibited access includes consultation with the Owner or with design professionals engaged by the Owner regarding cost estimating, constructability review, or project scheduling. This prohibition to bid applies to open, competitive bidding or pre-qualified contractor bidding or Filed Sub-bidding. The Bureau may require additional information to determine if the activities of a Contractor constitute an unfair bidding advantage.
- 1.4 Each bidder is responsible for becoming thoroughly familiar with the Bid Documents prior to submitting a bid. The failure of a bidder to review evident site conditions, to attend available pre-bid conferences, or to receive, examine, or act on addenda to the Bid Documents shall not relieve that bidder from any obligation with respect to their bid or the execution of the work as a Contractor.
- 1.5 Prior to the award of the contract, General Contractor bidders or Filed Sub-bidders may be required to provide documented evidence to the Owner or the Bureau showing compliance with the provisions of this section, their business experience, financial capability, or performance on previous projects.
- 1.6 The selected General Contractor bidder will be required to provide proof of insurance before a contract can be executed.
- 1.7 Contracts developed from this bid shall not be assigned, sublet or transferred without the written consent of the Owner.
- 1.8 By submitting a bid the Contractor attests that it has not been declared ineligible to bid on State of Maine projects. The Director of the Bureau of General Services may disallow award of this contract to any Contractor if there is evidence that the Contractor or any of its Subcontractors, through their own fault, have been terminated, suspended for cause, debarred from bidding, agreed to refrain from bidding as part of a settlement, have defaulted on a contract, or had a contract completed by another party.
- 1.9 The Contractor attests that it is not presently indicted for or otherwise criminally or civilly charged by a Federal, State or local government entity with commission of any of the following offenses and has not within a three-year period preceding this bid 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 anti-trust statutes or commission of embezzlement, theft, forgery, bribery, falsification or destruction of records, making false statements, or receiving stolen property.

00 21 13
Instructions to Bidders

- 1.10 The Contractor shall not make any award or permit any award (subgrant or contract) at any tier to any party which is debarred or suspended or is otherwise excluded from or ineligible for participation in Federal assistance programs or State of Maine projects.
2. Authority of Owner
 - 2.1 The Owner reserves the right to accept or reject any or all bids as may best serve the interest of the Owner.
 - 2.2 Subject to the Owner's stated right to accept or reject any or all bids, the Contractor shall be selected on the basis of the lowest dollar value of an acceptable Base Bid, or any combination of Base Bid plus Alternate Bids, as well as other limited cost modifications the Owner determines may best serve the interests of the Owner. An acceptable bid is a duly submitted bid from a responsive and responsible bidder.
 - 2.3 The Owner reserves the right to require Bid Bonds or Performance and Payment Bonds for any project of any contract value.
3. Submitting Bids and Bid Requirements
 - 3.1 Each bid shall be submitted on the forms provided in the Bid Documents.
 - 3.2 Each bid shall be valid for a period of thirty calendar days following the Project bid closing date and time. The bid expiration date may be extended in unusual circumstances by mutual consent of the Bidder and the Owner. The bid amount shall not be modified due to the bid expiration date extension.
 - 3.3 Any provision contained in a bid which shows cost escalation, or any modification of schedule or other requirements shall not be accepted. Such a provision causes the bid to be invalid, or, at the discretion of the Owner and BGS, that element of the bid submission may be disregarded for the purpose of awarding the contract without that provision.
 - 3.4 Bidders shall include a Bid Bond or other approved bid security with the bid form submitted to the Owner when the bid form indicates such bid security is required. The bond value shall be 5% of the bid amount. The form of bond is shown in section 00 43 13.
 - 3.5 Bidders recognize that inclusion of contract bonds and the cost of those bonds is dependent on the awarded contract dollar value. Therefore, a Base Bid, or any combination of Base Bid plus Alternate Bids, as well as other limited cost modifications, resulting in a contract award shall include the cost of Performance and Payment Bonds in the submitted bid amount when the construction contract value is over \$125,000.00. Similarly, the cost of Performance and Payment Bonds is excluded in the submitted bid amount when the construction contract value is \$125,000.00 or less unless bonds are specifically required by the Bid Documents. When required for the project, the selected Contractor shall provide these bonds before a contract can be executed, pursuant to 14 M.R.S.A., Section 871, Public Works Contractors' Surety Bond Law of 1971, subsection 3. The form of bonds is shown in section 00 61 13.13 and 00 61 13.16.

00 21 13
Instructions to Bidders

- 3.6 Bidders may modify bids in writing, by the same means as the original bid submission, prior to the bid closing time. Such written amendments shall not disclose the amount of the initial bid. If so disclosed, the entire bid is considered invalid.
- 3.7 Bidders implicitly acknowledge all Addenda issued when they submit the bid form. By usual practice the Consultant shall not issue Addenda less than 72 hours prior to the bid closing time, to allow ample time for bidders to incorporate the information. However, some information, such as extending the bid due date and time, may be issued with shorter notice. Addenda shall be issued to all companies who are registered holders of Bid Documents.
- 3.8 A bid may be withdrawn without penalty if a written request by the bidder is presented to the Owner prior to the bid closing time. Such written withdrawal requests are subject to verification as required by the Bureau.
- A bid may be withdrawn without penalty after the bid closing time if, in the determination of the Bureau, evidence provided by the Contractor shows an apparent unintended error such as a miscalculation, or an erroneous number on estimating documents, was the cause of an inaccurate bid. The Bureau may allow withdrawal in consideration of the bid bond or, without utilizing a bid bond, if the Bureau considers documented evidence provided by the Contractor shows factual errors had been made on the bid form.
- 3.9 In the event State of Maine Offices unexpectedly close on the published date of a public bid opening in the location of that bid opening, prior to the time of the scheduled deadline, the new deadline for the public bid opening will be the following business day at the originally scheduled hour of the day, at the original location. Official closings are posted on the State of Maine government website.
- 3.10 The Owner may require, in a Notice of Intent to Award letter to the apparent low bidder, a Schedule of Values, Project Schedule, and List of Subcontractors and Suppliers as both a demonstration of capability of the Bidder and as a condition of award.
- 3.11 Projects which require a State of Maine wage determination will include that schedule as part of the Bid Documents. See section 00 73 46, if such rates are required.
- 3.12 Projects which require compliance with the Davis-Bacon Act are subject to the regulations contained the Code for Federal Regulations and the federal wage determination which is made a part of the Bid Documents. See section 00 73 46, if such rates are required.
- 3.13 The Owner is exempt from the payment of Maine State sales and use taxes as provided in 36 M.R.S. §1760 (1). The Contractor and Subcontractors shall not include taxes on exempt items in the construction contract.

SECTION 00 41 43 CONTRACTOR BID FORM

**BARN ENVELOPE AND INTERIOR RENOVATIONS AND PARK UTILITY IMPROVEMENTS
AT LAMOINE STATE PARK IN LAMOINE MAINE**

BGS Project #3519 (= BGS 3519 + BGS 3660)

Bid Form submitted by:

Bid Administrator:

Deane Rykerson, Project Manager
Bureau of General Services
111 Sewall Street, Cross State Office Building, 4th floor
77 State House Station
Augusta, Maine 04333-0077

BGS.Architect@Maine.gov

Bidder:

Signature:	_____
Printed name and title:	_____
Company name:	_____
Mailing address:	_____
City, state, zip code:	_____
Phone number:	_____
Email address:	_____
State of incorporation, if a corporation:	_____
List of all partners, if a partnership:	_____

1. The Bidder agrees, if the Owner offers to award the contract, to provide any and all bonds and certificates of insurance, as well as Schedule of Values, Project Schedule, and List of Subcontractors and Suppliers, and to sign the designated Construction Contract within twelve (12) calendar days after the date of notification of such acceptance, except if the twelfth (12th) day falls on a State of Maine government holiday or other closure day, or a Saturday, or a Sunday, in which case the aforementioned documents must be received before 12:00 noon on the first available business day following the holiday, other closure day, Saturday, or Sunday.
2. As a guarantee thereof, the Bidder submits, together with this bid, a bid bond, based on the Overall Project Base Bid amount, or other acceptable instrument as and if required by the Bid Documents.

SECTION 00 41 43 CONTRACTOR BID FORM

3. The Bidder, having carefully examined the BARN ENVELOPE AND INTERIOR RENOVATIONS AND PARK UTILITY IMPROVEMENTS AT LAMOINE STATE PARK IN LAMOINE MAINE Project Manual dated 20. September, 2024, prepared by Lewis + Malm Architecture, as well as Specifications, Drawings, and any Addenda, the form of contract, and the premises and conditions relating to the work, proposes to furnish all labor, equipment and materials necessary for and reasonably incidental to the construction and completion of this project for the

A. **Overall Project Base Bid** (Total) amount of: \$ _____ .00

The Base bid shall include the sum of the six (6) sub-project amounts in 3.1 below, plus Allowances and General Contractor markup costs (General Conditions, Overhead & Profit, Insurance & Bonds):

3.1 The Base Bid includes the following six (6) Sub-Project Base Bid Amounts (breakdown required):

A.	Drawing series 100 / Barn Renovations (BGS 3519)	\$ _____ .00
B.	Drawing Series 200 / DMR Office Fit-Out (BGS 3660)	\$ _____ .00
C.	Drawing Series 300 / Campsite Infrastructure Upgrades (BGS 3519)	\$ _____ .00
D.	Drawing Series 400 / Well System Upgrades & Pumphouse (BGS 3519)	\$ _____ .00
E.	Drawing Series 500 / Entry Building Expansion & Gate (BGS 3519)	\$ _____ .00
F.	Drawing Series 600 / 5-Bay Pole Barn (BGS 3519)	\$ _____ .00

Notes:

- Failure to submit separate Bid amounts for each of the six (6) Sub-Projects above shall constitute a non-compliant Overall Project Bid.
 - BGS Project Numbers 3519 + 3660 are for the Owner's funding monitoring use. The GC is advised that two (2) Schedules of Values will therefore be required at all Requisitions.
4. Allowances are part of this project and the Bidder acknowledges that the total Allowance amount listed herein is included in the Overall Project Base Bid amount.

Refer to SECTION 00 21 00 Allowances for details.

\$ 98,000.00

5. Unit Prices are on this project.

Refer to SECTION 01 22 00 Unit Prices for details and the Unit Prices bidding requirements indicated therein. GC shall attach their Unit Prices List to this Bid Form.

SECTION 00 41 43 CONTRACTOR BID FORM

6. Filed Sub-bids *are not required* on this project.
7. Bid security *is required* on this project and shall be based solely on the Overall Project Base Bid (Total) amount listed in 3.A. above (see SECTION 00 43 13 Contractor Bid Bond Sample).
8. Alternate Bids are on this project.

Refer to SECTION 01 23 00 Alternates for details and the Alternate Bids listed on the following page.

Any dollar amount line below that is left blank by the Bidder shall be read as a bid of **\$0.00**.

<i>1 Alternate #1: BARN GUTTER SYSTEM</i>	<i>\$_____</i>	<i><u>.00</u></i>
<i>2 Alternate #2: DMR OFFICE VESTIBULE</i>	<i>\$_____</i>	<i><u>.00</u></i>
<i>3 Alternate #3: DMR OFFICE CARPET TILE</i>	<i>\$_____</i>	<i><u>.00</u></i>
<i>4 Alternate #4: ADDITIONAL SLIDING DOORS</i>	<i>\$_____</i>	<i><u>.00</u></i>

00 43 13
Contractor Bid Bond

Bond No.: insert bond number

We, the undersigned, insert company name of Contractor, select type of entity of insert name of municipality in the State of insert name of state as principal, and insert name of surety as Surety, are hereby held and firmly bound unto select title of obligee in the penal sum of five percent of the bid amount, for the payment of which, well and truly to be made, we hereby jointly and severally bind ourselves, our heirs, executors, administrators, successors and assigns, signed this insert date, i.e.: 8th day of select month, select year, which is the same date as that of the first specified bid due date, or subsequent bid due date revised by addendum.

The condition of the above obligation is such that whereas the principal has submitted to the Owner, or State of Maine, to a certain bid, attached hereto and hereby made a part hereof, to enter into a contract in writing, for the construction of insert name of project as designated in the contract documents

Now therefore:

If said bid shall be rejected, or, in the alternate,

If said bid shall be accepted and the principal shall execute and deliver a contract in the form of contract attached hereto, properly completed in accordance with said bid, and shall furnish a bond for the 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 void.

Otherwise, the same shall remain in force and effect- it being expressly understood and agreed that the liability of the Surety for any and all claims hereunder shall, in no event, exceed the penal amount of this obligation as herein stated.

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

00 43 13
Contractor Bid Bond

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

Signed and sealed this *insert date, i.e.: 8th* day of *select month, select year*, which is the same date as that of the first specified bid due date, or subsequent bid due date revised by addendum.

Contractor

(Signature)

insert name and title

insert company name

insert address
insert city state zip code

Surety

(Signature)

insert name and title

insert company name

insert address
insert city state zip code

If Contractor is a partnership, all partners shall execute the bond. A power of attorney document indicating that it still is in full force and effect shall be provided by the person executing this bond.

State of Maine CONSTRUCTION CONTRACT

Large Construction Project

*This form is used when the Contract value is \$50,000 or greater.
The Project Manual, Specifications and Drawings, and any Addenda are considered part of this Contract.*

Agreement entered into by and between the contracting entity name hereinafter called the **Owner** and Contractor company name hereinafter called the **Contractor**.

BGS Project No.: number assigned by BGS

Other Project No.: _____

For the following Project: title of project as shown on bid documents at facility or campus name, municipality, Maine.

The Specifications and the Drawings have been prepared by Consultant firm name, acting as Professional-of-Record and named in the documents as the Consultant Architect or Engineer.

The *Owner* and *Contractor* agree as follows:

ARTICLE 1 COMPENSATION AND PAYMENTS

1.1 The Owner shall pay the Contractor to furnish all labor, equipment, materials and incidentals necessary for the construction of the Work described in the Specifications and shown on the Drawings the Contract Amount as shown below.

Base Bid	<u>\$0.00</u>
<u>Alternate Bid number and name or "no Alternates"</u>	<u>\$0.00</u>
<u>Alternate Bid number and name or "no Alternates"</u>	<u>\$0.00</u>
<u>Alternate Bid number and name or "no Alternates"</u>	<u>\$0.00</u>
<u>Alternate Bid number and name or "no Alternates"</u>	<u>\$0.00</u>
<u>Alternate Bid number and name or "no Alternates"</u>	<u>\$0.00</u>
Total Contract Amount	<u>\$0.00</u>

1.2 The Contractor's requisition shall contain sufficient detail and supporting information for the Owner to evaluate and support the payment requested.

1.2.1 Payments are due and payable twenty-five working days from the date of receipt of a Contractor requisition which is approved by the Owner.

1.2.2 Provisions for late payments are governed by 5 M.R.S. Chapter 144, *Payment of Invoices Received from Business Concerns*, and interest shall be calculated at 1% per month.

ARTICLE 2 COMMENCEMENT AND COMPLETION DATES

2.1 The Work of this Contract shall commence no sooner than the date this document is executed by the approval authority, or a subsequent date designated in the contract documents.

2.2 The Substantial Completion Date shall be _____.

2.3 The Work of this Contract shall be completed on or before the Contract Final Completion Date of _____.

2.4 The Contract Expiration Date shall be _____. (This date is the Owner's deadline for internal management of contract accounts. The Contract Expiration Date does not directly relate to any contract obligation of the Contractor.)

ARTICLE 3 INELIGIBLE BIDDER

3.1 By signing this contract the Contractor attests that it has not been declared ineligible to bid on State of Maine projects. The Bureau of General Services may disallow award of this contract to any Contractor if there is evidence that the Contractor or any of its Subcontractors, through their own fault, have been terminated, suspended for cause, debarred from bidding, agreed to refrain from bidding as part of a settlement, have defaulted on a contract, or had a contract completed by another party.

3.2 By signing this contract the Contractor attests that it is not presently indicted for or otherwise criminally or civilly charged by a Federal, State or local government entity with commission of any of the following offenses and has not within a three-year period preceding this bid 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 anti-trust statutes or commission of embezzlement, theft, forgery, bribery, falsification or destruction of records, making false statements, or receiving stolen property.

3.3 The Contractor shall not make any award or permit any award (subgrant or contract) at any tier to any party which is debarred or suspended or is otherwise excluded from or ineligible for participation in Federal assistance programs or State of Maine projects.

ARTICLE 4 CONTRACTOR'S RESPONSIBILITIES

4.1 On this project, the Contractor shall furnish the Owner the appropriate contract bonds in the amount of 100% of the Contract Sum. Contract bonds are mandated if the Contract Sum exceeds \$125,000, or if bonds are specifically required by the Contract Documents.

4.2 The Contractor shall comply with all laws, codes and regulations applicable to the Work.

4.3 The Contractor shall acquire all permits and third-party approvals applicable to the Work not specifically identified as provided by the Owner. Costs for Contractor-provided permits and third-party approvals shall be included in the Contract Sum identified in Section 1.1 above.

4.4 The Contractor shall remain an independent agent for the duration of this Contract, shall not become an employee of the State of Maine, and shall assure that no State employee will be compensated by, or otherwise benefit from, this Contract.

4.5 The Contractor shall be responsible for any design cost, construction cost, or other cost incurred on the Project to the extent caused by the negligent acts, errors or omissions of the Contractor or their Subcontractors in the performance of Work under this Contract.

ARTICLE 5 OWNER'S RESPONSIBILITIES

5.1 The Owner shall provide full information about the objectives, schedule, constraints and existing conditions of the project. The Owner has established a budget with reasonable contingencies that meets the project requirements.

5.2 By signing this contract, the Owner attests that all State of Maine procurement requirements for this contract have been met, including the solicitation of competitive bids.

ARTICLE 6 INSTRUMENTS OF SERVICE

6.1 The Contractor's use of the drawings, specifications and other documents known as the Consultant's Instruments of Service is limited to the execution of the Contractor's scope of work of this project unless the Contractor receives the written consent of the Owner and Consultant for use elsewhere.

ARTICLE 7 MISCELLANEOUS PROVISIONS

7.1 This Contract shall be governed by the laws of the State of Maine.

7.2 The Owner and Contractor, respectively, bind themselves, their partners, successors, assigns and legal representatives to this Contract. Neither party to this Contract shall assign the Contract as a whole without written consent of the other party, which consent the Owner may withhold without cause.

7.3 Notwithstanding any other provision of this Agreement, if the Owner does not receive sufficient funds to fund this Agreement or funds are de-appropriated, or if the Owner does not receive legal authority from the Maine State Legislature or Maine Courts to expend funds intended for this Agreement, then the Owner is not obligated to make payment under this Agreement; provided, however, the Owner shall be obligated to pay for services satisfactorily performed prior to any such non-appropriation in accordance with the termination provisions of this Agreement. The Owner shall timely notify the Contractor of any non-appropriation and the effective date of the non-appropriation.

ARTICLE 8 CONTRACT DOCUMENTS

8.1 The Project Manual, Specifications and Drawings, and any Addenda, together with this agreement, form the contract. Each element is as fully a part of the Contract as if hereto attached or herein repeated.

8.2 Specifications: *indicate date of issuance of project manual*

8.3 Drawings: *note here or attach each sheet number and title*

8.4 Addenda: *note each addenda number and date, or "none"*

BGS Project No.: _____

The Contract is effective as of the date executed by the approval authority.

OWNER**CONTRACTOR**

Signature *Date*
*name and title**name of contracting entity*
*address**telephone*
email address

Signature *Date*
*name and title**name of contractor company*
*address**telephone*
email address
*Vendor Number**Indicate the names of the review and approval individuals appropriate to the approval authority.***select proper approval authority****Reviewed by:****Approved by:**

Signature *Date*
*insert name**Project Manager/ Contract Administrator*

Signature *Date*
*William Longfellow**Director, Bureau of General Services*

00 61 13.13
Contractor Performance Bond

Bond No.: insert bond number

We, the undersigned, insert company name of Contractor, select type of entity of insert name of municipality in the State of insert name of state as principal, and insert name of surety as Surety, are hereby held and firmly bound unto select title of obligee in the penal sum of the Contract Price \$ insert the Contract Price in numbers for the payment of which, well and truly to be made, we hereby jointly and severally bind ourselves, our heirs, executors, administrators, successors and assigns.

The condition of the above obligation is such that if the principal shall promptly and faithfully perform the contract entered into this insert date, i.e.: 8th day of select month, select year, which is the same date as that of the notice of intent to award letter, or in the absence of such a letter, not later than the date the Owner signs the construction contract, for the construction of insert name of project as designated in the contract documents, then this obligation shall be null and void.

Otherwise, the same shall remain in force and effect- it being expressly understood and agreed that the liability of the Surety for any and all claims hereunder shall, in no event, exceed the penal amount of this obligation as herein stated.

The Surety, for value received hereby stipulates and agrees that the obligation of said Surety and its bonds shall be in no way impaired or affected by any extension of the time which the Obligee may accept during the performance of the contract and said Surety does hereby waive notice of any such extension.

00 61 13.13
Contractor Performance Bond

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

Signed and sealed this *insert date, i.e.: 8th* day of *select month, select year*, which is the same date as that of the notice of intent to award letter, or in the absence of such a letter, not later than the date the Owner signs the construction contract.

Contractor

(Signature)

insert name and title

insert company name

insert address

insert city state zip code

Surety

(Signature)

insert name and title

insert company name

insert address

insert city state zip code

If Contractor is a partnership, all partners shall execute the bond. A power of attorney document indicating that it still is in full force and effect shall be provided by the person executing this bond.

00 61 13.16
Contractor Payment Bond

Bond No.: insert bond number

We, the undersigned, insert company name of Contractor, select type of entity of insert name of municipality in the State of insert name of state as principal, and insert name of surety as Surety, are hereby held and firmly bound unto select title of obligee in the penal sum of the Contract Price \$ insert the Contract Price in numbers for the use and benefit of claimants, defined as an entity having a contract with the principal or with a subcontractor of the principal for labor, materials, or both labor and materials, used or reasonably required for use in the performance of the contract, for the payment of which, well and truly to be made, we hereby jointly and severally bind ourselves, our heirs, executors, administrators, successors and assigns.

The condition of the above obligation is such that if the principal shall promptly satisfy all claims and demands incurred for all labor and materials, used or required by the principal in connection with the work described in the contract entered into this insert date, i.e.: 8th day of select month, select year, which is the same date as that of the notice of intent to award letter, or in the absence of such a letter, not later than the date the Owner signs the construction contract, for the construction of insert name of project as designated in the contract documents, and shall fully reimburse the obligee for all outlay and expense with said obligee may incur in making good any default of said principal, then this obligation shall be null and void.

Otherwise, the same shall remain in force and effect- it being expressly understood and agreed that the liability of the Surety for any and all claims hereunder shall, in no event, exceed the penal amount of this obligation as herein stated.

The Surety, for value received hereby stipulates and agrees that the obligation of said Surety and its bonds shall be in no way impaired or affected by any extension of the time which the Obligee may accept during the performance of the contract and said Surety does hereby waive notice of any such extension.

00 61 13.16
Contractor Payment Bond

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

Signed and sealed this *insert date, i.e.: 8th* day of *select month, select year*, which is the same date as that of the notice of intent to award letter, or in the absence of such a letter, not later than the date the Owner signs the construction contract.

Contractor

(Signature)

insert name and title

insert company name

insert address

insert city state zip code

Surety

(Signature)

insert name and title

insert company name

insert address

insert city state zip code

If Contractor is a partnership, all partners shall execute the bond. A power of attorney document indicating that it still is in full force and effect shall be provided by the person executing this bond.

00 71 00
Definitions

1. Definitions

- 1.1 *Addendum*: A document issued by the Consultant that amends the Bid Documents. Addenda shall not be issued less than seventy-two hours prior to the specified bid opening time.
- 1.2 *Allowance*: A specified dollar amount for a particular scope of work or service included in the Work that is identified in the Bid Documents and included in each Bidder's Bid. The Contractor shall document expenditures for an Allowance during the Project. Any unused balance shall be credited to the Owner. The Contractor is responsible for notifying the Owner of anticipated expenses greater than the specified amount and the Owner is responsible for those additional expenses.
- 1.3 *Alternate Bid*: The Contractor's written offer of a specified dollar amount, submitted on the Bid Form, for the performance of a particular scope of work described in the Bid Documents. The Owner determines the low bidder based on the sum of the base Bid and any combination of Alternate Bids that the Owner selects.
- 1.4 *Architect*: A Consultant acting as, or supporting, the Professional-of-Record who is responsible for the design of the Project. Equivalent to "Consultant" in State of Maine contract forms.
- 1.5 *Architectural Supplemental Instruction (ASI)*: A written instruction from the Architect for the purpose of clarification of the Contract Documents. An ASI does not alter the Contract Price or Contract Time. ASIs may be responses to RFIs and shall be issued by the Architect in a timely manner to avoid any negative impact on the Schedule of the Work.
- 1.6 *Bid*: The Contractor's written offer of a specified dollar amount or amounts, submitted on a form included in the Bid Documents, for the performance of the Work. A Bid may include bonds or other requirements. A base Bid is separate and distinct from Alternate Bids, being the only cost component necessary for the award of the contract, and representing the minimum amount of Work that is essential for the functioning of the Project.
- 1.7 *Bid Bond*: The security designated in the Bid Documents, furnished by Bidders as a guaranty of good faith to enter into a contract with the Owner, should a contract be awarded to that Bidder.
- 1.8 *Bidder*: Any business entity, individual or corporation that submits a bid for the performance of the work described in the Bid Documents, acting directly or through a duly authorized representative. See also *Responsive and Responsible Bidder*.
- 1.9 *Bid Documents*: The drawings, procurement and contracting requirements, general requirements, and the written specifications -including all addenda, that a bidder is required to reference in the submission of a bid.
- 1.10 *Bureau*: The State of Maine Bureau of General Services, or BGS, in the Department of Administrative and Financial Services.
- 1.11 *Calendar days*: Consecutive days, as occurring on a calendar, taking into account each day of the week, month, year, and any religious, national or local holidays. Calendar days are used for changes in Contract Time.

00 71 00
Definitions

- 1.12 *Certificate of Substantial Completion*: A document developed by the Consultant that describes the final status of the Work and establishes the date that the Owner may use the facility for its intended purpose. The Certificate of Substantial Completion may also include a provisional list of items - a "punch list" - remaining to be completed by the Contractor. The Certificate of Substantial Completion identifies the date from which the project warranty period commences.
- 1.13 *Certificate of Occupancy*: A document developed by a local jurisdiction such as the Code Enforcement Officer that grants permission to the Owner to occupy a building.
- 1.14 *Change Order (CO)*: A document that modifies the contract and establishes the basis of a specific adjustment to the Contract Price or the Contract Time, or both. Change Orders may address correction of omissions, errors, and document discrepancies, or additional requirements. Change Orders should include all labor, materials and incidentals required to complete the work described. A Change Order is not valid until signed by the Contractor, Owner and Consultant and approved by the Bureau.
- 1.15 *Change Order Proposal (COP) (see also Proposal)*: Contract change proposed by the Contractor regarding the contract amount, requirements, or time. The Contractor implements the work of a COP after it is accepted by all parties. Accepted COPs are incorporated into the contract by Change Order.
- 1.16 *Clerk of the Works*: The authorized representative of the Consultant on the job site. Clerk of the Works is sometimes called the Architect's representative.
- 1.17 *Construction Change Directive (CCD)*: A written order prepared by the Consultant and signed by the Owner and Consultant, directing a change in the Work prior to final agreement with the Contractor on adjustment, if any, in the Contract Price or Contract Time, or both.
- 1.18 *Contract*: A written agreement between the Owner and the successful bidder which obligates the Contractor to perform the work specified in the Contract Documents and obligates the Owner to compensate the Contractor at the mutually accepted sum, rates or prices.
- 1.19 *Contract Bonds (also known as Payment and Performance Bonds)*: The approved forms of security, furnished by the Contractor and their surety, which guarantee the faithful performance of all the terms of the contract and the payment of all bills for labor, materials and equipment by the Contractor.
- 1.20 *Contract Documents*: The drawings and written specifications (including all addenda), Standard General Conditions, and the contract (including all Change Orders subsequently incorporated in the documents).
- 1.21 *Contract Expiration Date*: Date determined by the Owner as a deadline for internal management of contract accounts. This allows time after the Contract Final Completion Date for processing the final Requisition for Payment. The Contract Expiration Date does not directly relate to any contract obligation of the Contractor.
- 1.22 *Contract Final Completion Date*: Point of time when the Work is fully completed in compliance with the Contract Documents, as certified by the Consultant. Final payment to the Contractor is due upon Final Completion of the Project.
- 1.23 *Contract Price*: The dollar amount of the construction contract, also called *Contract Sum*.

00 71 00
Definitions

- 1.24 *Contract Time*: The designated duration of time to execute the Work of the contract, with a specific date for completion.
- 1.25 *Contractor*: Also called the "General Contractor" or "GC" the individual or entity undertaking the execution of the general contract work under the terms of the contract with the Owner, acting directly or through a duly authorized representative. The Contractor is responsible for the means, methods and materials utilized in the execution and completion of the Work.
- 1.26 *Consultant*: The Architect or Engineer acting as Professional-of-Record for the Project. The Consultant is responsible for the design of the Project.
- 1.27 *Drawings*: The graphic and pictorial portion of the Contract Documents showing the design, location and dimensions of the Work, generally including plans, elevations, sections, details, schedules, and diagrams.
- 1.28 *Engineer*: A Consultant acting as, or supporting, the Professional-of-Record who is responsible for the design of the Project. Equivalent to "Consultant" in State of Maine contract forms.
- 1.29 *Filed Sub-bid*: The designated major Subcontractor's (or, in some cases, Contractor's) written offer of a specified dollar amount or amounts, submitted on a form included in the Bid Documents, for the performance of a particular portion of the Work. A Filed Sub-bid may include bonds or other requirements.
- 1.30 *General Requirements*: The on-site overhead expense items the Contractor provides for the Project, typically including, but not limited to, building permits, construction supervision, Contract Bonds, insurance, field office, temporary utilities, rubbish removal, and site fencing. Overhead expenses of the Contractor's general operation are not included. Sometimes referred to as the Contractor's General Conditions.
- 1.31 *Owner*: The State agency which is represented by duly authorized individuals. The Owner is responsible for defining the scope of the Project and compensation to the Consultant and Contractor.
- 1.32 *Owner's Representative*: The individual or entity contracted by the Owner to be an advisor and information conduit regarding the Project.
- 1.33 *Overhead*: General and administrative expenses of the Contractor's principal and branch offices, including payroll costs and other compensation of Contractor employees, deductibles paid on any insurance policy, charges against the Contractor for delinquent payments, and costs related to the correction of defective work, and the Contractor's capital expenses, including interest on capital used for the work.
- 1.34 *Performance and Payment Bonds (also known as Contract Bonds)*: The approved forms of security, furnished by the Contractor and their surety, which guarantee the faithful performance of all the terms of the contract and the payment of all bills for labor, materials and equipment by the Contractor.
- 1.35 *Post-Bid Addendum*: Document issued by the Consultant that defines a potential Change Order prior to signing of the construction contract. The Post-Bid Addendum allows the Owner to negotiate

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contract changes with the Bidder submitting the lowest valid bid, only if the negotiated changes to the Bid Documents result in no change or no increase in the bid price.

A Post-Bid Addendum may also be issued after a competitive construction Bid opening to those Bidders who submitted a Bid initially, for the purpose of rebidding the Project work without re-advertising.

- 1.36 *Project*: The construction project proposed by the Owner to be constructed according to the Contract Documents. The Project, a public improvement, may be tied logistically to other public improvements and other activities conducted by the Owner or other contractors.
- 1.37 *Proposal (see also Change Order Proposal)*: The Contractor's written offer submitted to the Owner for consideration containing a specified dollar amount or rate, for a specific scope of work, and including a schedule impact, if any. A proposal shall include all costs for overhead and profit. The Contractor implements the work of a Proposal after it is accepted by all parties. Accepted Proposals are incorporated into the contract by Change Order.
- 1.38 *Proposal Request (PR)*: An Owner's written request to the Contractor for a Change Order Proposal.
- 1.39 *Punch List*: A document that identifies the items of work remaining to be done by the Contractor at the Close Out of a Project. The Punch List is created as a result of a final inspection of the work only after the Contractor attests that all of the Work is in its complete and permanent status.
- 1.40 *Request For Information (RFI)*: A Contractor's written request to the Consultant for clarification, definition or description of the Work. RFIs shall be presented by the Contractor in a timely manner to avoid any negative impact on the Schedule of the Work.
- 1.41 *Request For Proposal (RFP)*: An Owner's written request to the Contractor for a Change Order Proposal.
- 1.42 *Requisition for Payment*: The document in which the Contractor certifies that the Work described is, to the best of the Contractor's knowledge, information and belief, complete and that all previous payments have been paid by the Contractor to Subcontractors and suppliers, and that the current requested payment is now due. See *Schedule of Values*.
- 1.43 *Responsive and Responsible Bidder*: A bidder who complies, when submitting a bid on a given project, with the following *responsive* standards, as required by the Bid Documents:
 - submits specific qualifications to bid the project, if required;
 - attends mandatory pre-bid conferences, if required;
 - submits a bid prior to the close of the bid period;
 - submits a complete bid form;
 - submits a bid without indications of intent contrary to the stated requirements;
 - submits other materials and information, such as bid security, as required;
 and, meets the following minimums regarding these *responsible* standards:
 - sustains a satisfactory record of project performance;
 - maintains a permanent place of business in a known physical location;
 - possesses the financial means for short- and long-term operations;
 - possesses the appropriate technical experience and capabilities;
 - employs adequate personnel and subcontractor resources;

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maintains the equipment needed to perform the work;
complies with the proposed implementation schedule;
complies with the insurance and bonding requirements;
provides post-construction warranty coverage;
and other criteria which can be considered relevant to the contract.

- 1.44 *Retainage*: The amount, calculated at five percent (5%) of the contract value or a scheduled value, that the Owner shall withhold from the Contractor until the work or portion of work is declared substantially complete or otherwise accepted by the Owner. The Owner may, if requested, reduce the amount withheld if the Owner deems it desirable and prudent to do so. (See Title 5 M.R.S.A., Section 1746.)
- 1.45 *Sample*: A physical example provided by the Contractor which illustrates materials, equipment or workmanship and establishes standards by which the Work will be judged.
- 1.46 *Schedule of the Work*: The document prepared by the Contractor and approved by the Owner that specifies the dates on which the Contractor plans to begin and complete various parts of the Work, including dates on which information and approvals are required from the Owner.
- 1.47 *Schedule of Values*: The document prepared by the Contractor and approved by the Owner before the commencement of the Work that specifies the dollar values of discrete portions of the Work equal in sum to the contract amount. The Schedule of Values is used to document progress payments of the Work in regular (usually monthly) requisitions for payment. See *Requisition for Payment*.
- 1.48 *Shop Drawings*: The drawings, diagrams, schedules and other data specially prepared for the Work by the Contractor or a Subcontractor, manufacturer, supplier or distributor to illustrate some portion of the Work.
- 1.49 *Specifications*: The portion of the Contract Documents consisting of the written requirements of the Work for materials, equipment, systems, standards, workmanship, and performance of related services.
- 1.50 *Subcontractor*: An individual or entity undertaking the execution of any part of the Work by virtue of a written agreement with the Contractor or any other Subcontractor. Also, an individual or entity retained by the Contractor or any other Subcontractor as an independent contractor to provide the labor, materials, equipment or services necessary to complete a specific portion of the Work.
- 1.51 *Substantial Completion Date*: Point of time when the Work or a designated portion of the Work is sufficiently complete in compliance with the Contract Documents so that the Owner can occupy or utilize the Work for its intended purpose without unscheduled disruption. Substantial Completion is documented by the date of the Certificate of Substantial Completion signed by the Owner and the Contractor.
- 1.52 *Superintendent*: The representative of the Contractor on the job site, authorized by the Contractor to receive and fulfill instructions from the Consultant.
- 1.53 *Surety*: The individual or entity that is legally bound with the Contractor and Subcontractor to insure the faithful performance of the contract and for the payment of the bills for labor, materials and equipment by the Contractor and Subcontractors.

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- 1.54 *Work*: The construction and services, whether completed or partially completed, including all labor, materials, equipment and services provided or to be provided by the Contractor and Subcontractors to fulfill the requirements of the Project as described in the Contract Documents.

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1. Preconstruction Conference

- 1.1 The Contractor shall, upon acceptance of a contract and prior to commencing work, schedule a preconstruction conference with the Owner and Consultant. The purpose of this conference is as follows.
 - 1.1.1 Introduce all parties who have a significant role in the Project, including:
 - Owner (State agency or other contracting entity)
 - Owner's Representative
 - Consultant (Architect or Engineer)
 - Subconsultants
 - Clerk-of-the-works
 - Contractor (GC)
 - Superintendent
 - Subcontractors
 - Other State agencies
 - Construction testing company
 - Commissioning agent
 - Special Inspections agent
 - Bureau of General Services (BGS);
 - 1.1.2 Review the responsibilities of each party;
 - 1.1.3 Review any previously-identified special provisions of the Project;
 - 1.1.4 Review the Schedule of the Work calendar submitted by the Contractor to be approved by the Owner and Consultant;
 - 1.1.5 Review the Schedule of Values form submitted by the Contractor to be approved by the Owner and Consultant;
 - 1.1.6 Establish routines for Shop Drawing approval, contract changes, requisitions, et cetera;
 - 1.1.7 discuss jobsite issues;
 - 1.1.8 Discuss Project close-out procedures;
 - 1.1.9 Provide an opportunity for clarification of Contract Documents before work begins; and
 - 1.1.10 Schedule regular meetings at appropriate intervals for the review of the progress of the Work.

2. Intent and Correlation of Contract Documents

- 2.1 The intent of the Contract Documents is to describe the complete Project. The Contract Documents consist of various components; each component complements the others. What is shown as a requirement by any one component shall be inferred as a requirement on all corresponding components.
- 2.2 The Contractor shall furnish all labor, equipment and materials, tools, transportation, insurance, services, supplies, operations and methods necessary for, and reasonably incidental to, the construction and completion of the Project. Any work that deviates from the Contract Documents which appears to be required by the exigencies of construction or by inconsistencies in the Contract Documents, will be determined by the Consultant and authorized in writing by the Consultant, Owner and the Bureau prior to execution. The Contractor shall be responsible for requesting clarifying information where the intent of the Contract Documents is uncertain.
- 2.3 The Contractor shall not utilize any apparent error or omission in the Contract Documents to the disadvantage of the Owner. The Contractor shall promptly notify the Consultant in writing of such errors or omissions. The Consultant shall make any corrections or clarifications necessary in such a situation to document the true intent of the Contract Documents.

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3. Additional Drawings and Specifications

- 3.1 Upon the written request of the Contractor, the Owner shall provide, at no expense to the Contractor, up to five sets of printed Drawings and Specifications for the execution of the Work.
- 3.2 The Consultant shall promptly furnish to the Contractor revised Drawings and Specifications, for the area of the documents where those revisions apply, when corrections or clarifications are made by the Consultant. All such information shall be consistent with, and reasonably inferred from, the Contract Documents. The Contractor shall do no work without the proper Drawings and Specifications.

4. Ownership of Contract Documents

- 4.1 The designs represented on the Contract Documents are the property of the Consultant. The Drawings and Specifications shall not be used on other work without consent of the Consultant.

5. Permits, Laws, and Regulations

- 5.1 The Owner is responsible for obtaining any zoning approvals or other similar local project approvals necessary to complete the Work, unless otherwise specified in the Contract Documents.
- 5.2 The Owner is responsible for obtaining Maine Department of Environmental Protection, Maine Department of Transportation, or other similar state government project approvals necessary to complete the Work, unless otherwise indicated in the Contract Documents.
- 5.3 The Owner is responsible for obtaining any federal agency project approvals necessary to complete the Work, unless otherwise indicated in the Contract Documents.
- 5.4 The Owner is responsible for obtaining all easements for permanent structures or permanent changes in existing facilities.
- 5.5 The Contractor is responsible for obtaining and paying for all permits and licenses necessary for the implementation of the Work. The Contractor shall notify the Owner of any delays, variance or restrictions that may result from the issuing of permits and licenses.
- 5.6 The Contractor shall comply with all ordinances, laws, rules and regulations and make all required notices bearing on the implementation of the Work. In the event the Contractor observes disagreement between the Drawings and Specifications and any ordinances, laws, rules and regulations, the Contractor shall promptly notify the Consultant in writing. Any necessary changes shall be made as provided in the contract for changes in the work. The Contractor shall not perform any work knowing it to be contrary to such ordinances, laws, rules and regulations.
- 5.7 The Contractor shall comply with local, state and federal regulations regarding construction safety and all other aspects of the Work.
- 5.8 The Contractor shall comply with the Maine Code of Fair Practices and Affirmative Action, 5 M.R.S. §784 (2).

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6. Taxes

- 6.1 The Owner is exempt from the payment of Maine State sales and use taxes as provided in 36 M.R.S. §1760 (1). The Contractor and Subcontractors shall not include taxes on exempt items in the construction contract.
- 6.2 Section 1760 further provides in subsection 61 that sales to a construction contractor or its subcontractor of tangible personal property that is to be physically incorporated in, and become a permanent part of, real property for sale to or owned by the Owner, are exempt from Maine State sales and use taxes. Tangible personal property is defined in 36 M.R.S. §1752 (17).
- 6.3 The Contractor may contact Maine Revenue Services, 24 State House Station, Augusta, Maine 04333 for guidance on tax exempt regulations authorized by 36 M.R.S. §1760 and detailed in Rule 302 (18-125 CMR 302).

7. Labor and Wages

- 7.1 The Contractor shall conform to the labor laws of the State of Maine, and all other laws, ordinances, and legal requirements affecting the work in Maine.
- 7.2 The Consultant shall include a wage determination document prepared by the Maine Department of Labor in the Contract Documents for state-funded contracts in excess of \$50,000. The document shows the minimum wages required to be paid to each category of labor employed on the project.
- 7.3 On projects requiring a Maine wage determination, the Contractor shall submit monthly payroll records to the Owner ("the contracting agency") showing the name and occupation of all workers and all independent contractors employed on the project. The monthly submission must also include the Contractor's company name, the title of the project, hours worked, hourly rate or other method of remuneration, and the actual wages or other compensation paid to each person.
- 7.4 The Contractor shall not reveal, in the payroll records submitted to the Owner, personal information regarding workers and independent contractors, other than the information described above. Such information shall not include Social Security number, employee identification number, or employee address or phone number, for example.
- 7.5 The Contractor shall conform to Maine statute (39-A M.R.S. §105-A (6)) by providing to the Workers' Compensation Board a list of all subcontractors and independent contractors on the job site and a record of the entity to whom that subcontractor or independent contractor is directly contracted and by whom that subcontractor or independent contractor is insured for workers' compensation purposes.
- 7.6 The Contractor shall enforce strict discipline and good order among their employees at all times, and shall not employ any person unfit or unskilled to do the work assigned to them.
- 7.7 The Contractor shall promptly pay all employees when their compensation is due, shall promptly pay all others who have billed and are due for materials, supplies and services used in the Work, and shall promptly pay all others who have billed and are due for insurance, workers compensation coverage, federal and state unemployment compensation, and Social Security

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charges pertaining to this Project. Before final payments are made, the Contractor shall furnish to the Owner affidavits that all such payments described above have been made.

- 7.8 The Contractor may contact the Maine Department of Labor, 54 State House Station, Augusta, Maine 04333 for guidance on labor issues.
- 7.9 The Contractor may contact the Maine Workers' Compensation Board, 27 State House Station, Augusta, Maine 04333 for guidance on workers' compensation issues.

8. Indemnification

- 8.1 The Contractor shall indemnify and hold harmless the Owner and its officers and employees from and against any and all damages, liabilities, and costs, including reasonable attorney's fees, and defense costs, for any and all injuries to persons or property, including claims for violation of intellectual property rights, to the extent caused by the negligent acts or omissions of the Contractor, its employees, agents, officers or subcontractors in the performance of work under this Agreement. The Contractor shall not be liable for claims to the extent caused by the negligent acts or omissions of the Owner or for actions taken in reasonable reliance on written instructions of the Owner.
- 8.2 The Contractor shall notify the Owner promptly of all claims arising out of the performance of work under this Agreement by the Contractor, its employees or agents, officers or subcontractors.
- 8.3 This indemnity provision shall survive the termination of the Agreement, completion of the project or the expiration of the term of the Agreement.

9. Insurance Requirements

- 9.1 The Contractor shall provide, with each original of the signed Contract, an insurance certificate or certificates acceptable to the Owner and BGS. The Contractor shall submit insurance certificates to the Owner and BGS at the commencement of this Contract and at policy renewal or revision dates. The certificates shall identify the project name and BGS project number, and shall name the Owner as certificate holder and as additional insured for general liability and automobile liability coverages. The submitted forms shall contain a provision that coverage afforded under the insurance policies will not be canceled or materially changed unless at least ten days prior written notice by registered letter has been given to the Owner and BGS.
- 9.2 The Owner does not warrant or represent that the insurance required herein constitutes an insurance portfolio which adequately addresses all risks faced by the Contractor or its Subcontractors. The Contractor is responsible for the existence, extent and adequacy of insurance prior to commencement of work. The Contractor shall not allow any Subcontractor to commence work until all similar insurance required of the Subcontractor has been confirmed by the Contractor.
- 9.3 The Contractor shall procure and maintain primary insurance for the duration of the Project and, if written on a Claims-Made basis, shall also procure and maintain Extended Reporting Period (ERP) insurance for the period of time that any claims could be brought. The Contractor shall ensure that all Subcontractors they engage or employ will procure and maintain similar insurance

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in form and amount acceptable to the Owner and BGS. At a minimum, the insurance shall be of the types and limits set forth herein protecting the Contractor from claims which may result from the Contractor's execution of the Work, whether such execution be by the Contractor or by those employed by the Contractor or by those for whose acts they may be liable. All required insurance coverages shall be placed with carriers authorized to conduct business in the State of Maine by the Maine Bureau of Insurance.

- 9.3.1 The Contractor shall have Workers' Compensation insurance for all employees on the Project site in accordance with the requirements of the Workers' Compensation law of the State of Maine.

Minimum acceptable limits for Employer's Liability are:

Bodily Injury by Accident.....	\$500,000
Bodily Injury by Disease.....	\$500,000 Each Employee
Bodily Injury by Disease.....	\$500,000 Policy Limit

- 9.3.2 The Contractor shall have Commercial General Liability insurance providing coverage for bodily injury and property damage liability for all hazards of the Project including premise and operations, products and completed operations, contractual, and personal injury liabilities. The policy shall include collapse and underground coverage as well as explosion coverage if explosion hazards exist. Aggregate limits shall apply on a location or project basis. Minimum acceptable limits are:

General aggregate limit.....	\$2,000,000
Products and completed operations aggregate	\$1,000,000
Each occurrence limit.....	\$1,000,000
Personal injury aggregate	\$1,000,000

- 9.3.3 The Contractor shall have Automobile Liability insurance against claims for bodily injury, death or property damage resulting from the maintenance, ownership or use of all owned, non-owned and hired automobiles, trucks and trailers. Minimum acceptable limit is:

Any one accident or loss	\$500,000
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- 9.3.4 For the portion of a project which is new construction, the Contractor shall procure and maintain Builder's Risk insurance naming the Owner, Contractor, and any Subcontractor as insureds as their interest may appear. Covered causes of loss form shall be all Risks of Direct Physical Loss, endorsed to include flood, earthquake, transit and sprinkler leakage where sprinkler coverage is applicable. Unless specifically authorized in writing by the Owner, the limit of insurance shall not be less than the initial contract amount, for the portion of the project which is new construction, and coverage shall apply during the entire contract period and until the work is accepted by the Owner.

- 9.3.5 The Contractor shall have Owner's Protective Liability insurance for contract values \$50,000 and above, naming the Owner as the Named Insured. Minimum acceptable limits are:

General aggregate limit.....	\$2,000,000
Each occurrence limit.....	\$1,000,000

10. Contract Bonds

- 10.1 When noted as required in the Bid Documents, the Contractor shall provide to the Owner a Performance Bond and a Payment Bond, or "contract bonds", upon execution of the contract. Each bond value shall be for the full amount of the contract and issued by a surety company authorized to do business in the State of Maine as approved by the Owner. The bonds shall be

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executed on the forms furnished in the Bid Documents. The bonds shall allow for any subsequent additions or deductions of the contract.

- 10.2 The contract bonds shall continue in effect for one year after final acceptance of the contract to protect the Owner's interest in connection with the one year guarantee of workmanship and materials and to assure settlement of claims for the payment of all bills for labor, materials and equipment by the Contractor.

11. Patents and Royalties

- 11.1 The Contractor shall, for all time, secure for the Owner the free and undisputed right to the use of any patented articles or methods used in the Work. The expense of defending any suits for infringement or alleged infringement of such patents shall be borne by the Contractor. Awards made regarding patent suits shall be paid by the Contractor. The Contractor shall hold the Owner harmless regarding patent suits that may arise due to installations made by the Contractor, and to any awards made as a result of such suits.
- 11.2 Any royalty payments related to the work done by the Contractor for the Project shall be borne by the Contractor. The Contractor shall hold the Owner harmless regarding any royalty payments that may arise due to installations made by the Contractor.

12. Surveys, Layout of Work

- 12.1 The Owner shall furnish all property surveys unless otherwise specified.
- 12.2 The Contractor is responsible for correctly staking out the Work on the site. The Contractor shall employ a competent surveyor to position all construction on the site. The surveyor shall run the axis lines, establish correct datum points and check each line and point on the site to insure their accuracy. All such lines and points shall be carefully preserved throughout the construction.
- 12.3 The Contractor shall lay out all work from dimensions given on the Drawings. The Contractor shall take measurements and verify dimensions of any existing work that affects the Work or to which the Work is to be fitted. The Contractor is solely responsible for the accuracy of all measurements. The Contractor shall verify all grades, lines, levels, elevations and dimensions shown on the Drawings and report any errors or inconsistencies to the Consultant prior to commencing work.

13. Record of Documents

- 13.1 The Contractor shall maintain one complete set of Contract Documents on the jobsite, in good order and current status, for access by the Owner and Consultant.
- 13.2 The Contractor shall maintain, continuously updated, complete records of Requests for Information, Architectural Supplemental Instructions (or equivalent), Information Bulletins, supplemental sketches, Change Order Proposals, Change Orders, Shop Drawings, testing reports, et cetera, for access by the Owner and Consultant.

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14. Allowances

- 14.1 The Contract Price shall include all allowances described in the Contract Documents. The Contractor shall include all overhead and profit necessary to implement each allowance in their Contract Price.
- 14.2 The Contractor shall not be required to employ parties for allowance work against whom the Contractor has a reasonable objection. In such a case, the Contractor shall notify the Owner in writing of their position and shall propose an alternative party to complete the work of the allowance.

15. Shop Drawings

- 15.1 The Contractor shall administer Shop Drawings prepared by the Contractor, Subcontractors, suppliers or others to conform to the approved Schedule of the Work. The Contractor shall verify all field measurements, check and authorize all Shop Drawings and schedules required by the Work. The Contractor is the responsible party and contact for the Contractor's work as well as that of Subcontractors, suppliers or others who provide Shop Drawings.
- 15.2 The Consultant shall review and acknowledge Shop Drawings, with reasonable promptness, for general conformity with the design concept of the project and compliance with the information provided in the Contract Documents.
- 15.3 The Contractor shall provide monthly updated logs containing: requests for information, information bulletins, supplemental instructions, supplemental sketches, change order proposals, change orders, submittals, testing and deficiencies.
- 15.4 The Contractor shall make any corrections required by the Consultant, and shall submit a quantity of corrected copies as may be needed. The acceptance of Shop Drawings or schedules by the Consultant shall not relieve the Contractor from responsibility for deviations from Drawings and Specifications, unless the Contractor has called such deviations to the attention of the Consultant at the time of submission and secured the Consultant's written approval. The acceptance of Shop Drawings or schedules by the Consultant does not relieve the Contractor from responsibility for errors in Shop Drawings or schedules.

16. Samples

- 16.1 The Contractor shall furnish for approval, with reasonable promptness, all samples as directed by the Consultant. The Consultant shall review and approve such samples, with reasonable promptness, for general conformity with the design concept of the project and compliance with the information provided in the Contract Documents. The subsequent work shall be in accord with the approved samples.

17. Substitutions

- 17.1 The Contractor shall furnish items and materials described in the Contract Documents. If the item or material specified describes a proprietary product, or uses the name of a manufacturer, the term "or approved equal" shall be implied, if it is not included in the text. The specific item or material specified establishes a minimum standard for the general design, level of quality, type, function, durability, efficiency, reliability, compatibility, warranty coverage, installation factors

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and required maintenance. The Drawing or written Specification shall not be construed to exclude other manufacturers products of comparable design, quality, and efficiency.

- 17.2 The Contractor may submit detailed information about a proposed substitution to the Consultant for consideration. Particular models of items and particular materials which the Contractor asserts to be equal to the items and materials identified in the Contract Documents shall be allowed only with written approval by the Consultant. The request for substitution shall include a cost comparison and a reason or reasons for the substitution.
- 17.3 The Consultant may request additional information about the proposed substitution. The approval or rejection of a proposed substitution may be based on timeliness of the request, source of the information, the considerations of minimum standards described above, or other considerations. The Consultant should briefly state the rationale for the decision. The decision shall be considered final.
- 17.4 The duration of a substitution review process can not be the basis for a claim for delay in the Schedule of the Work.

18. Assignment of Contract

- 18.1 The Contractor shall not assign or sublet the contract as a whole without the written consent of the Owner. The Contractor shall not assign any money due to the Contractor without the written consent of the Owner.

19. Separate Contracts

- 19.1 The Owner reserves the right to create other contracts in connection with this Project using similar General Conditions. The Contractor shall allow the Owner's other contractors reasonable opportunity for the delivery and storage of materials and the execution of their work. The Contractor shall coordinate and properly connect the Work of all contractors.
- 19.2 The Contractor shall promptly report to the Consultant and Owner any apparent deficiencies in work of the Owner's other contractors that impacts the proper execution or results of the Contractor. The Contractor's failure to observe or report any deficiencies constitutes an acceptance of the Owner's other contractors work as suitable for the interface of the Contractor's work, except for latent deficiencies in the Owner's other contractors work.
- 19.3 Similarly, the Contractor shall promptly report to the Consultant and Owner any apparent deficiencies in their own work that would impact the proper execution or results of the Owner's other contractors.
- 19.4 The Contractor shall report to the Consultant and Owner any conflicts or claims for damages with the Owner's other contractors and settle such conflicts or claims for damages by mutual agreement or arbitration, if necessary, at no expense to the Owner.
- 19.5 In the event the Owner's other contractors sue the Owner regarding any damage alleged to have been caused by the Contractor, the Owner shall notify the Contractor, who shall defend such proceedings at the Contractor's expense. The Contractor shall pay or satisfy any judgment that may arise against the Owner, and pay all other costs incurred.

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20. Subcontracts

- 20.1 The Contractor shall not subcontract any part of this contract without the written permission of the Owner.
- 20.2 The Contractor shall submit a complete list of named Subcontractors and material suppliers to the Consultant and Owner for approval by the Owner prior to commencing work. The Subcontractors named shall be reputable companies of recognized standing with a record of satisfactory work.
- 20.3 The Contractor shall not employ any Subcontractor or use any material until they have been approved, or where there is reason to believe the resulting work will not comply with the Contract Documents.
- 20.4 The Contractor, not the Owner, is as fully responsible for the acts and omissions of Subcontractors and of persons employed by them, as the Contractor is for the acts and omissions of persons directly or indirectly employed by the Contractor.
- 20.5 Neither the Contract Documents nor any Contractor-Subcontractor contract shall indicate, infer or create any direct contractual relationship between any Subcontractor and the Owner.

21. Contractor-Subcontractor Relationship

- 21.1 The Contractor shall be bound to the Subcontractor by all the obligations in the Contract Documents that bind the Contractor to the Owner.
- 21.2 The Contractor shall pay the Subcontractor, in proportion to the dollar value of the work completed and requisitioned by the Subcontractor, the approved dollar amount allowed to the Contractor no more than seven days after receipt of payment from the Owner.
- 21.3 The Contractor shall pay the Subcontractor accordingly if the Contract Documents or the subcontract provide for earlier or larger payments than described in the provision above.
- 21.4 The Contractor shall pay the Subcontractor for completed and requisitioned subcontract work, less retainage, no more than seven days after receipt of payment from the Owner for the Contractor's approved Requisition for Payment, even if the Consultant fails to certify a portion of the Requisition for Payment for a cause not the fault of the Subcontractor.
- 21.5 The Contractor shall not make a claim for liquidated damages or penalty for delay in any amount in excess of amounts that are specified by the subcontract.
- 21.6 The Contractor shall not make a claim for services rendered or materials furnished by the Subcontractor unless written notice is given by the Contractor to the Subcontractor within ten calendar days of the day in which the claim originated.
- 21.7 The Contractor shall give the Subcontractor an opportunity to present and to submit evidence in any progress conference or disputes involving subcontract work.

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- 21.8 The Contractor shall pay the Subcontractor a just share of any fire insurance payment received by the Contractor.
- 21.9 The Subcontractor shall be bound to the Contractor by the terms of the Contract Documents and assumes toward the Contractor all the obligations and responsibilities that the Contractor, by those documents, assumes toward the Owner.
- 21.10 The Subcontractor shall submit applications for payment to the Contractor in such reasonable time as to enable the Contractor to apply for payment as specified.
- 21.11 The Subcontractor shall make any claims for extra cost, extensions of time or damages, to the Contractor in the manner provided in these General Conditions for like claims by the Contractor to the Owner, except that the time for the Subcontractor to make claims for extra cost is seven calendar days after the receipt of Consultant's instructions.

22. Supervision of the Work

- 22.1 During all stages of the Work the Contractor shall have a competent superintendent, with any necessary assistant superintendents, overseeing the project. The superintendent shall not be reassigned without the consent of the Owner unless a superintendent ceases to be employed by the Contractor due to unsatisfactory performance.
- 22.2 The superintendent represents the Contractor on the jobsite. Directives given by the Consultant or Owner to the superintendent shall be as binding as if given directly to the Contractor's main office. All important directives shall be confirmed in writing to the Contractor. The Consultant and Owner are not responsible for the acts or omissions of the superintendent or assistant superintendents.
- 22.3 The Contractor shall provide supervision of the Work equal to the industry's highest standard of care. The superintendent shall carefully study and compare all Contract Documents and promptly report any error, inconsistency or omission discovered to the Consultant. The Contractor may not necessarily be held liable for damages resulting directly from any error, inconsistency or omission in the Contract Documents or other instructions by the Consultant that was not revealed by the superintendent in a timely way.

23. Observation of the Work

- 23.1 The Contractor shall allow the Owner, the Consultant and the Bureau continuous access to the site for the purpose of observation of the progress of the work. All necessary safeguards and accommodations for such observations shall be provided by the Contractor.
- 23.2 The Contractor shall coordinate all required testing, approval or demonstration of the Work. The Contractor shall give sufficient notice to the appropriate parties of readiness for testing, inspection or examination.
- 23.3 The Contractor shall schedule inspections and obtain all required certificates of inspection for inspections by a party other than the Consultant.

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- 23.4 The Consultant shall make all scheduled observations promptly, prior to the work being concealed or buried by the Contractor. If approval of the Work is required of the Consultant, the Contractor shall notify the Consultant of the construction schedule in this regard. Work concealed or buried prior to the Consultant's approval may need to be uncovered at the Contractor's expense.
- 23.5 The Consultant may order reexamination of questioned work, and, if so ordered, the work must be uncovered by the Contractor. If the work is found to conform to the Contract Documents, the Owner shall pay the expense of the reexamination and remedial work. If the work is found to not conform to the Contract Documents, the Contractor shall pay the expense, unless the defect in the work was caused by the Owner's Contractor, whose responsibility the reexamination expense becomes.
- 23.6 The Bureau shall periodically observe the Work during the course of construction and make recommendations to the Contractor or Consultant as necessary. Such recommendations shall be considered and implemented through the usual means for changes to the Work.
24. Consultant's Status
- 24.1 The Consultant represents the Owner during the construction period, and observes the work in progress on behalf of the Owner. The Consultant has authority to act on behalf of the Owner only to the extent expressly provided by the Contract Documents or otherwise demonstrated to the Contractor. The Consultant has authority to stop the work whenever such an action is necessary, in the Consultant's reasonable opinion, to ensure the proper execution of the contract.
- 24.2 The Consultant is the interpreter of the conditions of the contract and the judge of its performance. The Consultant shall favor neither the Owner nor the Contractor, but shall use the Consultant's powers under the contract to enforce faithful performance by both parties.
- 24.3 In the event of the termination of the Consultant's employment on the project prior to completion of the work, the Owner shall appoint a capable and reputable replacement. The status of the new Consultant relative to this contract shall be that of the former Consultant.
25. Management of the Premises
- 25.1 The Contractor shall place equipment and materials, and conduct activities on the premises in a manner that does not unreasonably hinder site circulation, environmental stability, or any long term effect. Likewise, the Consultant's directions shall not cause the use of premises to be impeded for the Contractor or Owner.
- 25.2 The Contractor shall not use the premises for any purpose other than that which is directly related to the scope of work. The Owner shall not use the premises for any purpose incompatible with the proposed work simultaneous to the work of the Contractor.
- 25.3 The Contractor shall enforce the Consultant's instructions regarding information posted on the premises such as signage and advertisements, as well as activities conducted on the premises such as fires, and smoking.

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25.4 The Owner may occupy any part of the Project that is completed with the written consent of the Contractor, and without prejudice to any of the rights of the Owner or Contractor. Such use or occupancy shall not, in and of itself, be construed as a final acceptance of any work or materials.

26. Safety and Security of the Premises

26.1 The Contractor shall designate, and make known to the Consultant and the Owner, a safety officer whose duty is the prevention of accidents on the site.

26.2 The Contractor shall continuously maintain security on the premises and protect from unreasonable occasion of injury all people authorized to be on the job site. The Contractor shall also effectively protect the property and adjacent properties from damage or loss.

26.3 The Contractor shall take all necessary precautions to ensure the safety of workers and others on and adjacent to the site, abiding by applicable local, state and federal safety regulations. The Contractor shall erect and continuously maintain safeguards for the protection of workers and others, and shall post signs and other warnings regarding hazards associated with the construction process, such as protruding fasteners, moving equipment, trenches and holes, scaffolding, window, door or stair openings, and falling materials.

26.4 The Contractor shall restore the premises to conditions that existed prior to the start of the project at areas not intended to be altered according to the Contract Documents.

26.5 The Contractor shall protect existing utilities and exercise care working in the vicinity of utilities shown in the Drawings and Specifications or otherwise located by the Contractor.

26.6 The Contractor shall protect from damage existing trees and other significant plantings and landscape features of the site which will remain a permanent part of the site. If necessary or indicated in the Contract Documents, tree trunks shall be boxed and barriers erected to prevent damage to tree branches or roots.

26.7 The Contractor shall repair or replace damage to the Work caused by the Contractor's or Subcontractor's forces, including that which is reasonably protected, at the expense of the responsible party.

26.8 The Contractor shall not load, or allow to be loaded, any part of the Project with a force which imperils personal or structural safety. The Consultant may consult with the Contractor on such means and methods of construction, however, the ultimate responsibility lies with the Contractor.

26.9 The Contractor shall not jeopardize any work in place with subsequent construction activities such as blasting, drilling, excavating, cutting, patching or altering work. The Consultant must approve altering any structural components of the project. The Contractor shall supervise all construction activities carried out by others on site to ensure that the work is neatly done and in a manner that will not endanger the structure or the component parts.

26.10 The Contractor may act with their sole discretion in emergency situations that potentially effect health, life or serious damage to the premises or adjacent properties, to prevent such potential loss or injury. The Contractor may negotiate with the Owner for compensation for expenses due to such emergency work.

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- 26.11 The Contractor and Subcontractors shall have no responsibility for the identification, discovery, presence, handling, removal or disposal of, or exposure of persons to, hazardous materials in any form at the project site. The Contractor shall avoid disruption of any hazardous materials or toxic substances at the project site and promptly notify the Owner in writing on the occasion of such a discovery.
- 26.12 The Contractor shall keep the premises free of any unsafe accumulation of waste materials caused by the work. The Contractor shall regularly keep the spaces "broom clean". See the Close-out of the Work provisions of this section regarding cleaning at the completion of the project.

27. Changes in the Work

- 27.1 The Contractor shall not proceed with extra work without an approved Change Order or Construction Change Directive. A Change Order which has been properly signed by all parties shall become a part of the contract.
- 27.2 A Change Order is the usual document for directing changes in the Work. In certain circumstances, however, the Owner may utilize a Construction Change Directive to direct the Contractor to perform changes in the Work that are generally consistent with the scope of the project. The Owner shall use a Construction Change Directive only when the normal process for approving changes to the Work has failed to the detriment of the Project, or when agreement on the terms of a Change Order cannot be met, or when an urgent situation requires, in the Owner's judgment, prompt action by the Contractor.
- 27.3 The Consultant shall prepare the Construction Change Directive representing a complete scope of work, with proposed Contract Price and Contract Time revisions, if any, clearly stated.
- 27.4 The Contractor shall promptly carry out a Construction Change Directive which has been signed by the Owner and the Consultant. Work thus completed by the Contractor constitutes the basis for a Change Order. Changes in the Contract Price and Contract Time shall be as defined in the Construction Change Directive unless subsequently negotiated with some other terms.
- 27.5 The method of determining the dollar value of extra work shall be by:
- .1 an estimate of the Contractor accepted by Owner as a lump sum, or
 - .2 unit prices named in the contract or subsequently agreed upon, or
 - .3 cost plus a designated percentage, or
 - .4 cost plus a fixed fee.
- 27.6 The Contractor shall determine the dollar value of the extra work for both the lump sum and cost plus designated percentage methods so as not to exceed the following rates. The rates include all overhead and profit expenses.
- .1 Contractor - for any work performed by the Contractor's own forces, up to 20% of the cost;
 - .2 Subcontractor - for work performed by Subcontractor's own forces, up to 20% of the cost;
 - .3 Contractor - for work performed by Contractor's Subcontractor, up to 10% of the amount due the Subcontractor.
- 27.7 The Contractor shall keep and provide records as needed or directed for the cost plus designated percentage method. The Consultant shall review and certify the appropriate amount which

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includes the Contractor's overhead and profit. The Owner shall make payments based on the Consultant's certificate.

- 27.8 Cost reflected in Change Orders shall be limited to the following: cost of materials, cost of delivery, cost of labor (including Social Security, pension, Workers' Compensation insurance, and unemployment insurance), and cost of rental of power tools and equipment. Labor cost may include a pro-ratio share of a foreman's time only in the case of an extension of contract time granted due to the Change Order.
- 27.9 Overhead reflected in Change Orders shall be limited to the following: bond premium, supervision, wages of clerks, time keepers, and watchmen, small tools, incidental expenses, general office expenses, and all other overhead expenses directly related to the Change Order.
- 27.10 The Contractor shall provide credit to the Owner for labor, materials, equipment and other costs but not overhead and profit expenses for those Change Order items that result in a net value of credit to the contract.
- 27.11 The Owner may change the scope of work of the Project without invalidating the contract. The Owner shall notify the Contractor of a change of the scope of work for the Owner's Contractors, which may affect the work of this Contractor, without invalidating the contract. Change Orders for extension of the time caused by such changes shall be developed at the time of directing the change in scope of work.
- 27.12 The Consultant may order minor changes in the Work, not involving extra cost, which is consistent with the intent of the design or project.
- 27.13 The Contractor shall immediately give written notification to the Consultant of latent conditions discovered at the site which materially differ from those represented in the Drawings or Specifications, and which may eventually result in a change in the scope of work. The Contractor shall suspend work until receiving direction from the Consultant. The Consultant shall promptly investigate the conditions and respond to the Contractor's notice with direction that avoids any unnecessary delay of the Work. The Consultant shall determine if the discovered conditions warrant a Change Order.
- 27.14 The Contractor shall, within ten calendar days of receipt of the information, give written notification to the Consultant if the Contractor claims that instructions by the Consultant will constitute extra cost not accounted for by Change Order or otherwise under the contract. The Consultant shall promptly respond to the Contractor's notice with direction that avoids any unnecessary delay of the Work. The Consultant shall determine if the Contractor's claim warrants a Change Order.

28. Correction of the Work

- 28.1 The Contractor shall promptly remove from the premises all work the Consultant declares is non-conforming to the contract. The Contractor shall replace the work properly at no expense to the Owner. The Contractor is also responsible for the expenses of others whose work was damaged or destroyed by such remedial work.

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- 28.2 The Owner may elect to remove non-conforming work if it is not removed by the Contractor within a reasonable time, that time defined in a written notice from the Consultant. The Owner may elect to store removed non-conforming work not removed by the Contractor at the Contractor's expense. The Owner may, with ten days written notice, dispose of materials which the Contractor does not remove. The Owner may sell the materials and apply the net proceeds, after deducting all expenses, to the costs that should have been borne by the Contractor.
- 28.3 The Contractor shall remedy any defects due to faulty materials or workmanship and pay for any related damage to other work which appears within a period of one year from the date of substantial completion, and in accord with the terms of any guarantees provided in the contract. The Owner shall promptly give notice of observed defects to the Contractor and Consultant. The Consultant shall determine the status of all claimed defects. The Contractor shall perform all remedial work without unjustifiable delay in either the initial response or the corrective action.
- 28.4 The Consultant may authorize, after a reasonable notification to the Contractor, an equitable deduction from the contract amount in lieu of the Contractor correcting non-conforming or defective work.
29. Owner's Right to do Work
- 29.1 The Owner may, using other contractors, correct deficiencies attributable to the Contractor, or complete unfinished work. Such action shall take place only after giving the Contractor three days written notice, and provided the Consultant approves of the proposed course of action as an appropriate remedy. The Owner may then deduct the cost of the remedial work from the amount due the Contractor.
- 29.2 The Owner may act with their sole discretion when the Contractor is unable to take action in emergency situations that potentially effect health, life or serious damage to the premises or adjacent properties, to prevent such potential loss or injury. The Owner shall inform the Contractor of the emergency work performed, particularly where it may affect the work of the Contractor.
30. Termination of Contract and Stop Work Action
- 30.1 The Owner may, owing to a certificate of the Consultant indicating that sufficient cause exists to justify such action, without prejudice to any other right or remedy and after giving the Contractor and the Contractor's surety seven days written notice, terminate the employment of the Contractor. At that time the Owner may take possession of the premises and of all materials,

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tools and appliances on the premises and finish the work by whatever method the Owner may deem expedient. Cause for such action by the Owner includes:

- .1 the contractor is adjudged bankrupt, or makes a general assignment for the benefit of its creditors, or
- .2 a receiver is appointed due to the Contractor's insolvency, or
- .3 the Contractor persistently or repeatedly refuses or fails to provide enough properly skilled workers or proper materials, or
- .4 the Contractor fails to make prompt payment to Subcontractors or suppliers of materials or labor, or
- .5 the Contractor persistently disregards laws, ordinances or the instructions of the Consultant, or is otherwise found guilty of a substantial violation of a provision of the Contract Documents.

- 30.2 The Contractor is not entitled, as a consequence of the termination of the employment of the Contractor as described above, to receive any further payment until the Work is finished. If the unpaid balance of the contract amount exceeds the expense of finishing the Work, including compensation for additional architectural, managerial and administrative services, such balance shall be paid to the Contractor. If the expense of finishing the Work exceeds the unpaid balance, the Contractor shall pay the difference to the Owner. The Consultant shall certify the expense incurred by the Contractor's default. This obligation for payment shall continue to exist after termination of the contract.
- 30.3 The Contractor may, if the Work is stopped by order of any court or other public authority for a period of thirty consecutive days, and through no act or fault of the Contractor or of anyone employed by the Contractor, with seven days written notice to the Owner and the Consultant, terminate this contract. The Contractor may then recover from the Owner payment for all work executed, any proven loss and reasonable profit and damage.
- 30.4 The Contractor may, if the Consultant fails to issue a certificate for payment within seven days after the Contractor's formal request for payment, through no fault of the Contractor, or if the Owner fails to pay to the Contractor within 30 days after submission of any sum certified by the Consultant, with seven days written notice to the Owner and the Consultant, stop the Work or terminate this Contract.

31. Delays and Extension of Time

- 31.1 The completion date of the contract shall be extended if the work is delayed by changes ordered in the work which have approved time extensions, or by an act or neglect of the Owner, the Consultant, or the Owner's Contractor, or by strikes, lockouts, fire, flooding, unusual delay in transportation, unavoidable casualties, or by other causes beyond the Contractor's control. The Consultant shall determine the status of all claimed causes.
- 31.2 The contract shall not be extended for delay occurring more than seven calendar days before the Contractor's claim made in writing to the Consultant. In case of a continuing cause of delay, only one claim is necessary.
- 31.3 The contract shall not be extended due to failure of the Consultant to furnish drawings if no schedule or agreement is made between the Contractor and the Consultant indicating the dates

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which drawings shall be furnished and fourteen calendar days has passed after said date for such drawings.

- 31.4 This article does not exclude the recovery of damages for delay by either party under other provisions in the Contract Document.

32. Payments to the Contractor

- 32.1 As noted under *Preconstruction Conference* in this section, the Contractor shall submit a Schedule of Values form, before the first application for payment, for approval by the Owner and Consultant. The Consultant may direct the Contractor to provide evidence that supports the correctness of the form. The approved Schedule of Values shall be used as a basis for payments.
- 32.2 The Contractor shall submit an application for each payment ("Requisition for Payment") on a form approved by the Owner and Consultant. The Consultant may require receipts or other documents showing the Contractor's payments for materials and labor, including payments to Subcontractors.
- 32.3 The Contractor shall submit Requisitions for Payment as the work progresses not more frequently than once each month, unless the Owner approves a more frequent interval due to unusual circumstances. The Requisition for Payment is based on the proportionate quantities of the various classes of work completed or incorporated in the Work, in agreement with the actual progress of the Work and the dollar value indicated in the Schedule of Values.
- 32.4 The Consultant shall verify and certify each Requisition for Payment which appears to be complete and correct prior to payment being made by the Owner. The Consultant may certify an appropriate amount for materials not incorporated in the Work which have been delivered and suitably stored at the site. The Contractor shall submit bills of sale, insurance certificates, or other such documents that will adequately protect the Owner's interests prior to payments being certified.
- 32.5 In the event any materials delivered but not yet incorporated in the Work have been included in a certified Requisition for Payment with payment made, and said materials thereafter are damaged, deteriorated or destroyed, or for any reason whatsoever become unsuitable or unavailable for use in the Work, the full amount previously allowed shall be deducted from subsequent payments unless the Contractor satisfactorily replaces said material.
- 32.6 The Contractor may request certification of an appropriate dollar amount for materials not incorporated in the Work which have been delivered and suitably stored away from the site. The Contractor shall submit bills of sale, insurance certificates, right-of-entry documents or other such documents that will adequately protect the Owner's interests. The Consultant shall determine if the Contractor's documentation for the materials is complete and specifically designated for the Project. The Owner may allow certification of such payments.
- 32.7 Subcontractors may request, and shall receive from the Consultant, copies of approved Requisitions for Payment showing the amounts certified in the Schedule of Values.
- 32.8 Certified Requisitions for Payment, payments made to the Contractor, or partial or entire occupancy of the project by the Owner shall not constitute an acceptance of any work that does

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not conform to the Contract Documents. The making and acceptance of the final payment constitutes a waiver of all claims by the Owner, other than those arising from unsettled liens, from faulty work or materials appearing within one year from final payment or from requirements of the Drawings and Specifications, and of all claims by the Contractor, except those previously made and still unsettled.

33. Payments Withheld

- 33.1 The Owner shall retain five percent of each payment due the Contractor as part security for the fulfillment of the contract by the Contractor. The Owner may make payment of a portion of this “retainage” to the Contractor temporarily or permanently during the progress of the Work. The Owner may thereafter withhold further payments until the full amount of the five percent is reestablished. The Contractor may deposit with the Maine State Treasurer certain securities in place of retainage amounts due according to Maine Statute (5 M.R.S. §1746).
- 33.2 The Consultant may withhold or nullify the whole or a portion of any Requisitions for Payment submitted by the Contractor in the amount that may be necessary, in his reasonable opinion, to protect the Owner from loss due to any of the following:
- .1 defective work not remedied;
 - .2 claims filed or reasonable evidence indicating probable filing of claims;
 - .3 failure to make payments properly to Subcontractors or suppliers;
 - .4 a reasonable doubt that the contract can be completed for the balance then unpaid;
 - .5 liability for damage to another contractor.

The Owner shall make payment to the Contractor, in the amount withheld, when the above circumstances are removed.

34. Liens

- 34.1 The Contractor shall deliver to the Owner a complete release of all liens arising out of this contract before the final payment or any part of the retainage payment is released. The Contractor shall provide with the release of liens an affidavit asserting each release includes all labor and materials for which a lien could be filed. Alternately, the Contractor, in the event any Subcontractor or supplier refuses to furnish a release of lien in full, may furnish a bond satisfactory to the Owner, to indemnify the Owner against any lien.
- 34.2 In the event any lien remains unsatisfied after all payments to the Contractor are made by the Owner, the Contractor shall refund to the Owner all money that the latter may be compelled to pay in discharging such lien, including all cost and reasonable attorney’s fees.

35. Workmanship

- 35.1 The Contractor shall provide materials, equipment, and installed work equal to or better than the quality specified in the Contract Documents and approved in submittal and sample. The installation methods shall be of the highest standards, and the best obtainable from the respective trades. The Consultant’s decision on the quality of work shall be final.

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- 35.2 The Contractor shall know local labor conditions for skilled and unskilled labor in order to apply the labor appropriately to the Work. All labor shall be performed by individuals well skilled in their respective trades.
- 35.3 The Contractor shall perform all cutting, fitting, patching and placing of work in such a manner to allow subsequent work to fit properly, whether that be by the Contractor, the Owner's Contractors or others. The Owner and Consultant may advise the Contractor regarding such subsequent work. Notwithstanding the notification or knowledge of such subsequent work, the Contractor may be directed to comply with this standard of compatible construction by the Consultant at the Contractor's expense.
- 35.4 The Contractor shall request clarification or revision of any design work by the Consultant, prior to commencing that work, in a circumstance where the Contractor believes the work cannot feasibly be completed at the highest quality, or as indicated in the Contract Documents. The Consultant shall respond to such requests in a timely way, providing clarifying information, a feasible revision, or instruction allowing a reduced quality of work. The Contractor shall follow the direction of the Consultant regarding the required request for information.
- 35.5 The Contractor shall guarantee the Work against any defects in workmanship and materials for a period of one year commencing with the date of the Certificate of Substantial Completion, unless specified otherwise for specific elements of the project. The Work may also be subdivided in mutually agreed upon components, each defined by a separate Certificate of Substantial Completion.
36. Close-out of the Work
- 36.1 The Contractor shall remove from the premises all waste materials caused by the work. The Contractor shall make the spaces "broom clean" unless a more thorough cleaning is specified. The Contractor shall clean all windows and glass immediately prior to the final inspection, unless otherwise directed.
- 36.2 The Owner may conduct the cleaning of the premises where the Contractor, duly notified by the Consultant, fails to adequately complete the task. The expense of this cleaning may be deducted from the sum due to the Contractor.
- 36.3 The Contractor shall participate in all final inspections and acknowledge the documentation of unsatisfactory work, customarily called the "punch list", to be corrected by the Contractor. The Consultant shall document the successful completion of the Work in a dated Certificate of Substantial Completion, to be signed by Owner, Consultant, and Contractor.
- 36.4 The Contractor shall not call for final inspection of any portion of the Work that is not completely and permanently installed. The Contractor may be found liable for the expenses of individuals called to final inspection meetings prematurely.
- 36.5 The Contractor and all major Subcontractors shall participate in the end-of-warranty-period conference, typically scheduled close to one year after the Substantial Completion date.

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37. Date of Completion and Liquidated Damages

- 37.1 The Contractor may make a written request to the Owner for an extension or reduction of time, if necessary. The request shall include the reasons the Contractor believes justifies the proposed completion date. The Owner may grant the revision of the contract completion date if the Work was delayed due to conditions beyond the control and the responsibility of the Contractor. The Contractor shall not conduct unauthorized accelerated work or file delay claims to recover alleged damages for unauthorized early completion.
- 37.2 The Contractor shall vigorously pursue the completion of the Work and notify the Owner of any factors that have, may, or will affect the approved Schedule of the Work. The Contractor may be found responsible for expenses of the Owner or Consultant if the Contractor fails to make notification of project delays.
- 37.3 The Project is planned to be done in an orderly fashion which allows for an iterative submittal review process, construction administration including minor changes in the Work and some bad weather. The Contractor shall not file delay claims to recover alleged damages on work the Consultant determines has followed the expected rate of progress.
- 37.4 The Consultant shall prepare the Certificate of Substantial Completion which, when signed by the Owner and the Contractor, documents the date of Substantial Completion of the Work or a designated portion of the Work. The Owner shall not consider the issuance of a Certificate of Occupancy by an outside authority a prerequisite for Substantial Completion if the Certificate of Occupancy cannot be obtained due to factors beyond the Contractor's control.
- 37.5 Liquidated Damages may be deducted from the sum due to the Contractor for each calendar day that the Work remains uncompleted after the completion date specified in the Contract or an approved amended completion date. The dollar amount per day shall be calculated using the Schedule of Liquidated Damages table shown below.

If the original contract amount is:	The per day Liquidated Damages shall be:
Less than \$100,000	\$250
\$100,000 to less than \$2,000,000	\$750
\$2,000,000 to less than \$10,000,000	\$1,500
\$10,000,000 and greater	\$1,500 plus \$250 for each \$2,000,000 over \$10,000,000

38. Dispute Resolution

38.1 Mediation

- 38.1.1 A dispute between the parties which arises under this Contract which cannot be resolved through informal negotiation, shall be submitted to a neutral mediator jointly selected by the parties.
- 38.1.2 Either party may file suit before or during mediation if the party, in good faith, deems it to be necessary to avoid losing the right to sue due to a statute of limitations. If suit is filed before good faith mediation efforts are completed, the party filing suit shall agree to stay all proceedings in the lawsuit pending completion of the mediation process, provided such stay is without prejudice.

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38.1.3 In any mediation between the Owner and the Consultant, the Owner has the right to consolidate related claims between Owner and Contractor.

38.2 Arbitration

38.2.1 If the dispute is not resolved through mediation, the dispute shall be settled by arbitration. The arbitration shall be conducted before a panel of three arbitrators. Each party shall select one arbitrator; the third arbitrator shall be appointed by the arbitrators selected by the parties. The arbitration shall be conducted in accordance with the Maine Uniform Arbitration Act (MUAA), except as otherwise provided in this section.

38.2.2 The decision of the arbitrators shall be final and binding upon all parties. The decision may be entered in court as provided in the MUAA.

38.2.3 The costs of the arbitration, including the arbitrators' fees shall be borne equally by the parties to the arbitration, unless the arbitrator orders otherwise.

38.2.4 In any arbitration between the Owner and the Consultant, the Owner has the right to consolidate related claims between Owner and Contractor.

Supplemental General Conditions

Notice: The contract or delivery order to which this addendum is attached is made using federal assistance provided to the State of Maine by the US Department of Treasury under the American Rescue Plan Act ("ARPA"), Sections 602 and 603 of the Social Security Act, [Pub. L. No. 117-2 \(March 11, 2021\)](#).

1. Equal Opportunity

The Contractor shall comply with [Executive Order 11246](#) of September 24, 1965 entitled "Equal Opportunity," as amended by [Executive Order 11375](#) of October 13, 1967 and as supplemented by in Department of Labor Regulations ([41 CFR Part 60](#)). The equal opportunity clause for federally assisted construction contracts at 41 CFR Part 60-1.4 is incorporated by reference.

2. Contract Work Hours and Safety Standards Act

If the Contract is in excess of \$100,000 and involves the employment of mechanics or laborers, Contractor shall comply with [40 U.S.C. 3702](#) and [3704](#), as supplemented by Department of Labor regulations ([29 CFR Part 5](#)). Under [40 U.S.C. 3702](#) of the Act, Contractor shall be required to compute the wages of every mechanic and laborer on the basis of a standard work week of 40 hours. Work in excess of the standard work week is permissible provided that the worker is compensated at a rate of not less than 1½ times the basic rate of pay for all hours worked in excess of 40 hours in the work week unless a higher rate is required by state or federal law. The requirements of [40 U.S.C. 3704](#) are applicable to construction work and provide that no laborer or mechanic shall be required to work in surroundings or under working conditions which are unsanitary, hazardous or dangerous. These requirements do not apply to the purchases of supplies or materials or articles ordinarily available on the open market, or contracts for transportation or transmission of intelligence.

Contractor shall comply with the following required provisions:

- a. 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 unless a higher rate is required by state or federal law.
- b. Violation; liability for unpaid wages; liquidated damages: In the event of any violation of the clause set forth in paragraph (a) 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 (a) of this section, in the sum of \$29 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 (a) of this section.
- c. Withholding for unpaid wages and liquidated damages: The State of Maine 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 (b) of this section.

Supplemental General Conditions

- d. Subcontracts: The Contractor or subcontractor shall insert in any subcontracts the clauses set forth in paragraph (a) through (d) 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 (a) through (d) of this section.
- e. The Contractor or subcontractor shall maintain payrolls and basic payroll records during the course of the work and shall preserve them for a period of three years from the completion of the contract for all laborers and mechanics, including guards and watchmen, working on the contract. Such records shall contain the name and address of each such employee, social security number, correct classifications, hourly rates of wages paid, daily and weekly number of hours worked, deductions made, and actual wages paid.
- f. Records to be maintained under this provision shall be made available by the Contractor or subcontractor for inspection, copying, or transcription by authorized representatives of the Department of Treasury, and the Department of Labor, and the Contractor or subcontractor will permit such representatives to interview employees during working hours on the job.

3. Environmental Compliance

- a. Contracts and subgrants of amounts in excess of \$150,000 must comply with all applicable standards, orders or regulations issued pursuant to the Clean Air Act ([42 U.S.C. 7401–7671q](#)) and the Federal Water Pollution Control Act as amended ([33 U.S.C. 1251–1387](#)). Violations must be reported to the Federal awarding agency and the Regional Office of the Environmental Protection Agency (EPA).
- b. The Contractor shall comply with all applicable standards, orders, or requirements issued under section 508 of the Clean Water Act ([33 U.S.C. 1368](#)), Executive Order 11738, Environmental Protection Agency regulations (40 CFR Part 15), and section 308 of the Federal Water Pollution Control Act ([33 U.S.C. 1318](#)), that relate generally to inspection, monitoring, entry reports, and information, and with all regulations and guidelines issued thereunder.
- c. The Contractor shall comply with all applicable standards, orders, or requirements issued under the [Resource Conservation and Recovery Act \(RCRA\)](#); [the Comprehensive Environmental Response Compensation and Liabilities Act \(CERCLA\)](#); and any applicable Federal, Codes or Local environmental regulation.

4. Protection for Whistleblowers

- a. In accordance with [41 U.S.C. § 4712](#), Contractor may not discharge, demote, or otherwise discriminate against an employee in reprisal for disclosing to any of the list of persons or entities provided below, information that the employee reasonably believes is evidence of gross mismanagement of a federal contract or grant, a gross waste of federal funds, an abuse of authority relating to a federal contract or grant, a substantial and specific danger to public health or safety, or a violation of law, rule, or regulation related to a federal contract (including the competition for or negotiation of a contract) or grant.
- b. The list of persons and entities referenced in the paragraph above includes the following:
 - i. A member of Congress or a representative of a committee of Congress;
 - ii. An Inspector General
 - iii. The Government Accountability Office;
 - iv. A Treasury employee responsible for contract or grant oversight or management;

Supplemental General Conditions

- v. An authorized official of the Department of Justice or other law enforcement agency;
 - vi. A court or grand jury; or
 - vii. A management official or other employee of Contractor, contractor, or subcontractor who has the responsibility to investigate, discover, or address misconduct.
- c. Contractor shall inform its employees in writing of the rights and remedies provided under this section, in the predominant native language of the workforce.

5. Domestic Preference for Procurements

Contractor should, to the greatest extent practicable under a Federal award, provide a preference for the purchase, acquisition, or use of goods, products, or materials produced in the United States (including but not limited to iron, aluminum, steel, cement, and other manufactured products). The requirements of this section must be included in all subawards including all contracts and purchase orders for work or products under this award. For purposes of this section: (1) “Produced in the United States” means, for iron and steel products, that all manufacturing processes, from the initial melting stage through the application of coatings, occurred in the United States. (2) “Manufactured products” means items and construction materials composed in whole or in part of non-ferrous metals such as aluminum; plastics and polymer-based products such as polyvinyl chloride pipe; aggregates such as concrete; glass, including optical fiber; and lumber ([2 CFR 200.322](#)).

6. Procurement of recovered materials

The Contractor shall comply with [section 6002 of the Solid Waste Disposal Act](#), as amended by the Resource Conservation and Recovery Act. The requirements of Section 6002 include procuring only items designated in guidelines of the Environmental Protection Agency (EPA) at [40 CFR part 247](#) that contain the highest percentage of recovered materials practicable, consistent with maintaining a satisfactory level of competition, where the purchase price of the item exceeds \$10,000 or the value of the quantity acquired during the preceding fiscal year exceeded \$10,000; procuring solid waste management services in a manner that maximizes energy and resource recovery; and establishing an affirmative procurement program for procurement of recovered materials identified in the EPA guidelines ([2 CFR 200.323](#)).

7. Nondiscrimination

The Contractor shall ensure that no person is denied benefits of, or otherwise be subjected to discrimination in connection with the Contractor’s performance under this agreement, on the grounds of race, religion, color, national origin, sex, and handicap. Accordingly, and to the extent applicable, the Contractor covenants and agrees to comply with the following:

- a. [Title VI of the Civil Rights Act of 1964](#), which prohibits recipients of federal financial assistance from excluding from a program or activity, denying benefits of, or otherwise discriminating against a person on the basis of race, color, or national origin ([42 U.S.C. § 2000d et seq.](#)), as implemented by the Department of the Treasury’s Title VI regulations, [31 CFR Part 22](#), which are herein incorporated by reference and made a part of this contract (or agreement). Title VI also includes protection to persons with “Limited English Proficiency” in any program or activity receiving federal financial assistance, 42 U.S.C. § 2000d et seq., as implemented by the Department of the Treasury’s Title VI regulations, 31 CFR Part 22, and herein incorporated by reference and made a part of this contract or agreement.
- b. [The Fair Housing Act, Title VIII of the Civil Rights Act of 1968](#) (42 U.S.C. §§ 3601, et seq.), which prohibits discrimination in housing on the basis of race, color, religion, national origin, sex, familial status, or disability
- c. [Section 504 of the Rehabilitation Act of 1973](#) (29 U.S.C. § 794)
- d. [The Age Discrimination Act of 1975](#) (42 U.S.C. § 6101 et seq.) and regulations issued thereunder (45 CFR Part 90).

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- e. [Title II of the Americans with Disabilities Act of 1990](#), as amended (42 U.S.C. §§ 12101 et seq.), which prohibits discrimination on the basis of disability under programs, activities, and services provided or made available by state and local governments or instrumentalities or agencies thereto.

8. Lobbying

- 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 an 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 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 of Lobbying Activities," in accordance with its instructions.
- c. The undersigned shall require that the language of this certification be included in the award documents for all subawards at all tiers (including subcontracts, subgrants, and contracts under grants, loans, and cooperative agreements) and that all subrecipients shall certify and disclose accordingly. 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 section 1352, title 31, U.S. Code. 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.
- d. The Interim Final Rule, New Restrictions on Lobbying, issued by the Office of Management and Budget to implement the provisions of section [319 of Public Law 101-121 \(31 U.S.C., Art 1352\)](#) is incorporated by reference.

9. Drug-Free Workplace

The Contractor will comply with the provisions of the [Drug-Free Workplace Act of 1988](#) (Public Law 100-690, title V, subtitle D; 41 U.S.C. 701 et seq.) and maintain a drug-free workplace.

10. Increasing Seat Belt Use in the United States

Pursuant to [Executive Order 13043, 62 FR 19217](#) (Apr. 18, 1997), Contractor is encouraged to adopt and enforce on-the-job seat belt policies and programs for its their employees when operating company owned, rented or personally owned vehicles.

11. Reducing Text Messaging While Driving

Pursuant to [Executive Order 13513, 74 FR 51225](#) (October 6, 2009), Contractor is encouraged to adopt and enforce policies that ban text messaging while driving, and to establish workplace safety policies to decrease accidents caused by distracted drivers.

12. Debarment and Suspension

If the Contract is in excess of \$25,000, this Contract is a covered transaction for purposes of [2 C.F.R. Part 180](#) and [2 C.F.R. Part 3000](#). As such, the Contractor is required to verify that none of the Contractor's principals (defined at [2 C.F.R. § 180.995](#)) or its affiliates (defined at [2 C.F.R. § 180.905](#)) are excluded (defined at [2 C.F.R. § 180.940](#)) or disqualified (defined at [2 C.F.R. § 180.935](#)). The Contractor must comply with 2 C.F.R. Part 180, subpart C and 2 C.F.R. Part 3000, subpart C, and must include a requirement to comply with these regulations in any lower tier covered transaction it enters into. This certification is a material representation of fact relied upon by The State of Maine. If it is later determined that the Contractor did not comply with 2 C.F.R. Part 180, subpart C and 2 C.F.R.

Supplemental General Conditions

Part 3000, subpart C, in addition to remedies available to The State of Maine, the federal government may pursue available remedies, including but not limited to suspension and/or debarment. The bidder or proposer agrees to comply with the requirements of 2 C.F.R. Part 180, subpart C and 2 C.F.R. Part 3000, subpart C while this offer is valid and throughout the period of any contract that may arise from this offer. The bidder or proposer further agrees to include a provision requiring such compliance in its lower tier covered transactions.

13. Prohibition on Certain Telecommunications and Video Surveillance Services or Equipment

Contractor shall use no funds provided under this Contract to:

- a. Procure or obtain;
- b. Extend or renew a contract to procure or obtain; or
- c. Enter into a contract (or extent or renew a contract) to procure or obtain equipment, services, or systems that uses covered telecommunications equipment or services as a substantial or essential component of any system, or as critical technology as part of any system. As described in Public Law 115-232, section 889, covered telecommunications equipment is telecommunications equipment produced by Huawei Technologies Company or ZTE Corporation (or any subsidiary or affiliate of such entities).
 - i. For the purpose of public safety, security of government facilities, physical security surveillance of critical infrastructure, and other national security purposes, video surveillance and telecommunications equipment produced by Hytera Communications Corporation, Hangzhou Hikvision Digital Technology Company, or Dahua Technology Company (or any subsidiary or affiliate of such entities).
 - ii. Telecommunications or video surveillance services provided by such entities or using such equipment.
 - iii. Telecommunications or video surveillance equipment or services produced or provided by an entity that the Secretary of Defense, in consultation with the Director of the National Intelligence or the Director of the Federal Bureau of Investigation, reasonably believes to be an entity owned or controlled by, or otherwise connected to, the government of a covered foreign country.
- d. The Contractor shall insert the substance of this clause, including this paragraph, into all subcontracts and other contractual instruments ([2 CFR 200.216](#)).

Data for Infrastructure Projects and Capital Expenditure Projects

- 14.1** Programmatic Data for Infrastructure Projects (Expenditure Category 5 (EC 5)): For all projects listed under the Water, Sewer¹, and Broadband Expenditure Categories (see Appendix 1 of the Compliance and Reporting Guidance for a listing of expenditure categories), more detailed project-level information is required. The Contractor/ Sub-recipient acknowledges that they must provide the below-referenced data associated with the services tied to this service contract/sub-award. This information will be provided to the State of Maine Contracting Department (Owner/Department) by the Contractor/Sub-recipient. Contractors and Sub-recipients are only required to provide the specific information tied to the project associated with this contract/sub-award that fits into one or more listed ECs. Each project will be required to report expenditure data as described above, but will also report the following information:

¹ Definitions for water and sewer Expenditure Categories can be found in the EPA's handbooks. For "clean water" expenditure category definitions, please see: <https://www.epa.gov/sites/production/files/2018-03/documents/cwdefinitions.pdf>. For "drinking water" expenditure category definitions, please see: <https://www.epa.gov/dwsrf/drinking-water-staterevolving-fund-national-information-management-system-reports>.

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1. All Water and Sewer projects (EC 5.1-5.18):
 - Projected/actual construction start date (month/year)
 - Projected/actual initiation of operations date (month/year)
 - Public Water System (PWS) ID Number
 - National Pollutant Discharge Elimination System (NPDES) Permit Number
 - Median Household Income of Service Area²
 - Lowest Quintile Income of the Service Area²
2. All Broadband Projects (EC 5.19-5.21):
 - Projected/actual construction start date (month/year)
 - Projected/actual initiation of operations date (month/year)
 - Location Details
 - Confirm that the project is designed to, upon completion, reliably meet or exceed symmetrical 100 Mbps download and upload speeds.
 - If the project is not designed to reliably meet or exceed symmetrical 100 Mbps download and upload speeds, explain why not, and
 - Confirm that the project is designed to, upon completion, meet or exceed 100 Mbps download speed and between at least 20 Mbps and 100 Mbps upload speed, and be scalable to a minimum of 100 Mbps download speed and 100 Mbps upload speed.
 - Confirm that the service provider for the project has, or will upon completion of the project, either participated in the Federal Communications Commission (FCC)'s Affordable Connectivity Program (ACP) or otherwise provided access to a broad-based affordability program that provides benefits to households commensurate with those provided under the ACP to low-income consumers in the proposed service area of the broadband infrastructure (applicable only to projects that provide service to households).
 - Detailed Project Information:
 - Project technology type(s) (Planned/Actual)
 - Fiber
 - Coaxial Cable
 - Terrestrial Fixed Wireless
 - Other (specify)
 - Total miles of fiber deployed (Planned/Actual)
 - Total number of funded locations served (Planned/Actual)
 - Pre-SLFRF Investment
 - Total Number of Funded Locations Served receiving 25/3 Mbps or below
 - Total Number of Funded Locations Served receiving between 25/3 Mbps and 100/20 Mbps
 - Post-SLFRF
 - Total Number Receiving Minimum 100/100 Mbps
 - Total Number Receiving Minimum 100/20Mbps and scalable to 100/100 Mbps
 - Total number of funded locations served, broken out by type (Planned/Actual):
 - Residential
 - Total Housing Units
 - Business
 - Community Anchor Institution
 - Location-by-Location Project Information

For each location served by a Project, the Owner/Department must collect from the Contractor/Sub-recipient and submit the following information to Treasury using a

² *For median income and lowest quintile income of Census Tracts and other geographic areas, Contractor/Sub-recipient should refer to the most recent American Community Survey 5-year estimates available through the Census website.

Supplemental General Conditions

predetermined file format that will be provided by Treasury (collection of certain fields will begin in October 2022, as specified below):

- Latitude/longitude at the structure where service will be installed (required starting October 2022) Technology used to offer service at the location (required starting October 2022)
- Location type (required starting October 2022)
 - Residential
 - If Residential, Number of Housing Units
 - Business
 - Community anchor institution
- Speed tier at the location post-SLFRF investment (collection to be phased in)
 - Maximum download speed offered
 - Maximum download speed delivered
 - Maximum upload speed offered
 - Maximum upload speed delivered
 - Latency
- Standardized FCC Identifiers
 - Fabric ID # (Broadband Serviceable Fabric Locations)
 - FCC Issued Provider ID #

3. Wage Rate Disclosures and Certifications for Capital Expenditure and Infrastructure Projects.

A. N/A

B. To the extent that the Contractor/Sub-recipient employs laborers and mechanics as defined by the Davis Bacon Act, the Contractor/Sub-recipient must provide a project employment and local impact report detailing:

- The number of employees of contractors and sub-contractors working on the project;
- The number of employees on the project hired directly;
- The number of employees on the project hired through a third party;
- The wages and benefits of workers on the project by classification; and
- Whether those wages are at rates less than those prevailing;
- Contractor/Sub-recipient must maintain sufficient records to substantiate this information upon request.

C. To the extent that the Contractor/Sub-recipient employs laborers and mechanics as defined by the Davis Bacon Act, the Contractor/Sub-recipient must provide a project workforce continuity plan, detailing:

- How the Contractor/Sub-recipient will ensure the project has ready access to a sufficient supply of appropriately skilled and unskilled labor to ensure high-quality construction

Supplemental General Conditions

throughout the life of the project, including a description of any required professional certifications and/or in-house training;

- How the Contractor/Sub-recipient will minimize risks of labor disputes and disruptions that would jeopardize timeliness and cost-effectiveness of the project;
- How the Contractor/Sub-recipient will provide a safe and healthy workplace that avoids delays and costs associated with workplace illnesses, injuries, and fatalities, including descriptions of safety training, certification, and/or licensure requirements for all relevant workers (e.g., OSHA 10, OSHA 30);
- Whether workers on the project will receive wages and benefits that will secure an appropriately skilled workforce in the context of the local or regional labor market;
- Whether the project has completed a project labor agreement;
- Whether the project prioritizes local hires
- Whether the project has a Community Benefit Agreement, with a description of any such agreement.

00 73 46
Wage Determination Schedule

PART 1- GENERAL

1.1 Related Documents

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

1.2 Summary

- A. This Section includes the wage determination requirements for Contractors as issued by the State of Maine Department of Labor Bureau of Labor Standards or the United States Department of Labor.
- B. **Clarification:** The Owner has confirmed that the Davis-Bacon Act does not apply to this contract.

1.3 Requirements

- A. Conform to the wage determination schedule for this project which is shown on the following page.

PART 2 - PRODUCTS (not used)

PART 3 - EXECUTION (not used)

00 73 46
Wage Determination Schedule

See Wage Determination Schedule(s) attached to this section.

End of Section 00 73 46 (see attachments as mentioned)

State of Maine Department of Labor - Bureau of Labor Standards
Augusta, Maine 04333-0045 - Telephone (207) 623-7906

Wage Determination - In accordance with 26 MRS §1301 et. seq., this is a determination by the Bureau of Labor Standards, of the fair minimum wage rate to be paid to laborers and workers employed on the below titled project.

2024 Fair Minimum Wage Rates -- Building 2 Hancock County (other than 1 or 2 family homes)

Occupational Title	Minimum Wage	Minimum Benefit	Total
Brickmasons And Blockmasons	\$27.38	\$9.14	\$36.52
Bulldozer Operator	\$31.50	\$7.53	\$39.03
Carpenter	\$27.42	\$8.02	\$35.44
Cement Masons And Concrete Finisher	\$22.63	\$3.67	\$26.30
Commercial Divers	\$30.00	\$4.62	\$34.62
Construction And Maintenance Painters	\$20.74	\$8.88	\$29.62
Construction Laborer	\$22.00	\$2.31	\$24.31
Crane And Tower Operators	\$34.00	\$10.12	\$44.12
Crushing Grinding And Polishing Machine Operators	\$23.00	\$4.94	\$27.94
Drywall And Ceiling Tile Installers	\$26.20	\$10.62	\$36.82
Earth Drillers - Except Oil And Gas	\$21.41	\$5.51	\$26.92
Electrical Power - Line Installer And Repairers	\$38.93	\$8.91	\$47.84
Electricians	\$37.58	\$6.36	\$43.94
Elevator Installers And Repairers	\$68.38	\$45.29	\$113.67
Excavating And Loading Machine And Dragline Operators	\$26.00	\$7.01	\$33.01
Excavator Operator	\$29.50	\$2.71	\$32.21
Fence Erectors	\$26.75	\$4.05	\$30.80
Flaggers	\$20.00	\$0.38	\$20.38
Floor Layers - Except Carpet/Wood/Hard Tiles	\$27.00	\$6.21	\$33.21
Glaziers	\$37.00	\$6.60	\$43.60
Grader/Scraper Operator	\$23.00	\$1.99	\$24.99
Hazardous Materials Removal Workers	\$20.63	\$1.25	\$21.88
Heating And Air Conditioning And Refrigeration Mechanics And Installers	\$30.16	\$5.68	\$35.84
Heavy And Tractor - Trailer Truck Drivers	\$21.50	\$0.95	\$22.45
Highway Maintenance Workers	\$20.00	\$0.00	\$20.00
Industrial Machinery Mechanics	\$31.25	\$1.01	\$32.26
Industrial Truck And Tractor Operators	\$29.25	\$4.06	\$33.31
Insulation Worker - Mechanical	\$23.00	\$3.59	\$26.59
Ironworker - Ornamental	\$30.83	\$24.97	\$55.80
Light Truck Or Delivery Services Drivers	\$23.34	\$1.67	\$25.01
Millwrights	\$33.75	\$8.78	\$42.53
Mobile Heavy Equipment Mechanics - Except Engines	\$27.75	\$4.89	\$32.64
Operating Engineers And Other Equipment Operators	\$24.00	\$2.38	\$26.38
Paver Operator	\$27.03	\$6.49	\$33.52
Pile-Driver Operators	\$32.75	\$1.95	\$34.70
Pipelayers	\$28.50	\$4.89	\$33.39
Plumbers Pipe Fitters And Steamfitters	\$37.50	\$21.71	\$59.21
Pump Operators - Except Wellhead Pumpers	\$31.49	\$32.08	\$63.57
Radio Cellular And Tower Equipment Installers	\$26.00	\$3.77	\$29.77
Reclaimer Operator	\$27.03	\$7.68	\$34.71
Reinforcing Iron And Rebar Workers	\$30.83	\$24.97	\$55.80
Riggers	\$29.25	\$7.79	\$37.04
Roofers	\$23.00	\$3.10	\$26.10
Screed/Wheelman	\$29.25	\$4.94	\$34.19
Sheet Metal Workers	\$26.53	\$6.23	\$32.76
Structural Iron And Steel Workers	\$30.83	\$24.97	\$55.80
Tapers	\$25.00	\$5.11	\$30.11
Telecommunications Equipment Installers And Repairers - Except Line Installers	\$30.00	\$2.39	\$32.39
Telecommunications Line Installers And Repairers	\$23.00	\$5.16	\$28.16
Tile And Marble Setters	\$27.75	\$6.73	\$34.48

Welders are classified as the trade to which welding is incidental (e.g. welding structural steel is Structural Iron and Steel Worker)


Apprentices – The minimum wage rates for registered apprentices are the rates recognized in the sponsorship agreement for registered apprentices working in the pertinent classification.

For any other specific trade on this project not listed above, contact the Bureau of Labor Standards for further clarification.

Title 26 §1310 requires that a clearly legible statement of all fair minimum wage and benefits rates to be paid the several classes of laborers, workers and mechanics employed on the construction on the public work must be kept posted in a prominent and easily accessible place at the site by each contractor and subcontractor subject to sections 1304 to 1313.

Appeal – Any person affected by the determination of these rates may appeal to the Commissioner of Labor by filing a written notice with the Commissioner stating the specific grounds of the objection within ten (10) days from the filing of these rates.

A true copy

Attest: 
Scott R. Cotnoir
Wage & Hour Director
Bureau of Labor Standards

Expiration Date: 12-31-2024
Revision Date: 1-3-2024

SECTION 011000 - SUMMARY

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section includes:

1. Project information.
2. Work covered by Contract Documents.
3. Start of construction.
4. Work by Owner.
5. Work under separate contracts.
6. Future work.
7. Purchase contracts.
8. Owner-furnished products.
9. General Contractor-furnished, Owner-installed products.
10. Access to site.
11. Coordination with occupants.
12. Work restrictions.
13. Specification and drawing conventions.

- B. Related Section:

1. Division 01 Section "Temporary Facilities and Controls" for limitations and procedures governing temporary use of Owner's facilities, if applicable.

1.3 PROJECT INFORMATION

- A. Project Identification:

1. BGS project #3519 (= BGS-3519 + BGS 3660) / Architect project #2308.1
2. Project Location: Lamoine State Park, Lamoine, Maine.
3. Overall Project BID: The total sum of all six (6) individual Sub-Projects BID amounts, when added together, plus GC markups as indicated in SECTIONs 001113 Notice to Contractors and 004113 Contractor Bid Form.
4. Project BID Bond: The Project Bid Bond shall be based solely on the amount of the Overall Project BID, as indicated in item 1.3.A.3 above, and as per SECTION 004313 Contractor Bid Bond.

5. Sub-Projects Bidding: The Project is broken down into the following six (6) Sub-Projects, for each of which the GC shall provide individual pricing amounts (failure to submit said pricing shall constitute a non-compliant Overall Project Bid):

Drawing Series 100 Barn Renovations (RENO / BGS-3519)
Drawing Series 200 DMR Office Fit-Out (RENO /BGS-3660)
Drawing Series 300 Campsite Infrastructure Upgrades (RENO + NC / BGS-3519)
Drawing Series 400 Well System Upgrades & Pumphouse (RENO +NC / BGS-3519)
Drawing Series 500 Entry Building Expansion & Gate (RENO &+ NC / BGS-3519)
Drawing Series 600 5-Bay Pole Barn (NC / BGS-3519)

Note: BGS Project Numbers 3519 + 3660 are for the Owner's funding monitoring use. The GC is advised that two (2) Schedules of Values will therefore be required at all Requisitions.

6. Wage Determination: Refer to:
1. SECTION 00 73 46 Wage Determination Schedule.
 2. SECTION 00 72 13 General Conditions.
 3. SECTION 00 72 14 Supplemental General Conditions.
 - 1) Clarification: The Owner has confirmed that the Davis-Bacon Act does not apply to this contract.
7. Allowances: Refer to:
1. SECTION 00 41 13 Contractor Bid Form.
 2. SECTION 01 21 00 Allowances.
 3. Clarification: Allowances can be applied across all six (6) Sub-Projects at the Owner's and Architect's mutual discretion.
8. Unit Prices: Refer to:
1. SECTION 00 41 13 Contractor Bid Form.
 2. SECTION 01 22 00 Unit Prices.
 3. SECTION 01 15 00 Measurement and Payment
9. Alternates: Refer to:
1. SECTION 00 41 13 Contractor Bid Form.
 2. SECTION 01 23 00 Alternates.
 3. Clarification: Alternates apply to specific Sub-Projects, as indicated.

- B. Owner: State of Maine, Department of Agriculture, Conservation and Forestry, Bangor, Maine.
- C. Architect: Lewis + Malm Architecture (LMA), 119 Main Street, Suite C, PO Box 1459, Bucksport, ME 04416. Tel: 207.469.7440, Cell: 207.659.6683 (Charles Earley, Project Manager/Senior Designer), Cell: 207.356.8369 (Jim Tatgenhorst, Architect of Record).
- D. Professional Consultants to Architect: The Architect has hired the following engineering consultants for the Project:
1. Civil Engineer: Dubois & King, Bangor, ME, John Kenney, P.E.
 2. Structural Engineer: Lincoln Haney & Associates, Michael Cunningham, P.E.
 3. Mechanical & Plumbing Engineer: Hewett & Whitney Engineers, Ken Whitney, P.E.

4. Electrical Engineer: Hewett & Whitney Engineers, Colin Hewett, P.E.
- E. General Contractor: To be determined by public bid, on the basis of the Contract Documents, as indicated. The abbreviation “GC” is synonymous with General Contractor.

1.4 WORK COVERED BY CONTRACT DOCUMENTS

- A. The Work of the Project is defined by the Contract Documents and involves all safety measures, protection, removals, new construction and installations.
- B. Sub-Project Descriptions by Drawing Series: (See Construction Documents for detailed scope).
 1. Drawing Series 100: Barn Renovations includes select removals, some minor civil works, structural framing reinforcements, some mechanical & plumbing upgrades, electrical system upgrades, new windows, some new doors, exterior wall cladding improvements, roofing replacements, exterior paintwork.
 2. Drawing Series 200: DMR Office Renovations includes select removals, some minor civil works, some structural raised floor framing reinforcements & sub-flooring, mechanical & plumbing upgrades, electrical system upgrades, new interior doors, ADA improvements to an existing deck, new floor finishes interior paintwork.
 3. Drawing Series 300: Campsite Infrastructure Upgrades includes select removals, civil & gravel roadway works, new underground power & water infrastructure to existing campsites, and RV-Hookups.
 4. Drawing Series 400: Well System Upgrades includes select removals, a new Pump House Building w/ some minor civil works, wooden skids, insulated wood framing, insulated roofing, asphalt shingle or metal roofing, mechanical & plumbing installations, electrical system installations.
 5. Drawing Series 500: Entry Building Expansion & Gate includes select removals, some minor civil works, new structural wood framing, some minor electrical system upgrades, new windows, existing building upgrades, built-in casework, exterior wall cladding improvements, roofing replacements, exterior paintwork, and a new traffic barrier gate (see Drawing Series 500).
 6. Drawing Series 600: 5-Bay Pole Barn includes some site preparations & gravel pad, new structural pole driving & pole barn wood framing, new barn- and personnel-doors, exterior wall cladding, and roofing (see Drawing Series 600). There are no MEP installations in this Sub-Project.
- C. Type of Contract: The Project will be constructed under a single prime contract based on State of Maine norms.

1.5 START OF CONSTRUCTION

- A. The General Contractor mobilization may begin upon receipt of a signed agreement (see SECTION 00 52 13 Construction Contract Sample), unless agreed otherwise in writing.

1.6 REMOVAL MATERIALS

- A. The General Contractor is advised that the Owner has determined that all debris resulting from removals performed by the GC and/or his Sub-Contractors must be completely removed from the Lamoine campground property.
- B. It is absolutely prohibited to deposit any removal or construction debris on the camp ground property.

1.7 WORK BY OWNER

- A. General: Cooperate fully with Owner so work may be carried out smoothly, without interfering with or delaying work under this Contract or work by Owner. Coordinate the Work of this Contract with work performed by Owner.
- B. Adjacent Areas: The Owner has determined that the rest of the Lamoine State Park Campground (outside of Sub-Project scope areas), is not part of the Project area, unless indicated otherwise. The General Contractor shall coordinate & maintain Owner's direct access to existing facilities and areas during the entire construction period. The GC is responsible to coordinate with Owner and allow ample time in construction schedule to allow construction to progress smoothly without delaying the work.

1.8 WORK UNDER SEPARATE CONTRACTS

- A. General: Cooperate fully with separate General Contractors so work on those contracts may be carried out smoothly, without interfering with or delaying work under this Contract or other contracts. Coordinate the Work of this Contract with work performed under separate contracts.
- B. Concurrent Work: The Owner will award a separate contract for the following construction operations in the Project Building & Project Scope Areas. Those operations will be conducted prior to the start of the General Contractor's work under this Contract.
 - 1. Existing Lamoine State Park Outdoor Storage Items in SERIES 600: Pole Barn site area.
- C. Potential Concurrent Work: The Owner will award a separate contract for the following construction operations in the Project Building & Project Scope Areas. Those operations may be conducted prior to the start of the General Contractor's work under this Contract.
 - 1. Emergency Power Generator (EPG) system (Housekeeping Pad, EPG Unit, Automatic Transfer Switch), serving SERIES 100: Barn Renovations, SERIES 200: Office Renovations (Fit-Out), and the Existing Marine Science Laboratory.

1.9 CONTRACTOR SUPPLIED / CONTRACTOR INSTALLED PRODUCTS (CS/CI)

- A. The General Contractor will furnish products indicated. The Work includes receiving, unloading, handling, storing, protecting, and installing Contractor-furnished products.
- B. This article defines responsibilities of Contractor-Supplied / Contractor Installed (CS/CI) Products:
 - 1. All works indicated and specified.
 - 2. All Alternate Bid Items (if accepted by the Owner after the BID), as specified.

1.10 OTHER SALVAGED ITEMS

- A. This article defines the responsibilities of the General Contractor of other salvaged items.
 - 1. None.

1.11 ACCESS TO SITE

- A. General: The General Contractor shall have limited use of Project site for construction operations.
- B. Use of Site: Limit use of Project site to areas within the Contract limits indicated. Do not disturb portions of Project site beyond areas in which the Work is indicated.
 - 1. Driveways & Walkways: The General Contractor is responsible to maintain all driveway & walkway surfaces during construction, do not impede automobile & pedestrian traffic. Refill any depressions causing standing water.
 - 2. Staging & Material Storage Area: The Owner will designate an outdoor area adjacent to the project scope area for General Contractor staging. The General Contractor is responsible to provide security, protect & maintain during construction. Coordinate location of temporary enclosures provided by the General Contractor for his own equipment, access & gates with Owner and Architect.
 - 3. Parking: The General Contractor shall coordinate a designated parking area for staff and sub-contractors with the Owner and Architect, and mark it with adequate weatherproof signage, barriers, traffic cones and other safety measures as required. The General Contractor shall maintain this designated parking area and provide for trash removal in this area.

1.12 WORK RESTRICTIONS

- A. Work Restrictions, General: Comply with restrictions on construction operations.
 - 1. Comply with limitations on use of public streets and other requirements of authorities having jurisdiction.
- B. On-Site Work Hours: Work shall be generally performed inside the existing buildings during normal business working hours of 7:00 a.m. to 5:00 p.m., Monday through Friday, unless otherwise indicated.

1. Weekend Hours: As approved by Architect and Owner.
 2. Early Morning Hours: As approved by Architect and Owner.
 3. Hours for Utility Shutdowns: As approved by Architect and Owner.
 4. Provide 24 hour notice to the Owner and the Architect when performing work other than normal working hours.
- C. Nonsmoking Construction Site: Smoking is not permitted on campus. The General Contractor is responsible to instruct, monitor & maintain observance of this strict rule by all staff & Sub-Contractors. Violators may be removed from the Project site.

1.13 SPECIFICATION AND DRAWING CONVENTIONS

- A. Specification Format: The Specifications are organized into Divisions and Sections using the 48-division format and CSI/CSC's "Master Format" numbering system.
- B. Specification Applications: There is one set of Specifications for the Overall Project covering all six (6) Sub-Projects. The General Contractor is advised that not all Spec Sections apply to all Sub-Projects. The GC is responsible to determine specification applications required to meet the needs of each Sub-Project.
- C. Specification Content: The Specifications use certain conventions for the style of language and the intended meaning of certain terms, words, and phrases when used in particular situations. These conventions are as follows:
1. Imperative mood and streamlined language are generally used in the Specifications. The words "shall," "shall be," or "shall comply with," depending on the context, are implied where a colon (:) is used within a sentence or phrase.
 2. Specification requirements are to be performed by General Contractor unless specifically stated otherwise.
- D. Familiarity with Construction Documents: At all times (prior to bidding, administratively and during construction in the field), the General Contractor's-Project Director(s), -Project Manager(s), -Superintendent(s) and -Foremen shall familiarize themselves with the content of the Construction Documents (Drawings and Specifications).
- E. Drawing Coordination: Requirements for materials and products identified on the Drawings are described in detail in the Specifications. One or more of the following are used on the Drawings to identify materials and products:
1. Terminology: Materials and products are identified by the typical generic terms used in the individual Specifications Sections.
- F. Drawings & Specifications are complimentary and one shall not be used against the other by the General Contractor or its Sub-Contractors. The GC shall report any discrepancies discovered in the Drawings & Specifications prior to proceeding with construction to the Architect in writing. In the instance of a discrepancy, the higher value shall be interpreted by the Owner, Architect and GC as being included in the GC's base bid.

- G. General Contractor's proposals/alternate solutions: The GC shall work with the Architect in terms of the design intent indicated in the construction documents. Should the GC have alternate solutions and approaches that meet the same desired result without reducing the quality of the construction, the GC shall submit such proposals or ideas in writing in the form of an RFI for the Architect's and Owner's consideration, including product data, sketches, drawings or other information to support final decision making by the Owner and Architect.

END OF SECTION

SECTION 01 15 00 - MEASUREMENT AND PAYMENT

PART 1 GENERAL

1.01 DESCRIPTION

- A. This Section covers the requirements for measurements and records for payment purposes, and describes the items under which payments will be made for gravel for existing gravel roads and gravel campsites related to Project 3a "CAMPSITE INFRASTRUCTURE UPGRADES" performed under this Contract.
- B. Items not specified to be measured or paid for shall be included in an appropriate unit price item or in a Lump-sum item.

1.02 MEASUREMENT REQUIREMENTS

- A. Notify Engineer and Owner so that gravel material may be inspected and measuring may be witnessed for the approval of the record of measurements. All materials transported to the project site without conforming to the above procedures, and which Engineer cannot verify or substantiate, will not be paid for.
- B. Maintain complete, neat, clean, and legible field notes for all measured items. Notes shall contain spaces for Contractor's and Engineer's (or owner's) signatures plus additional space for comments. An original and a copy shall be made for all notes and one copy shall be turned over to Engineer or owner daily. The Engineer's signature shall not be construed as an acceptance of the Work, or the measurements made, but shall mean that he was present when the measurements were made.

1.03 SUBMITTALS

- A. See Section 01 3000 - Administrative Requirements.
- B. Field notes of all measurements for payment purposes delivered to Engineer daily.
- C. Copies of all invoices required for payments out of cash allowance(s).
- D. Monthly Applications for Payment, on the forms specified in the Supplementary Conditions.

1.04 SCHEDULING

- A. Notify Engineer and Owner, as far in advance as possible, of the making of measurements so that the Engineer may observe existing conditions, work being performed, and measurements being made.
- B. Allow for and afford Engineer and Owner ample time, space and equipment to observe measurements and to verify measurements and elevations.

PART 2 PRODUCTS

2.01 GENERAL

- A. Provide all labor, materials, facilities, levels, measuring devices and all other equipment and items necessary to properly and accurately perform all measurements for payment purposes.

PART 3 EXECUTION

3.01 GENERAL REQUIREMENTS & STIPULATIONS

- A. Perform all measuring required under this Section.
- B. No separate payments will be made for work under this Contract except for the pay items stipulated in this PART 3. All costs in connection with the Work shall be included in one or more of the pay items as appropriate.
- C. Each pay item shall be full compensation for all costs in connection with the item including but not limited to:
 - 1. The furnishing of all materials, labor, equipment, tools, and all incidentals.
 - 2. The installation of all materials, equipment, facilities, accessories and appurtenant items.
 - 3. The proper share of overhead and profit.
 - 4. Any excavation, trenching, backfilling, dewatering, shoring or testing required.
 - 5. The restoration of unpaved surfaces.
 - 6. Any temporary facilities or controls required including flaggers and/or uniformed traffic officers.
 - 7. All erosion and dust control measures.
 - 8. All related and incidental work and items necessary or required to complete the Work and to provide completely connected, operational and approved systems capable of performing as required.
 - 9. Clearing and grubbing.
- D. Each pay item which specifically involves excavation shall be considered to include full compensation for:
 - 1. Excavation in earth.
 - 2. Disposal of any surplus.
 - 3. Handling of water as specified.
 - 4. Installation and removal of sheeting and bracing.

3.02 MEASUREMENT & PAYMENT ITEMS

The names of the following items are abbreviated forms of the Bid Items as contained on the Price Schedule in the Bid Form. The names, as shown below or on the Bid Form, shall not be construed to represent a complete description of all of the Work included under such items and are provided only as a means of identification and for ease of conversation.

A. AGGREGATE FOR GRAVEL DRIVES AND CAMPSITES

1. Method of Measurement Aggregate for gravel drives and campsites (Project 3a) will be measured by truck measure. The measurement will be in vehicles at the point of delivery as shown on delivery slips. Unless expressly provided otherwise, the Owner and the Contractor shall use the following general measurement provisions. Delivery Slips shall be serially pre-numbered delivery slips of acceptable size and format for stating the following minimum information shall be furnished by the Contractor, in as many copies as may be necessary. One copy shall be retained by the Resident or Inspector upon accepting delivery of the material.
 - a) Vehicle identification
 - b) Date loaded
 - c) Work identification number & location
 - d) Identification of Material:

- 1) Item number
 - 2) Source location of supplier
 - 3) Type and grade
- e) Signatures (legible initials acceptable) of: Weighmaster (if weight measured material), Contractor's representative (if volume measured material), and Resident (Cover Slips).

Aggregate for gravel drives and campsites (Project 3a), designated by pay item to be measured in place and used for driveways and other locations difficult to accurately measure in place, may be measured in vehicles at 80% of the number of cubic yards accepted and used, at the point of delivery as shown by delivery slips.

2. Basis of Payment The site contractor shall carry in their Base Bid the quantity of Aggregate for Gravel Drives and Campsites (Project 3a) as specified on drawings. The contract price will be modified based on the accepted quantities of aggregate for gravel drives and campsites (Project 3a) of the type specified according to the contract unit price per cubic yard. Payment shall include purchasing material, stripping pits, excavating, crushing and screening when necessary, hauling, placing, compacting and other necessary processes which are required to furnish acceptable material under this item. Water added or fines added or both added to the material to aid compaction and to prevent raveling will be at the Contractor's expense.

END OF SECTION

SECTION 012100 - ALLOWANCES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section includes administrative and procedural requirements governing allowances.
- B. Types of allowances include the following:
 - 1. Testing and inspecting allowances.
- C. Related Requirements:
 - 1. Section 012600 "Contract Modification Procedures" for procedures for submitting and handling Change Orders.
 - 2. Section 014000 "Quality Requirements" for procedures governing the use of allowances for field testing by an independent testing agency.

1.3 DEFINITIONS

- A. Allowance: A quantity of work or dollar amount included in the Contract, established in lieu of additional requirements, used to defer selection of actual materials and equipment to a later date when direction will be provided to Contractor. If necessary, additional requirements will be issued by Change Order.
- B. Allowance Use: Allowances are to only be used for works not designated in the Contract Documents.
- C. Permission: Allowance use must be agreed upon between the Owner, General Contractor and Architect, in writing, prior to the GC engaging in any allowance usage.
- D. Allowance Change Proposal: The General Contractor shall endeavor to provide complete written cost proposals in a timely manner for review by the Owner and Architect.
- E. Time & Materials Allowance Use: The Owner and Architect may agree to allow the General Contractor to proceed with smaller, low cost, Allowance use items on a Time & Materials basis, provided that the GC records and presents daily written T&M allowance use reports to the Owner & Architect.
- F. Allowance Use Log: The General Contractor shall maintain an Allowance Use Log and present updated print-outs of said log for review by the Owner and Architect as part of the monthly Requisitions record-keeping. The Allowance Use Log shall include the following:
 - 1. Original Allowance Amount

2. Date
3. Allowance Use Proposal Number
4. Topic of Allowance Use
5. Category of Allowance Use (Discipline)
6. Total Cost of Allowance Use
7. Remaining Balance by Allowance
8. Overall Remaining Balance (combined Allowances)

- G. Allowance Allocation: The Architect may determine to reallocate Allowance funds from one discipline category to another during construction.

1.4 TESTING AND INSPECTING ALLOWANCES

- A. Testing and inspecting allowances include the cost of engaging testing agencies, actual tests and inspections, and reporting results.
- B. The allowance does not include incidental labor required to assist the testing agency or costs for retesting if previous tests and inspections result in failure. The cost for incidental labor to assist the testing agency shall be included in the Contract Sum.
- C. Costs of testing and inspection services not specifically required by the Contract Documents are Contractor responsibilities and are not included in the allowance.
- D. At Project closeout, credit unused amounts remaining in the testing and inspecting allowance to Owner by Change Order.

1.5 ADJUSTMENT OF ALLOWANCES

- A. Allowance Adjustment: To adjust allowance amounts, prepare a Change Order proposal based on the difference between purchase amount and the allowance, multiplied by final measurement of work-in-place where applicable. If applicable, include reasonable allowances for cutting losses, tolerances, mixing wastes, normal product imperfections, required maintenance materials, and similar margins.
 1. Include installation costs in purchase amount only where indicated as part of the allowance.
 2. If requested, prepare an explanation and documentation to substantiate distribution of overhead costs and other markups.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION

3.1 SCHEDULE OF ALLOWANCES

- A. Allowance No. 1: Cut & Patch Asphalt, include the sum of \$4,000.00 for works not indicated in the Contract Documents.
- B. Allowance No. 2: Cut & Patch Concrete, include the sum of \$4,000.00 for works not indicated in the Contract Documents.
- C. Allowance No. 3: Cut & Patch Gypsum Wall Assemblies, include the sum of \$1,500.00 for works not indicated in the Contract Documents.
- D. Allowance No. 4: Cut & Patch Paint, include the sum of \$4,000.00 for works not indicated in the Contract Documents.
- E. Allowance No. 5: Cut & Patch Mechanical/Plumbing, include the sum of \$4,000.00 for works not indicated in the Contract Documents.
- F. Allowance No. 6: Cut & Patch Electrical, include the sum of \$4,000.00 for works not indicated in the Contract Documents.
- G. Allowance No. 7: Electrical Utilities, include the sum of \$66,000 for mainline utility connections not indicated in the contract documents.
- H. Allowance No. 8: Architect/Engineer's Discretion Allowance: Include the sum of \$7,000.00 for works not indicated in the construction documents.

END OF SECTION

SECTION 012200 - UNIT PRICES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section includes administrative and procedural requirements for unit prices.
- B. Related Sections:
 - 1. Division 01 Section "Quality Requirements" for general testing and inspecting requirements.
 - 2. Division 01 Section "Quality Requirements" for general testing and inspecting requirements.
- C. DEFINITIONS
 - 1. Unit price is an amount incorporated in the Agreement, applicable during the duration of the Work as a price per unit of measurement for materials, equipment, or services, or a portion of the Work, added to or deducted from the Contract Sum by appropriate modification, if the scope of Work or estimated quantities of Work required by the Contract Documents are increased or decreased.

1.3 PROCEDURES

- A. Unit prices include all necessary material, plus cost for delivery, installation, insurance, overhead, and profit.
- B. Measurement and Payment: Refer to individual Specification Sections for work that requires establishment of unit prices. Methods of measurement and payment are as specified herein.
- C. Owner reserves the right to reject Contractor's measurement of work-in-place that involves use of established unit prices and to have this work measured, at Owner's expense, by an independent surveyor acceptable to Contractor.
- D. Unit Price Application shall be discussed and agreed upon as viable circumstances meriting the application of Unit Prices prior to the GC's execution of the additional scope of work being covered.
- E. List of Unit Prices: A schedule of unit prices is included in Part 3. Specification Sections referenced in the schedule contain requirements for materials described under each unit price.

- F. Bidding of Unit Prices: General Contractor's shall prepare a complete a list of the required Unit Prices listed herein; printed on their company letterhead, dated and signed. The GC shall attach said Unit Prices List to their BID Form (refer to SECTION 00 41 13 Contractor Bid Form). The List shall include the following information:

GENERAL CONTRACTOR's LETTERHEAD

We herewith submit the following Unit Prices and confirm their validity for the entire duration of the project.

- | | | |
|----|--|---------------------------|
| 1. | UNIT PRICE #1: Additional Fire Caulking | \$____.____ / Linear Foot |
| 2. | UNIT PRICE #2: Additional Gypsum Board Assemblies | \$____.____ / Square Foot |
| 3. | UNIT PRICE #3: Additional Primer & Paint on Gypsum Board | \$____.____ / Square Foot |
| 4. | UNIT PRICE #4: Additional Primer & Paint on Metal | \$____.____ / Square Foot |
| 5. | UNIT PRICE #5: Additional Primer & Paint on Wood | \$____.____ / Square Foot |
| 6. | UNIT PRICE #6: Additional Aggregate for Gravel Drives | \$____.____ / Cubic Yard |

Signed _____ Date _____ October, 2024

Title _____

Note: Failure to submit a complete Unit Prices list as indicated above and attaching it to the GC's Bid Form at the time of bidding, shall result in the GC's Bid being interpreted as non-conforming.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION

3.1 SCHEDULE OF UNIT PRICES

A. Unit Price No. 1: Additional Fire Caulking

1. Unit Price: Provide Unit Price for One (1) linear foot of Fire Caulking work.
2. Description: Fire Caulking scheduled to be installed in accordance with Division 07 Section "Penetration & Junction Fire Stopping." This unit price is separate from the Base Bid Fire Stopping specified therein.

3. Unit of Measurement: Linear Feet, based upon survey of in place quantity installed. Field conditions may vary and may result in a Change Order (ADD or DEDUCT). Final measurement shall be mutually agreed upon between the Owner, Architect & Contractor.

B. Unit Price No. 2: Additional Gypsumboard Assemblies

1. Unit Price: Provide Unit Price for One (1) square foot area of Additional Gypsumboard Assemblies Work, for areas not described in the contract documents.
2. Description: Gypsum Board Assemblies work as described in Division 09 Section "Non-Structural Metal Framing" and Section "Gypsum Board", including preparation, non-structural metal framing, gypsum board, accessories, joint tape & compound work w/ a level 4 finish.
Unit of Measurement: Square Feet, based upon survey of in place of additional quantity installed. Field conditions may vary and may result in a Change Order (ADD or DEDUCT). Final measurement shall be mutually agreed upon between the Owner, Architect & Contractor.

C. Unit Price No. 3: Additional Paint on Gypsum Board

1. Unit Price: Provide Unit Price for One (1) square foot area of Additional Paint Work, for areas not described in the contract documents.
2. Description: Interior Painting of Gypsumboard work as described in Division 09 Section "Exterior & Interior Painting", including preparation, primer and finish coats required.
Unit of Measurement: Square Feet, based upon survey of in place of additional quantity installed. Field conditions may vary and may result in a Change Order (ADD or DEDUCT). Final measurement shall be mutually agreed upon between the Owner, Architect & Contractor.

D. Unit Price No. 4: Additional Primer & Paint on Existing Metal

1. Unit Price: Provide Unit Price for One (1) square foot area of Additional Paint Work, for areas not described in the contract documents.
2. Description: Exterior Painting of Existing Metal work as described in Division 09 Section "Exterior & Interior Painting", including preparation, primer and finish coats required.
Unit of Measurement: Square Feet, based upon survey of in place of additional quantity installed. Field conditions may vary and may result in a Change Order (ADD or DEDUCT). Final measurement shall be mutually agreed upon between the Owner, Architect & Contractor.

E. Unit Price No. 5: Additional Primer & Paint on Wood

1. Unit Price: Provide Unit Price for One (1) square foot area of Additional Paint Work, for areas not described in the contract documents.
2. Description: Interior Painting of wood work as described in Division 09 Section "Exterior & Interior Painting", including preparation, primer and finish coats required.
Unit of Measurement: Square Feet, based upon survey of in place of additional quantity installed. Field conditions may vary and may result in a Change Order (ADD or DEDUCT). Final measurement shall be mutually agreed upon between the Owner, Architect & Contractor.

F. Unit Price No. 6: Unit Price for Additional Aggregate for Gravel Drives, for areas not described in the contract documents.

1. Unit Price: Provide Unit Price for One (1) cubic yard Additional Aggregate for Gravel Drives, for areas not described in the contract documents.
2. Description: Provide and install aggregate for drives and campsites, including preparation of surface, grading, and compaction as specified in Division 31 "Aggregate for Gravel Drives and Campsites"
3. Measure the volume, in place, as specified below:

Depth - Measure vertically from the bottom of the excavation as approved or ordered by the Engineer.

Width - Measure horizontally from the limits of the excavation as approved or ordered by the Engineer.

Length - Measure length as actual length.

Payment shall be per cubic yard ordered or authorized by the Architect/Engineer. No granular materials specifically paid for under other items are to be included for payment under this item.

END OF SECTION 012200

SECTION 012300 - ALTERNATES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section includes administrative and procedural requirements for alternates.

1.3 DEFINITIONS

- A. Alternate: An amount proposed by bidders and stated on the Bid Form for certain work defined in the Bidding Requirements that may be added to or deducted from the base bid amount if Owner decides to accept a corresponding change either in the amount of construction to be completed or in the products, materials, equipment, systems, or installation methods described in the Contract Documents.
 - 1. Alternates described in this Section are part of the Work only if enumerated in the Agreement.
 - 2. The cost or credit for each alternate is the net addition to or deduction from the Contract Sum to incorporate alternate into the Work. No other adjustments are made to the Contract Sum.

1.4 PROCEDURES

- A. Coordination: Modify or adjust affected adjacent work as necessary to completely integrate work of the alternate into Project.
 - 1. Include as part of each alternate, miscellaneous devices, accessory objects, and similar items incidental to or required for a complete installation whether or not indicated as part of alternate.
- B. Notification: Immediately following award of the Contract, notify each party involved, in writing, of the status of each alternate. Indicate if alternates have been accepted, rejected, or deferred for later consideration. Include a complete description of negotiated modifications to alternates.
- C. Execute accepted alternates under the same conditions as other work of the Contract.
- D. Schedule: A schedule of alternates is included at the end of this Section. Specification Sections referenced in schedule contain requirements for materials necessary to achieve the work described under each alternate.

PART II - SCHEDULE OF ALTERNATES

A. **Alternate # 1: GUTTERS & DOWNSPOUTS ON BARN (pertains to Sub-Project #1: Barn Renovations).**

1. BASE BID Condition: Do not provide gutters, downspouts, or splash pans at Barn roof, as indicated.
2. ALTERNATE BID Condition: Provide 20-23 Gauge metal, semi-circular profile (Eurostyle) gutters w/ EDPM gasketed seams, inlets, leaf guards, heavy duty brackets, downspouts/outlets (all w/ "Greencoat" factory painted finish, or equal), and pre-cast concrete splash pans, according to manufacturer's recommendations for this application, 20-Year Warranty (Nordic Steel gutter systems or equal), as indicated.

B. **Alternate #2: DMR OFFICE VESTIBULE (pertains to Sub-Project #2: DMR Office Fit-Out).**

1. BASE BID Condition: Provide Vestibule interior walls & finishes to same, transaction window, communication device, transaction counter & trim w/ finish, interior entry Door #4 w/ trim & finish. Under this Alternate, electric strike and proximity card reader shall be located at interior entry Door #4, as indicated.
2. ALTERNATE BID Condition: Do not provide Vestibule interior walls & finishes to same, transaction window, transaction counter & trim w/ finish, or interior entry Door #4 w/ trim & finish. Under this Alternate the electric strike and proximity card reader shall be relocated to exterior entry Door #3, as indicated.

C. **Alternate # 3: DMR OFFICE CARPET TILE (pertains to Sub-Project #2: DMR Office Fit-Out).**

1. BASE BID Condition: Provide 12"x12" VCT flooring, including wooden sub-floor leveling skim-coat prep, as required and threshold transitions, as indicated.
2. ALTERNATE BID Condition: Provide 24"x24" Carpet Tile, including wooden sub-floor leveling skim-coat prep, as required and threshold transitions, as indicated.

D. **Alternate # 4: ADDITIONAL SLIDING DOORS (pertains to Sub-Project #4: 5-Bay Pole Barn).**

1. BASE BID Condition: Provide one (1) set of sliding barn doors, dual-track and hardware in BAY #1, as indicated.

ALTERNATE BID Condition: Provide four (4) additional sets of barn doors, dual-track and hardware in BAYs #2, #3, #4 and #5 as indicated.

END OF SECTION

SECTION 012500 - SUBSTITUTION PROCEDURES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section includes administrative and procedural requirements for substitutions.
- B. Related Sections:
 - 1. Division 01 Section "Allowances" for products selected under an allowance.
 - 2. Division 01 Section "Alternates" for products selected under an alternate.
 - 3. Division 01 Section "Product Requirements" for requirements for submitting comparable product submittals for products by listed manufacturers.
 - 4. Divisions 02 through 48 Sections for specific requirements and limitations for substitutions.

1.3 DEFINITIONS

- A. Substitutions: Changes in products, materials, equipment, and methods of construction from those required by the Contract Documents and proposed by the General Contractor.
 - 1. Substitutions for Cause: Changes proposed by the General Contractor that are required due to changed Project conditions, such as documented unavailability of product, regulatory changes, or unavailability of required warranty terms.
 - 2. Substitutions for Convenience: Changes proposed by the General Contractor or Owner that are not required in order to meet other Project requirements but may offer advantage to the General Contractor or Owner.

1.4 SUBMITTALS OF SUBSTITUTION REQUESTS

- A. Substitution Requests: Must be provided with proper justification documentation in a timely manner, so as to not delay or hinder construction planning and/or execution. It is generally preferred to handle substitution requests during the Project Bidding period.
- B. The General Contractor shall allow the Architect ten (10) business days for review of complete Substitution Requests. The Architect reserves the right to reject incomplete substitution requests.
- C. The GC shall submit electronic copies of each request for consideration. The GC shall Identify product or fabrication or installation method to be replaced.

- D. The GC shall include Specification Section number and title and Drawing numbers and titles, applicable to the request, based on the following:
1. Documentation:
 - a. Identify Substitution Type as per 1.3 above, show compliance with requirements for substitutions.
 - b. Verify that the substitution will have no effect on the Contract Sum.
 - c. Provide statement that proposed substitution will have no adverse effect on the General Contractor's construction schedule, as opposed to specified products for the Work.
 - d. Provide a statement indicating why specified product or fabrication or installation cannot be provided (if applicable).
 - e. Provide coordination information, including a list of changes or modifications needed to other parts of the Work and to construction performed by Owner and separate contractors, necessary to accommodate proposed substitution.
 - f. Provide certification that proposed substitution complies with requirements in the Contract Documents is compatible with related materials, and is appropriate for applications indicated.
 - g. Provide a detailed comparison list of significant qualities of proposed substitution with those of the Work/Product specified. Include annotated copy of applicable specification section. Significant qualities may include attributes such as performance, weight, size, durability, visual effect, sustainable design characteristics, warranties, testing reports, and specific features/requirements indicated. Indicate deviations, if any, from the Work specified.
 - h. Submit Product Data, including drawings and descriptions of products and fabrication and installation procedures.
 - i. Provide material samples to support the substitution request.
 - j. Provide material test reports (certificates and qualification data), from a qualified testing agency indicating and interpreting test results for compliance with requirements indicated.
 - k. If specified product or method of construction cannot be provided within the Contract Time, include letter from manufacturer, on manufacturer's letterhead, stating date of receipt of purchase order, lack of availability, or delays in delivery.
 - l. Provide waiver of rights to additional payment or time that may subsequently become necessary because of failure of proposed substitution to produce indicated results.
 2. Architect's Action: If necessary, Architect will request additional information or documentation for evaluation within five (5) business days of receipt of a request for substitution.
 - a. Architect will notify General Contractors of acceptance or rejection of proposed substitution by Addendum or Architect's Supplemental Instruction (ASI).
 - b. The GC shall provide the specified product if Architect cannot make a decision on use of a proposed substitution within time allocated or notification is not made by Addendum or ASI.
 3. Conditions: The Architect will consider the GC's request for substitution when the following conditions are satisfied. If the following conditions are not satisfied, Architect will return requests without action, except to record noncompliance with these requirements:

- a. Requested substitution is consistent with the Contract Documents and will produce indicated results.
 - b. Substitution request is fully documented and properly submitted.
 - c. Requested substitution will not adversely affect the construction schedule.
 - d. Requested substitution has received necessary approvals of authorities having jurisdiction.
 - e. Requested substitution is compatible with other portions of the Work.
 - f. Requested substitution has been coordinated with other portions of the Work.
 - g. Requested substitution provides specified warranty.
 - h. If requested substitution involves more than one contractor, requested substitution has been coordinated with other portions of the Work, is uniform and consistent, is compatible with other products, and is acceptable to all contractors involved.
4. The Architect's decision regarding acceptance or rejection of a substitution request shall be final.

1.5 QUALITY ASSURANCE

- A. Compatibility of Substitutions: Investigate and document compatibility of proposed substitution with related products and materials. Engage qualified testing agency to perform compatibility tests recommended by manufacturers.

1.6 PROCEDURES

- A. Coordination: Modify or adjust affected work as necessary to integrate work of the approved substitutions.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION 012500

SECTION 012600 - CONTRACT MODIFICATION PROCEDURES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section includes administrative and procedural requirements for handling and processing Contract modifications.
- B. Related Sections:
 - 1. Division 01 Section "Product Requirements" for administrative procedures for handling requests for substitutions made after Contract award.

1.3 PROPOSAL REQUESTS

- A. Owner-Initiated Proposal Requests: The Architect will issue a detailed description of proposed changes in the Work that may require adjustment to the Contract Sum or the Contract Time. If necessary, the description will include supplemental or revised Drawings and Specifications.
 - 1. Proposal Requests: issued by Architect are scope definition related and therefore not instructions either to stop work in progress, or to execute the proposed change. The Architect may elect to use its standard Architect's Supplemental Instruction (ASI) Form, or the BGS Form available at <https://www.maine.gov/dafs/bgs/forms> 00 63 46 "Construction Change Directive".
 - 2. General Contractor Response: within seven (7) work days after receipt of Proposal Request, the GC shall submit a quotation on its company letterhead, estimating cost adjustments to the Contract Sum and the Contract Time necessary to execute the entirety of the change.
 - a. Include a list of quantities of products required or eliminated and unit costs, with total amount of purchases and credits to be made. If requested, furnish survey data to substantiate quantities.
 - b. Indicate applicable taxes, delivery charges, equipment rental, and amounts of trade discounts.
 - c. Include costs of labor and supervision directly attributable to the change.
 - d. Include an updated General Contractor's construction schedule that indicates the effect of the change, including, but not limited to, changes in activity duration, start and finish times, and activity relationship. Use available total float before requesting an extension of the Contract Time.

- e. Include any and all Sub-Contractor quotes related to the proposed change as attachments.
- f. General Contractor-Initiated Proposals: If latent or unforeseen conditions require modifications to the Contract, General Contractor may propose changes by submitting a request for a change to Architect on Change Order Request form.
- g. Quotation Form: In order to expedite the Architect's review process, the GC may elect to complete Draft Versions of the following forms available at <https://www.maine.gov/dafs/bgs/forms>

00 63 63 Change Order:

- 1) Construction Contract Change Order
- 2) List of Change Order Items
- 3) Details of Change Order

The GC shall include any and all backup documentation related to the Change Order Quotation and submit 1), 2), 3) and Backup Documentation to the Architect as completed draft versions to the Architect for review and comment.

- 3. Include a statement outlining reasons for the change and the effect of the change on the Work. Provide a complete description of the proposed change. Indicate the effect of the proposed change on the Contract Sum and the Contract Time.
- 4. Include a list of quantities of products required or eliminated and unit costs, with total amount of purchases and credits to be made. If requested, furnish survey data to substantiate quantities.
- 5. Indicate applicable taxes, delivery charges, equipment rental, and amounts of trade discounts.
- 6. Include costs of labor and supervision directly attributable to the change.
- 7. Include an updated General Contractor's construction schedule that indicates the effect of the change, including, but not limited to, changes in activity duration, start and finish times, and activity relationship. Use available total float before requesting an extension of the Contract Time.
- 8. Comply with requirements in Division 01 Section "Substitution Procedures" if the proposed change requires substitution of one product or system for product or system specified.

1.4 ADMINISTRATIVE CHANGE ORDERS

- A. Allowance Adjustment: Refer to Division 01 Section "Allowances" for administrative procedures for preparation of Change Order Proposal for adjusting the Contract Sum to reflect actual costs of allowances.
- B. Unit Price Adjustment: Refer to Division 01 Section "Unit Prices" for administrative procedures for preparation of Change Order Proposal for adjusting the Contract Sum to reflect measured scope of unit price work.
- C. Construction Log: The GC shall track all Change Requests (Proposed, Under Review), and Change Orders (Approved, Rejected), in an updated log for review by the Owner and Architect during monthly Requisition meetings.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION 012600

SECTION 012900 - PAYMENT PROCEDURES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. This Section specifies administrative and procedural requirements necessary to prepare and process Applications for Payment.
- B. Related Sections:
 - 1. Division 01 Section "Allowances" for procedural requirements governing the handling and processing of allowances.
 - 2. Division 01 Section "Unit Prices" for administrative requirements governing the use of unit prices (if applicable).
 - 3. Division 01 Section "Contract Modification Procedures" for administrative procedures for handling changes to the Contract.
 - 4. Division 01 Section "Construction Progress Documentation" for administrative requirements governing the preparation and submittal of the GC's construction schedule.
 - 5. Division 01 Section "Submittal Procedures" for administrative requirements governing the preparation and submittal of the submittal schedule.

1.3 DEFINITIONS

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

1.4 SCHEDULE OF VALUES

- A. Coordination: Coordinate preparation of the schedule of values with preparation of GC's construction schedule.
- B. Schedule of Values: The GC shall use form provided by including continuation sheet(s) as the only approved method <https://www.maine.gov/dafs/bgs/forms> for creating a Schedule of Values for the project:
 - 1. 00 62 76 .01 Continuation Sheet
 - 2. The GC shall provide a Draft Schedule of Values, including separate line items for Allowances and accepted Alternatives within ten (10) work days (no time extensions

permitted), after contract signing for review by the Owner and Architect, who will provide their comments in writing within five (5) working days.

3. If requested by the Owner and/or Architect, the GC shall provide detailed breakdowns by trade for line items in the Final Schedule of Values.
4. The GC shall make adjustments to the Draft Schedule of Values and prepare the Final Schedule of Values within five (5) working days after date of adjustment request described in item 2) above.
5. The GC shall re-submit the Final Schedule of Values as corrected as described in Item 3. above, no later than seven (7) days before the date scheduled for submittal of initial Applications for Payment.
6. Item 4, above, is in addition to Item 3. above, and does not imply an extension of time for requirements as described in Item 3. above.
7. The GC shall correlate line items in the schedule of values with other required administrative forms and schedules, including the following:
 - a. Application for Payment forms with continuation sheets.
 - b. Submittal schedule.
 - c. Items required to be indicated as separate activities in GC's construction schedule.
8. Sub-schedules for Phased Work: Where the Work is separated into phases requiring separately phased payments, provide sub-schedules showing values correlated with each phase of payment.
9. Sub-schedules for Separate Elements of Work: Where the GC's construction schedule defines separate elements of the Work, provide sub-schedules showing values correlated with each element.

C. Format and Content: Establish line items for the schedule of values.

1. Identification: The GC shall include the following Project identification on the schedule of values:
 - a. Project name and location.
 - b. Name of Architect.
 - c. Architect's project number.
 - d. GC's name and address.
 - e. Date of submittal.
2. The GC shall arrange the schedule of values in tabular form with separate columns to indicate the following for each item listed:
 - a. Related Specification Section or Division.
 - b. Description of the Work.
 - c. Name of sub-Contractor.
 - d. Name of manufacturer or fabricator.
 - e. Name of supplier.
 - f. Change Orders (numbers) that affect value.
 - g. Dollar value of the following, as a percentage of the Contract Sum to nearest one-hundredth percent, adjusted to total 100 percent.
 - 1) Labor.
 - 2) Materials.

3) Equipment.

3. The GC shall provide a breakdown of the Contract Sum in enough detail to facilitate continued evaluation of Applications for Payment and progress reports. Coordinate with the Project Manual table of contents. Provide multiple line items for principal subcontract amounts in excess of five percent of Contract Sum.
4. The GC shall round amounts to nearest whole dollar; total shall equal the Contract Sum.
5. The GC shall provide a separate line item in the schedule of values for each part of the Work where Applications for Payment may include materials or equipment purchased or fabricated and stored, but not yet installed.
 - a. The GC shall differentiate between items stored on-site and items stored off-site. If required, include evidence of insurance.
6. The GC shall provide separate line items in the schedule of values for initial cost of materials, for each subsequent stage of completion, and for total installed value of that part of the Work.
7. Allowances: The GC shall provide a separate line item in the schedule of values for each allowance. Show line-item value of unit-cost allowances, as a product of the unit cost, multiplied by measured quantity. Use information indicated in the Contract Documents to determine quantities.
8. Each item in the schedule of values and Applications for Payment shall be complete. Include total cost and proportionate share of general overhead and profit for each item.
 - a. Temporary facilities and other major cost items that are not direct cost of actual work-in-place may be shown either as separate line items in the schedule of values or distributed as general overhead expense, at GC's option.
9. Schedule Updating: The GC shall update and resubmit the schedule of values before the next Applications for Payment when Change Orders or Construction Change Directives result in a change in the Contract Sum. Failure to do so may result in delay of approval for payment.

1.5 APPLICATIONS FOR PAYMENT

- A. The GC shall ensure that each Application for Payment shall be consistent with previous applications and payments as certified by Architect and paid for by Owner.
 1. Initial Application for Payment, Application for Payment at time of Substantial Completion, and final Application for Payment involve additional requirements.
- B. Payment Application Times: The date for each progress payment is indicated in the Agreement between Owner and GC. The period of construction work covered by each Application for Payment is the period indicated in the Agreement.
- C. BGS Payment Application Forms: The GC shall use forms provided by including continuation sheets as the only approved method <https://www.maine.gov/dafs/bgs/forms>
 1. 00 62 76 Application for Payment
 2. 00 62 76 .01 Continuation Sheet

- D. Application Preparation: The GC shall complete every entry on form, notarize and execute by a person authorized to sign legal documents on behalf of GC. The Architect will return incomplete applications without action.
1. The GC shall ensure that all entries shall match data on the schedule of values and the GC's construction schedule. The GC shall provide updated schedules if revisions were made, failure to provide updated construction schedules may result in delay of payment.
 2. The GC shall include amounts for work completed following previous Application for Payment, whether or not payment has been received. Include only amounts for work completed at time of Application for Payment.
 3. The GC shall include amounts of Change Orders and Construction Change Directives issued before last day of construction period covered by application.
- E. Stored Materials: The GC shall include in Application for Payment amounts applied for materials or equipment purchased or fabricated and stored, but not yet installed. Differentiate between items stored on-site and items stored off-site.
1. The GC shall provide certificate of insurance, evidence of transfer of title to Owner, and consent of surety to payment, for stored materials.
 2. The GC shall provide supporting documentation that verifies amount requested, such as paid invoices. Match amount requested with amounts indicated on documentation; do not include overhead and profit on stored materials.
 3. The GC shall provide summary documentation for stored materials indicating the following:
 - a. Materials previously stored and included in previous Applications for Payment.
 - b. Work completed for this Application utilizing previously stored materials.
 - c. Additional materials stored with this Application.
 - d. Total materials remaining stored, including materials with this Application.
- F. Transmittal: The GC shall submit four (4) signed and notarized original copies of each Application for Payment to Architect at least five (5) working days prior to requisition meetings by a method ensuring receipt within 24 hours. One copy shall include waivers of lien and similar attachments if required.
1. Transmit each copy with a transmittal form listing attachments and recording appropriate information about application.
- G. Waivers of Mechanic's Lien: The GC shall submit, with each Application for Payment, waivers of mechanic's liens from sub-Contractors, sub-sub-Contractors, and suppliers for construction period covered by the previous application.
1. Submit partial waivers on each item for amount requested in previous application, after deduction for retainage, on each item.
 2. When an application shows completion of an item, submit conditional final or full waivers.
 3. The list of sub-Contractors, principal suppliers and fabricators shall be used to designate which entities involved in the Work must submit waivers. The list shall be approved by the Owner.
 4. Owner reserves the right to designate which entities involved in the Work must submit waivers.

5. Submit final Application for Payment with or preceded by conditional final waivers from every entity involved with performance of the Work covered by the application who is lawfully entitled to a lien.
 6. Waiver Forms: Submit waivers of lien on forms, executed in a manner acceptable to Owner.
- H. Application for Payment Distribution: The Application for Payment form shall include Distribution Check-Off Boxes for Owner, Architect, BGS (Bureau of General Services) and GC.
- I. Application for Payment Signature & Date Lines: The Application for Payment form shall include Signature & Date Lines for Owner, Architect, BGS (Bureau of General Services) and GC.
- J. Draft Application for Payment Form: The GC shall submit a Draft Application for Payment form within fifteen (15) days of contract signing for Owner and Architect review.
- K. Initial Application for Payment: Administrative actions and submittals that must precede or coincide with submittal of first Application for Payment include the following:
1. List of sub-Contractors.
 2. Schedule of values.
 3. GC's construction schedule (preliminary if not final).
 4. Combined GC's construction schedule (preliminary if not final) incorporating Work of multiple contracts, with indication of acceptance of schedule by each sub-Contractor.
 5. Products list (preliminary if not final).
 6. Schedule of unit prices.
 7. Submittal schedule (preliminary if not final).
 8. List of GC's staff assignments.
 9. List of GC's principal consultants.
 10. Copies of building permits.
 11. Copies of authorizations and licenses from authorities having jurisdiction for performance of the Work.
 12. Initial progress report.
 13. Certificates of insurance and insurance policies.
 14. Performance and payment bonds.
 15. Data needed to acquire Owner's insurance.
 16. Preliminary schedules, lists, etc. are to be finalized within ten (10) days of submittal as preliminary. Failure to do so may result in delay of payment.
- L. Application for Payment at Substantial Completion: After issuing the Certificate of Substantial Completion by the Architect, The GC shall submit an Application for Payment showing 100 percent completion for portion of the Work claimed as substantially complete.
1. The GC shall include documentation supporting claim that the Work is substantially complete and a statement showing an accounting of changes to the Contract Sum.
 2. This application shall reflect Certificates of Partial Substantial Completion issued previously for Owner occupancy of designated portions of the Work.

M. Final Payment Application: The GC shall submit final Application for Payment with releases and supporting documentation not previously submitted and accepted, including, but not limited, to the following:

1. Evidence of completion of Project closeout requirements.
2. Final submittal of record documents and operation and maintenance data.
3. Insurance certificates for products and completed operations where required and proof that taxes, fees, and similar obligations were paid.
4. Updated final statement, accounting for final changes to the Contract Sum.
5. Evidence that claims have been settled.
6. Final meter readings for utilities, a measured record of stored fuel, and similar data as of date of Substantial Completion or when Owner took possession of and assumed responsibility for corresponding elements of the Work.
7. Final liquidated damages settlement statement.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION

SECTION 013100 - PROJECT MANAGEMENT AND COORDINATION

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section includes administrative provisions for coordinating construction operations on Project including, but not limited to, the following:
 - 1. General project coordination procedures.
 - 2. Administrative and supervisory personnel.
 - 3. Coordination drawings.
 - 4. Requests for Information (RFIs).
 - 5. Architect's Supplemental Instructions (ASI's).
 - 6. Project meetings.
- B. Each contractor shall participate in coordination requirements. Certain areas of responsibility are assigned to a specific contractor.
- C. Related Sections:
 - 1. Division 01 Section "Construction Progress Documentation" for preparing and submitting Contractor's construction schedule.
 - 2. Division 01 Section "Execution" for procedures for coordinating general installation and field-engineering services, including establishment of benchmarks and control points.
 - 3. Division 01 Section "Closeout Procedures" for coordinating closeout of the Contract.
 - 4. Division 01 Section "General Commissioning Requirements" for coordinating the Work with Owner's commissioning authority.

1.3 DEFINITIONS

- A. RFI: Request for Information, written inquiries from the General Contractor seeking interpretation or clarification of the Contract Documents.
- B. RFI Response: Architect's written response to RFI's.
- C. ASI: Architect's Supplemental Instruction, written and drawn directives provided by the Architect to the GC, which may or may not have cost impact on the project.

1.4 COORDINATION

- A. Coordination: The GC shall coordinate construction operations included in different Drawings and Specification Sections to ensure efficient and orderly installation of each part of the Work. Coordinate construction operations, included trades in different Drawings and Specification Sections, depending on each other for proper installation, connection, and operation.
 - 1. Schedule construction operations in sequence required to obtain the best results where installation of one part of the Work depends on installation of other components, before or after its own installation.
 - 2. Coordinate installation of different components to ensure maximum performance and accessibility for required maintenance, service, and repair.
 - 3. Make adequate provisions to accommodate items scheduled for later installation.
- B. The GC shall prepare memoranda for distribution to each party involved, outlining special procedures required for coordination. Include such items as required notices, reports, and list of attendees at meetings.
 - 1. Prepare similar memoranda for Owner and separate contractors if coordination of their Work is required.
- C. Administrative Procedures: The GC shall coordinate scheduling and timing of required administrative procedures with other construction activities to avoid conflicts and to ensure orderly progress of the Work. Such administrative activities include, but are not limited to, the following:
 - 1. Preparation of Contractor's construction schedule.
 - 2. Preparation of the schedule of values.
 - 3. Installation and removal of temporary facilities and controls.
 - 4. Delivery and processing of submittals.
 - 5. Progress meetings.
 - 6. Pre-installation conferences.
 - 7. Project closeout activities.
 - 8. Startup and adjustment of systems.
 - 9. Project closeout activities.
- D. Conservation: The GC shall coordinate construction activities to ensure that operations are carried out with consideration given to conservation of energy, water, and materials. Coordinate use of temporary utilities to minimize waste.
 - 1. Salvage materials and equipment involved in performance of, but not actually incorporated into, the Work. Refer to other Sections for disposition of salvaged materials that are designated as Owner's property.

1.5 KEY PERSONNEL

- A. Key Personnel Names: The GC shall submit a list of key personnel assignments within ten (10) days of starting construction operations, including full-time superintendent and other personnel in attendance at Project site. Identify individuals and their duties and responsibilities; list addresses and telephone numbers, including home, office, and cellular telephone numbers and

email addresses. Provide names, addresses, and telephone numbers of individuals assigned as standbys in the absence of individuals assigned to Project.

1. Post copies of list in project meeting room, in temporary field office, and by each temporary telephone. Keep list current at all times.

1.6 REQUESTS FOR INFORMATION (RFIs)

- A. Importance: The RFI process is an essential and required written administrative tool that enables all entities involved in the project to remain familiar with project developments, questions and responses and shall not be replaced or circumvented with verbal inquiries.
- B. Procedure: Immediately on discovery of the need for interpretation of the Contract Documents, and if not possible to request interpretation at Project meeting table, the GC shall prepare and submit to the Architect a written RFI on a form approved by the Architect.
 1. Architect will return RFIs submitted to Architect by other entities controlled by Contractor (sub-Contractors, vendors, suppliers, etc.), with no response.
 2. Coordinate and submit RFIs in a prompt manner so as to avoid delays in Contractor's work or work of sub-Contractors.
- C. RFI Numbering: All RFI's are to be sequentially numbered (i.e. RFI # 01.0), by the GC and may address only one topic per RFI, and shall clearly identify by means of drawing reference, detail reference and/or specification section reference the subject matter. Repeat RFI's dealing with the same subject matter shall be sequentially numbered (i.e. RFI # 01.1, RFI # 01.2, etc.).
- D. Telephone RFI's: In general, the GC is not permitted to avoid providing written RFI's by calling the Architect over the phone.
- E. Content of the RFI: Include a detailed, legible description of item needing information or interpretation and the following:
 1. Project name.
 2. Project number.
 3. Date.
 4. Name of Contractor.
 5. Name of Architect.
 6. Sequentially numbered RFI.
 7. RFI subject.
 8. Specification Section number and title and related paragraphs, as appropriate.
 9. Drawing number and detail references, as appropriate.
 10. Field dimensions and conditions, as appropriate.
 11. Contractor's suggested resolution, if any. If Contractor's solution(s) impacts the Contract Time or the Contract Sum, Contractor shall state impact in the RFI.
 12. Contractor's signature.
 13. Attachments: Include sketches, descriptions, measurements, photos, Product Data, Shop Drawings, coordination drawings, and other information necessary to fully describe items needing interpretation.

- a. Include dimensions, thicknesses, structural grid references, and details of affected materials, assemblies, and attachments on attached sketches.
- F. Sample RFI: A copy of a sample RFI is attached to this Section. The GC may elect to use its standard RFI form, provided it contains the same information-rubrics indicated.
- G. RFI Delivery Method: The GC, Owner and Architect will agree on a single method of delivering RFI's (hardcopy or software generated), prior to Start of Construction.
- H. Hard-Copy RFIs: The GC shall submit a Draft RFI Form within ten (10) days after contract signing for review by the Architect, who will provide comments within five (5) days to the GC.
- I. Software-Generated RFIs: Software-generated form with substantially the same content as indicated above.
 - 1. RFI's & RFI Attachments shall be electronic files in .pdf format.
- J. Architect's Action: Architect will review each RFI, determine action required, and respond. Allow seven (7) working days for Architect's response for each RFI. RFIs received by Architect after 1:00 p.m. will be considered as received the following working day.
 - 1. The following RFIs will be returned without action:
 - a. Requests for approval of submittals.
 - b. Requests for approval of substitutions.
 - c. Requests for coordination information already indicated in the Contract Documents.
 - d. Requests for adjustments in the Contract Time or the Contract Sum.
 - e. Requests for interpretation of Architect's actions on submittals.
 - f. Incomplete RFIs or inaccurately prepared RFIs.
 - 2. Architect's action may include a request for additional information, in which case Architect's time for response will date from time of receipt of additional information.
 - 3. Architect's action on RFIs that may result in a change to the Contract Time or the Contract Sum may be eligible for Contractor to submit Change Proposal according to Division 01 Section "Contract Modification Procedures."
 - a. If Contractor believes the RFI response warrants change in the Contract Time or the Contract Sum, notify Architect in writing within five (5) days of receipt of the RFI response.
- K. On receipt of Architect's action in the form of an RFI Response, the GC shall update the RFI log and immediately distribute the RFI response to affected parties. The GC shall review the RFI response and notify Architect within five (5) work days if GC disagrees with the Architect's response.
- L. RFI Log: The GC shall prepare, maintain, and submit a tabular log of RFIs organized by the RFI number. Submit log at least five (5) work days prior to requisition meetings and coordinate with Architect's record to assure that all questions are answered in a timely manner. Include the following:

1. Project name.
2. Name and address of Contractor.
3. Name and address of Architect
4. RFI number including RFIs that were dropped and not submitted.
5. RFI description.
6. Date the RFI was submitted.
7. Date Architect's response was received.
8. Identification of related Minor Change in the Work, Construction Change Directive, and Proposal Request, as appropriate.
9. Identification of related Field Order, Work Change Directive, and Proposal Request, as appropriate.

1.7 PROJECT MEETINGS

- A. General: The GC shall schedule and conduct meetings and conferences at Project site, unless otherwise indicated.

1. Notify Owner and Architect of scheduled meeting dates and times.
2. Attendees: Inform participants and others involved, and individuals whose presence is required, of date and time of each meeting.
3. Agenda: Prepare the meeting agenda. Distribute the agenda to all invited attendees.
4. Minutes: The GC shall be responsible for conducting meeting will record significant discussions and agreements achieved.
5. The GC shall distribute the meeting minutes to everyone concerned, including Owner and Architect, within three (3) days of the meeting.

- B. Preconstruction Conference: The Architect will schedule and conduct a preconstruction conference before starting construction, at a time convenient to Owner and Architect, but no later than fifteen (15) days after execution of the Agreement.

1. Conduct the conference to review responsibilities and personnel assignments.
2. Attendees: Authorized representatives of the Owner, the Architect, and their consultants; the GC and its full-time superintendent; major sub-contractors; suppliers; and other concerned parties shall attend the conference. Participants at the conference shall be familiar with Project and authorized to conclude matters relating to the Work.
3. Agenda: Discuss items of significance that could affect progress, including the following:
 - a. Tentative construction schedule.
 - b. Phasing.
 - c. Critical work sequencing and long-lead items.
 - d. Designation of key personnel and their duties.
 - e. Lines of communications.
 - f. Procedures for processing field decisions and Change Orders.
 - g. Procedures for RFIs.
 - h. Procedures for testing and inspecting.
 - i. Procedures for processing Applications for Payment.
 - j. Distribution of the Contract Documents.
 - k. Submittal procedures.

- l. Sustainable design requirements.
 - m. Preparation of record documents.
 - n. Use of the premises.
 - o. Work restrictions.
 - p. Working hours.
 - q. Owner's occupancy requirements.
 - r. Responsibility for temporary facilities and controls.
 - s. Procedures for moisture and mold control.
 - t. Procedures for disruptions and shutdowns.
 - u. Construction waste management and recycling.
 - v. Parking availability.
 - w. Office, work, and storage areas.
 - x. Equipment deliveries and priorities.
 - y. First aid.
 - z. Security.
 - aa. Progress cleaning.
4. Minutes: The Architect will record and distribute the Pre-Construction Meeting minutes.
- C. Pre-installation Conferences: The GC shall organize & conduct a pre-installation conference at Project site before each construction activity that requires coordination with other construction.
- 1. The GC shall advise the Owner and the Architect of scheduled meeting dates, who may elect to attend Pre-installation Conferences.
 - 2. Attendees: GC, its sub-Contractors, installers and representatives of manufacturers and fabricators involved in or affected by the installation and its coordination or integration with other materials and installations that have preceded or will follow, shall attend the meeting.
 - 3. Agenda: Review progress of other construction activities and preparations for the particular activity under consideration, including requirements for the following:
 - a. Contract Documents.
 - b. Options.
 - c. Related RFIs.
 - d. Related Change Orders.
 - e. Purchases.
 - f. Deliveries.
 - g. Submittals.
 - h. Review of mockups.
 - i. Possible conflicts.
 - j. Compatibility problems.
 - k. Time schedules.
 - l. Weather limitations.
 - m. Manufacturer's written recommendations.
 - n. Warranty requirements.
 - o. Compatibility of materials.
 - p. Acceptability of substrates.
 - q. Temporary facilities and controls.
 - r. Space and access limitations.
 - s. Regulations of authorities having jurisdiction.

- t. Testing and inspecting requirements.
 - u. Installation procedures.
 - v. Coordination with other work.
 - w. Required performance results.
 - x. Protection of adjacent work.
 - y. Protection of construction and personnel.
4. The GC will record significant pre-installation meeting discussions, agreements, and disagreements, including required corrective measures and actions.
 5. Reporting: Upon receipt, the GC shall distribute pre-installation meeting minutes of the meeting to each party present and to other parties requiring information.
 6. The GC and his sub-Contractors shall not proceed with installation if the Pre-installation meeting cannot be successfully concluded. The GC shall initiate whatever actions are necessary to resolve impediments to performance of the Work and reconvene the conference at earliest feasible date.
- D. Monthly Progress Meetings: The GC and its full-time superintendent shall organize & attend progress meetings at monthly intervals.
1. Coordinate dates of meetings with preparation of payment requests.
 2. Attendees: In addition to representatives of Owner and Architect, the GC and its Superintendent shall attend these meetings. Additional attendees such as sub-Contractors, suppliers, and other entity concerned with current progress or involved in planning, coordination, or performance of future activities may also be represented at these meetings, on an as needed basis. All participants at the meeting shall be familiar with Project and authorized to conclude matters relating to the Work.
 3. Agenda: Review minutes of previous progress meeting. Review other items of significance that could affect progress. Include topics for discussion as appropriate to status of Project.
 - a. Contractor's Construction Schedule: Review progress since the last meeting. Determine whether each activity is on time, ahead of schedule, or behind schedule, in relation to Contractor's construction schedule. Determine how construction behind schedule will be expedited; secure commitments from parties involved to do so. Discuss whether schedule revisions are required to ensure that current and subsequent activities will be completed within the Contract Time.
 - 1) The GC shall prepare statements regarding and/or updates to the construction schedule on a monthly basis, failure to do so may have an impact on payments.
 - 2) Review schedule for next period.
 - 3) Schedule Updating: Where revisions to the schedule have been made or recognized during the monthly progress review meeting, the GC shall update the construction schedule immediately and issue revised schedule to all parties concerned within three (3) days.
 - b. Review present and future needs of each entity present, including the following:
 - 1) Interface requirements.
 - 2) Sequence of operations.
 - 3) Status of submittals.

- 4) Deliveries.
- 5) Off-site fabrication.
- 6) Access.
- 7) Site utilization.
- 8) Temporary facilities and controls.
- 9) Progress cleaning.
- 10) Quality and work standards.
- 11) Status of correction of deficient items.
- 12) Field observations.
- 13) Status of RFIs.
- 14) Status of proposal requests.
- 15) Pending changes.
- 16) Status of Change Orders.
- 17) Pending claims and disputes.
- 18) Documentation of information for payment requests.
- 19) Construction waste management.

4. Minutes: The Architect will record and distribute the meeting minutes to each party present and to parties requiring information.

E. GC Coordination Meetings: The GC shall organize & conduct Project coordination meetings at regular intervals with its sub-Contractors, vendors, suppliers, etc.. Such Project coordination meetings are in addition to specific meetings held for other purposes, such as pre-installation and progress meetings.

1. Attendees: Representatives of the GC and its Superintendent shall co-ordinate and attend these meetings. Additional attendees such as sub-Contractors, suppliers, and other entity concerned with current progress or involved in planning, coordination, or performance of future activities shall be represented at these meetings, on an as needed basis. All participants at the meeting shall be familiar with Project and authorized to conclude matters relating to the Work.
2. Agenda: Review and correct or approve minutes of the previous coordination meeting. Review other items of significance that could affect progress. Include topics for discussion as appropriate to status of Project.
 - a. Combined Contractor's Construction Schedule: Review progress since the last coordination meeting. Determine whether each contract is on time, ahead of schedule, or behind schedule, in relation to combined Contractor's construction schedule. Determine how construction behind schedule will be expedited; secure commitments from parties involved to do so. Discuss whether schedule revisions are required to ensure that current and subsequent activities will be completed within the Contract Time.
 - b. Schedule Updating: Revise combined Contractor's construction schedule after each coordination meeting where revisions to the schedule have been made or recognized. Issue revised schedule concurrently with report of each meeting.
 - c. Review present and future needs of each contractor present, including the following:
 - 1) Interface requirements.
 - 2) Sequence of operations.
 - 3) Status of submittals.
 - 4) Deliveries.

- 5) Off-site fabrication.
 - 6) Access.
 - 7) Site utilization.
 - 8) Temporary facilities and controls.
 - 9) Work hours.
 - 10) Hazards and risks.
 - 11) Progress cleaning.
 - 12) Quality and work standards.
 - 13) Change Orders.
3. Reporting: The GC shall record meeting results and distribute copies to everyone in attendance and to others affected by decisions or actions resulting from each meeting.
- F. Project Closeout Conference: The GC shall schedule and conduct a Project closeout conference, at a time convenient to Owner and Architect, but no later than twenty (20) days prior to the scheduled date of Substantial Completion.
1. Conduct the conference to review requirements and responsibilities related to Project closeout.
 2. Attendees: Authorized representatives of Owner, Architect, and their consultants; Contractor and its full-time superintendent; major subcontractors; suppliers; and other concerned parties shall attend the meeting. Participants at the meeting shall be familiar with Project and authorized to conclude matters relating to the Work.
 3. Agenda: Discuss items of significance that could affect or delay Project closeout, including the following:
 - a. Preparation of record documents.
 - b. Procedures required prior to inspection for Substantial Completion and for final inspection for acceptance.
 - c. Submittal of written warranties.
 - d. Requirements for preparing sustainable design documentation.
 - e. Requirements for preparing operations and maintenance data.
 - f. Requirements for demonstration and training.
 - g. Preparation of Contractor's punch list.
 - h. Procedures for processing Applications for Payment at Substantial Completion and for final payment.
 - i. Submittal procedures.
 - j. Coordination of separate contracts.
 - k. Owner's partial occupancy requirements.
 - l. Installation of Owner's furniture, fixtures, and equipment.
 - m. Responsibility for removing temporary facilities and controls.
 4. Minutes: The Architect will record and distribute meeting minutes.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION

REQUEST FOR INFORMATION

Project:	_____	R.F.I. Number:	_____
	_____	From:	_____
To:	_____	Date:	_____
	_____	A/E Project Number:	_____
Re:	_____	Contract For:	_____

Specification Section:	Paragraph:	Drawings Reference:	Detail:
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Request:

Signed by:

Response:

Attachments

Response from:	To:	Date Received	Date Returned
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Signed by:

Copies to:

SECTION 013200 - CONSTRUCTION PROGRESS DOCUMENTATION

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section includes administrative and procedural requirements for documenting the progress of construction during performance of the Work, including the following:
 - 1. Start-up construction schedule.
 - 2. General Contractor's construction schedule.
 - 3. Daily construction reports.
 - 4. Material location reports.
 - 5. Field condition reports.
 - 6. Allowance usage reports (based on Owner's & Architect's prior approval)
 - 7. Special reports.
- B. Related Sections:
 - 1. Division 01 Section "Submittal Procedures" for submitting schedules and reports.
 - 2. Division 01 Section "Quality Requirements" for submitting a schedule of tests and inspections.

1.3 DEFINITIONS

- A. Activity: A discrete part of a project that can be identified for planning, scheduling, monitoring, and controlling the construction project. Activities included in a construction schedule consume time and resources.
 - 1. Critical Activity: An activity on the critical path that must start and finish on the planned early start and finish times.
 - 2. Predecessor Activity: An activity that precedes another activity in the network.
 - 3. Successor Activity: An activity that follows another activity in the network.
- B. CPM: Critical path method, which is a method of planning and scheduling a construction project where activities are arranged based on activity relationships. Network calculations determine when activities can be performed and the critical path of the Project.
- C. Critical Path: The longest connected chain of interdependent activities through the network schedule that establishes the minimum overall Project duration and contains no float.
- D. Event: The starting or ending point of an activity.

- E. Float: The measure of leeway in starting and completing an activity.
 - 1. Float time is not for the exclusive use or benefit of either The Owner or General Contractor, but is a jointly owned, expiring Project resource available to both parties as needed to meet schedule milestones and Contract completion date.
 - 2. Free float is the amount of time an activity can be delayed without adversely affecting the early start of the successor activity.
 - 3. Total float is the measure of leeway in starting or completing an activity without adversely affecting the planned Project completion date.
- F. Bar Chart (Gantt Chart): A dated, linear chart that visually depicts construction-preparation, -tasks, -etc., against time, including start & finish times, important construction sequencing & milestones, identifying critical path items and completion records, as a complete construction planning, execution process and shall become a historical record of the construction Project.

1.4 INFORMATIONAL SUBMITTALS

- A. Submittals Schedule: Submit three copies of schedule. Arrange the following information in a tabular format:
 - 1. Scheduled date for first submittal.
 - 2. Specification Section number and title.
 - 3. Submittal category (action or informational).
 - 4. Name of sub-Contractor.
 - 5. Description of the Work covered.
 - 6. Scheduled date for the The Architect's final release or approval.
- B. Start-up construction schedule. Submit two copies.
- C. Start-up Network Diagram: Of size required to display entire network for entire construction period. Show logic ties for activities.
- D. Selection of Schedule: The General Contractor shall propose within seven (7) days after contract signing, which scheduling method (CPM or Bar Chart), best suits the scheduling needs of the project for review by the Owner and the Architect, who shall provide their comments within five (5) days. If Bar Chart is selected, the General Contractor shall integrate detailed information as deemed necessary by the Owner and the Architect.
- E. General Contractor's Construction Schedule: The General Contractor shall propose which scheduling method (CPM or Bar Chart), best suits the scheduling needs of the project for review by the Owner and the Architect. Initial schedule, of size required to display entire schedule for entire construction period.
- F. CPM Reports: Concurrent with CPM schedule, submit each of the following reports. Format for each activity in reports shall contain activity number, activity description, cost and resource loading, original duration, remaining duration, early start date, early finish date, late start date, late finish date, and total float in calendar days.
 - 1. Activity Report: List of all activities sorted by activity number and then early start date, or actual start date if known.

2. Logic Report: List of preceding and succeeding activities for all activities, sorted in ascending order by activity number and then early start date, or actual start date if known.
 3. Total Float Report: List of all activities sorted in ascending order of total float.
 4. Earnings Report: Compilation of General Contractor's total earnings from commencement of the Work until most recent Application for Payment.
- G. Field Condition Reports: Submit at time of discovery of differing conditions.
- H. Special Reports: Submit at time of unusual event.

1.5 QUALITY ASSURANCE

- A. Scheduling Consultant Qualifications: An experienced specialist in CPM scheduling and reporting, with capability of producing CPM reports and diagrams within 24 hours of The Architect's request.
- B. Prescheduling Conference: Conduct conference at Project site to comply with requirements in Division 01 Section "Project Management and Coordination." Review methods and procedures related to the preliminary construction schedule and General Contractor's construction schedule, including, but not limited to, the following:
1. Review software limitations and content and format for reports.
 2. Verify availability of qualified personnel needed to develop and update schedule.
 3. Discuss constraints, including phasing, work stages, area separations, and milestones.
 4. Review delivery dates for The Owner-furnished products.
 5. Review schedule for work of The Owner's separate contracts.
 6. Review time required for review of submittals and resubmittals.
 7. Review requirements for tests and inspections by independent testing and inspecting agencies.
 8. Review time required for completion and startup procedures.
 9. Review and finalize list of construction activities to be included in schedule.
 10. Review submittal requirements and procedures.
 11. Review procedures for updating schedule.

1.6 COORDINATION

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

PART 2 - PRODUCTS

2.1 GENERAL CONTRACTOR'S CONSTRUCTION SCHEDULE, GENERAL

- A. Time Frame: Extend schedule from date established for commencement of the Work to date of final completion.
 - 1. Contract completion date shall not be changed by submission of a schedule that shows an early completion date, unless specifically authorized by Change Order.
- B. Activities: Treat each story or separate area as a separate numbered activity for each principal element of the Work. Comply with the following:
 - 1. Activity Duration: Define activities so no activity is longer than 20 days, unless specifically allowed by The Architect.
 - 2. Procurement Activities: Include procurement process activities for the following long lead items and major items, requiring a cycle of more than 60 days, as separate activities in schedule. Procurement cycle activities include, but are not limited to, submittals, approvals, purchasing, fabrication, and delivery.
 - 3. Submittal Review Time: Include review and resubmittal times indicated in Division 01 Section "Submittal Procedures" in schedule. Coordinate submittal review times in General Contractor's construction schedule with submittal schedule.
 - 4. Startup and Testing Time: Include not less than 10 days for startup and testing.
 - 5. Substantial Completion: Indicate completion in advance of date established for Substantial Completion, and allow time for The Architect's administrative procedures necessary for certification of Substantial Completion.
 - 6. Punch List and Final Completion: Include not more than 30 days for punch list and final completion.
- C. Constraints: Include constraints and work restrictions indicated in the Contract Documents and as follows in schedule, and show how the sequence of the Work is affected.
 - 1. Phasing: Arrange list of activities on schedule by phase.
 - 2. Work under More Than One Contract: Include a separate activity for each contract.
 - 3. Work by The Owner: Include a separate activity for each portion of the Work performed by The Owner.
 - 4. The Owner-Furnished Products: Include a separate activity for each product. Include delivery date indicated in Division 01 Section "Summary." Delivery dates indicated stipulate the earliest possible delivery date.
 - 5. Work Restrictions: Show the effect of the following items on the schedule:
 - a. Coordination with existing construction.
 - b. Limitations of continued occupancies.
 - c. Uninterruptible services.
 - d. Partial occupancy before Substantial Completion.
 - e. Use of premises restrictions.
 - f. Provisions for future construction.
 - g. Seasonal variations.
 - h. Environmental control.

6. Work Stages: Indicate important stages of construction for each major portion of the Work, including, but not limited to, the following:
 - a. Subcontract awards.
 - b. Submittals.
 - c. Purchases.
 - d. Mockups.
 - e. Fabrication.
 - f. Sample testing.
 - g. Deliveries.
 - h. Installation.
 - i. Tests and inspections.
 - j. Adjusting.
 - k. Curing.
 - l. Startup and placement into final use and operation.
7. Construction Areas: Identify each major area of construction for each major portion of the Work. Indicate where each construction activity within a major area must be sequenced or integrated with other construction activities to provide for the following:
 - a. Structural completion.
 - b. Permanent space enclosure.
 - c. Completion of mechanical installation.
 - d. Completion of electrical installation.
 - e. Substantial Completion.
- D. Milestones: Include milestones indicated in the Contract Documents in schedule, including, but not limited to, the Notice to Proceed, Substantial Completion, and final completion.
- E. Upcoming Work Summary: Prepare summary report indicating activities scheduled to occur or commence prior to submittal of next schedule update. Summarize the following issues:
 1. Unresolved issues.
 2. Unanswered RFIs.
 3. Rejected or unreturned submittals.
 4. Notations on returned submittals.
- F. Recovery Schedule: When periodic update indicates the Work is 14 or more calendar days behind the current approved schedule, submit a separate recovery schedule indicating means by which General Contractor intends to regain compliance with the schedule. Indicate changes to working hours, working days, crew sizes, and equipment required to achieve compliance, and date by which recovery will be accomplished.

2.2 START-UP CONSTRUCTION SCHEDULE

- A. Bar-Chart Schedule: Submit start-up horizontal bar-chart-type construction schedule within seven (7) days of date established for commencement of the Work.
- B. Preparation: Indicate each significant construction activity separately. Identify first workday of each week with a continuous vertical line. Outline significant construction activities for first 90

days of construction. Include skeleton diagram for the remainder of the Work and a cash requirement prediction based on indicated activities.

2.3 GENERAL CONTRACTOR'S CONSTRUCTION SCHEDULE (CPM SCHEDULE)

- A. General: Prepare network diagrams using AON (activity-on-node) format.
- B. Start-up Network Diagram: Submit diagram within 14 days of date established for commencement of the Work. Outline significant construction activities for the first 90 days of construction. Include skeleton diagram for the remainder of the Work and a cash requirement prediction based on indicated activities.
- C. CPM Schedule: Prepare General Contractor's construction schedule using a time-scaled CPM network analysis diagram for the Work.
 - 1. Develop network diagram in sufficient time to submit CPM schedule so it can be accepted for use no later than 60 days after date established for commencement of the Work.
 - a. Failure to include any work item required for performance of this Contract shall not excuse General Contractor from completing all work within applicable completion dates, regardless of The Architect's approval of the schedule.
 - 2. Conduct educational workshops to train and inform key Project personnel, including sub-Contractors' personnel, in proper methods of providing data and using CPM schedule information.
 - 3. Establish procedures for monitoring and updating CPM schedule and for reporting progress. Coordinate procedures with progress meeting and payment request dates.
 - 4. Use "one workday" as the unit of time for individual activities. Indicate nonworking days and holidays incorporated into the schedule in order to correlate with Contract Time.
- D. CPM Schedule Preparation: Prepare a list of all activities required to complete the Work. Using the start-up network diagram, prepare a skeleton network to identify probable critical paths.
 - 1. Activities: Indicate the estimated time duration, sequence requirements, and relationship of each activity in relation to other activities. Include estimated time frames for the following activities:
 - a. Preparation and processing of submittals.
 - b. Mobilization and demobilization.
 - c. Purchase of materials.
 - d. Delivery.
 - e. Fabrication.
 - f. Utility interruptions.
 - g. Installation.
 - h. Work by The Owner that may affect or be affected by General Contractor's activities.
 - i. Testing and commissioning.
 - j. Punch list and final completion.

- k. Activities occurring following final completion.
 - 2. Critical Path Activities: Identify critical path activities, including those for interim completion dates. Scheduled start and completion dates shall be consistent with Contract milestone dates.
 - 3. Processing: Process data to produce output data on a computer-drawn, time-scaled network. Revise data, reorganize activity sequences, and reproduce as often as necessary to produce the CPM schedule within the limitations of the Contract Time.
 - 4. Format: Mark the critical path. Locate the critical path near center of network; locate paths with most float near the edges.
 - a. Subnetworks on separate sheets are permissible for activities clearly off the critical path.
- E. Contract Modifications: For each proposed contract modification and concurrent with its submission, prepare a time-impact analysis using a network fragment to demonstrate the effect of the proposed change on the overall project schedule.
- F. Initial Issue of Schedule: Prepare initial network diagram from a sorted activity list indicating straight "early start-total float." Identify critical activities. Prepare tabulated reports showing the following:
 - 1. General Contractor or sub-Contractor and the Work or activity.
 - 2. Description of activity.
 - 3. Principal events of activity.
 - 4. Immediate preceding and succeeding activities.
 - 5. Early and late start dates.
 - 6. Early and late finish dates.
 - 7. Activity duration in workdays.
 - 8. Total float or slack time.
 - 9. Average size of workforce.
 - 10. Dollar value of activity (coordinated with the schedule of values).
- G. Schedule Updating: Concurrent with making revisions to schedule, prepare tabulated reports showing the following:
 - 1. Identification of activities that have changed.
 - 2. Changes in early and late start dates.
 - 3. Changes in early and late finish dates.
 - 4. Changes in activity durations in workdays.
 - 5. Changes in the critical path.
 - 6. Changes in total float or slack time.
 - 7. Changes in the Contract Time.
- H. Value Summaries: Prepare two cumulative value lists, sorted by finish dates.
 - 1. In first list, tabulate activity number, early finish date, dollar value, and cumulative dollar value.
 - 2. In second list, tabulate activity number, late finish date, dollar value, and cumulative dollar value.

3. In subsequent issues of both lists, substitute actual finish dates for activities completed as of list date.
4. Prepare list for ease of comparison with payment requests; coordinate timing with progress meetings.
 - a. In both value summary lists, tabulate "actual percent complete" and "cumulative value completed" with total at bottom.
 - b. Submit value summary printouts one week before each regularly scheduled progress meeting.

2.4 REPORTS

- A. Field Condition Reports: Immediately on discovery of a difference between field conditions and the Contract Documents, prepare and submit a detailed report.
- B. Submit with a Request for Information (RFI), including a detailed description of the differing conditions, together with recommendations for changing the Contract Documents.

2.5 SPECIAL REPORTS

- A. General: Submit special reports directly to The Architect within one (1) day of an occurrence. Distribute copies of report to parties affected by the occurrence.
- B. Reporting Unusual Events: When an event of an unusual and significant nature occurs at Project site, whether or not related directly to the Work, prepare and submit a special report. List chain of events, persons participating, response by General Contractor's personnel, evaluation of results or effects, and similar pertinent information.
- C. Advise The Owner in advance when these events are known or predictable.

PART 3 - EXECUTION

3.1 GENERAL CONTRACTOR'S CONSTRUCTION SCHEDULE

- A. General Contractor's Construction Schedule Updating: At monthly intervals, review schedule for actual construction progress and activities. Issue schedule one week before each regularly scheduled progress meeting.
 1. Revise schedule immediately after each meeting or other activity where revisions have been recognized or made. Issue updated schedule concurrently with the report of each such meeting.
 2. Include a report with updated schedule that indicates every change, including, but not limited to, changes in logic, durations, actual starts and finishes, and activity durations.
 3. As the Work progresses, indicate final completion percentage for each activity.
- B. Distribution: Distribute copies of approved schedule to the Architect, the Owner, separate sub-Contractors, testing and inspecting agencies, and other parties identified by General Contractor with a need-to-know schedule responsibility.

1. Post copies in Project meeting rooms and temporary field offices.
2. When revisions are made, distribute updated schedules to the same parties and post in the same locations. Delete parties from distribution when they have completed their assigned portion of the Work and are no longer involved in performance of construction activities.

END OF SECTION

SECTION 013300 - SUBMITTAL PROCEDURES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section includes requirements for the submittal schedule and administrative and procedural requirements for submitting Shop Drawings, Product Data, Samples, and other submittals.
- B. Related Sections:
 - 1. Division 01 Section "Payment Procedures" for submitting Applications for Payment and the schedule of values.
 - 2. Division 01 Section "Construction Progress Documentation" for submitting schedules and reports, including the GC's construction schedule.
 - 3. Division 01 Section "Operation and Maintenance Data" for submitting operation and maintenance manuals.
 - 4. Division 01 Section "Project Record Documents" for submitting record Drawings, record Specifications, and record Product Data.
 - 5. Division 01 Section "Demonstration and Training" for submitting video recordings of demonstration of equipment and training of Owner's personnel.

1.3 DEFINITIONS

- A. Action Submittals: Written and graphic information and physical samples that require the Architect's responsive action. Action submittals are those submittals indicated in individual Specification Sections as action submittals.
- B. Informational Submittals: Written and graphic information and physical samples that do not require the Architect's responsive action. Submittals may be rejected for not complying with requirements. Informational submittals are those submittals indicated in individual Specification Sections as informational submittals.
- C. File Transfer Protocol (FTP): Communications protocol that enables transfer of files to and from another computer over a network and that serves as the basis for standard Internet protocols.
- D. FTP Site: An FTP site is a portion of a network located outside of network firewalls within which internal and external users are able to post and access files, provided by and maintained by the GC for the duration of construction, plus two (2) years after date of substantial completion certificate.

- E. Portable Document Format (PDF): An open standard file format licensed by Adobe Systems used for representing documents in a device-independent and display resolution-independent fixed-layout document format.

1.4 ACTION SUBMITTALS

- A. Submittal Schedule: Submit a schedule of submittals, arranged in chronological order by dates required by construction schedule. Include time required for review, ordering, manufacturing, fabrication, and delivery when establishing dates. Include additional time required for making corrections or modifications to submittals noted by the Architect and additional time for handling and reviewing submittals required by those corrections.
 - 1. Coordinate submittal schedule with list of subcontracts, the schedule of values, and the GC's construction schedule.
 - 2. Initial Submittal: Submit concurrently with start-up construction schedule. Include submittals required during the first 60 days of construction. List those submittals required to maintain orderly progress of the Work and those required early because of long lead time for manufacture or fabrication.
 - 3. Final Submittal: Submit concurrently with the first complete submittal of the GC's construction schedule.
 - a. Submit revised submittal schedule to reflect changes in current status and timing for submittals.
 - 4. Format: Arrange the following information in a tabular format:
 - a. Scheduled date for first submittal.
 - b. Specification Section number and title.
 - c. Submittal category: Action, informational.
 - d. Name of sub-Contractor.
 - e. Description of the Work covered.
 - f. Scheduled date for the Architect's final release or approval.
 - g. Scheduled dates for purchasing.
 - h. Scheduled dates for installation.
 - i. Activity or event number.

1.5 SUBMITTAL ADMINISTRATIVE REQUIREMENTS

- A. Architect's Digital Data Files: Electronic .pdf copies of the Contract Document drawings will be provided by Architect for the GC's use in preparing submittals.
 - 1. The Architect will furnish the GC one set of digital data drawing files of the Contract Drawings for use in preparing Shop Drawings.
 - a. The Architect makes no representations as to the compatibility of these files with the GC's hardware or its software. The Architect also makes no representation regarding the accuracy or completeness of the electronic files the GC receives.
 - b. Digital Drawing Software Program: CAD files were prepared using DataCad 12 software exported in .pdf format.

- c. Data contained on these electronic files is part of the Architect's instruments of service to the Owner of the referenced project, and shall not be used by the GC or anyone else receiving this data through the GC or from the GC for any purpose other than the GC's own review of the data for completion of this project. Any other use or reuse by the GC or others will be at the GC's sole risk and without liability or legal exposure to the Architect. The GC agrees to make no claim and hereby waive, to the fullest extent permitted by law, any claim or cause of action of any nature against the Architect, its officers, directors, employees, agents, or sub-Consultants which may arise out of or in connection with the GC's use of the electronic files.
 - d. Furthermore, the GC shall, to the fullest extent permitted by law, indemnify and hold harmless the Architect from all claims, damages, losses, and expenses, including attorney's fees, arising out of or resulting from the GC's use or possession of these electronic files.
 - e. The Architect makes no warranties, either expressed or implied, of merchantability and/or fitness of these files for any particular purpose. In no event shall the Architect be liable for any loss of profit or any consequential damages.
- B. Coordination: Coordinate preparation and processing of submittals with performance of construction activities.
 - 1. Coordinate each submittal with fabrication, purchasing, testing, delivery, other submittals, and related activities that require sequential activity.
 - 2. The GC is responsible to ensure that requirements all Specification Sections are met.
 - 3. Submit all submittal items required for each Specification Section concurrently unless partial submittals for portions of the Work are indicated on approved submittal schedule.
 - 4. Submit action submittals and informational submittals required by the same Specification Section as separate packages under separate transmittals.
 - 5. Coordinate transmittal of different types of submittals for related parts of the Work so processing will not be delayed because of need to review submittals concurrently for coordination.
 - a. The Architect reserves the right to withhold action on a submittal requiring coordination with other submittals until related submittals are received.
- C. Processing Time: Allow time for submittal review, including time for resubmittals, as follows. Time for review shall commence on the date of the Architect's receipt of submittal. No extension of the Contract Time will be authorized because of failure to transmit submittals enough in advance of the Work to permit processing, including resubmittals.
 - 1. Submittal Numbering: The GC shall number submittals according to Specification Section, followed by a decimal point and submittal tracking number (i.e. SUB # 01330-01, SUB # 01330.02, etc.).
 - 2. Re-submittal Numbering: The GC shall number re-submittals according to Specification Section, followed by a decimal point with submittal tracking number, followed by a decimal point, followed by a sequential revision number indicated which re-submittal is being processed (i.e. SUB # 01330.01.1, SUB # 01330.02.2, etc.).

3. Initial Review: Allow fifteen (15) days for initial review of each submittal. Allow additional time if coordination with subsequent submittals is required. Architect will advise The GC when a submittal being processed must be delayed for coordination.
 4. Intermediate Review: If intermediate submittal is necessary, process it in same manner as initial submittal.
 5. Re-submittal Review: Allow ten (10) days for review of each re-submittal.
 6. Sequential Review: Where sequential review of submittals by the Architect's consultants, Owner, or other parties is indicated, allow twenty (20) days for initial review of each submittal.
 - a. Sitework submittals.
 - b. Commercial equipment submittals.
 - c. Structural submittals.
 - d. Mechanical submittals.
 - e. Electrical submittals.
 - f. Data & Communications Systems submittals.
 7. No extension of the Contract Time will be authorized because of failure to transmit submittals enough in advance of the Work to permit processing.
 8. Submittals with Color Selections: The GC shall also deliver to the Architect a list of submittals required for the interior color package. The Architect needs to coordinate the colors of all interior items and will hold submittals with color selections until all materials in the interior color package have been received. The Architect will hold submittals with color selections until all materials in the interior color package have been received. Allow fifteen (15) days after the last item has been submitted for return of interior color selections. Careful coordination of the Submittal Schedule by the GC is required so as not to delay the Work.
- D. Identification and Information: The GC shall place a permanent label or title block on each paper copy submittal item for identification.
1. Indicate name of firm or entity that prepared each submittal on label or title block.
 2. Provide a space approximately 6 by 8 inches on label or beside title block to record the GC's review and approval markings and action taken by Architect.
 3. Include the following information for processing and recording action taken:
 - a. Project name.
 - b. Date.
 - c. Name of the Architect.
 - d. Name of the Construction Manager (when applicable).
 - e. Name of the GC.
 - f. Name of the sub-Contractor.
 - g. Name of the supplier.
 - h. Name of the manufacturer.
 - i. Specification Section Title.
 - j. Specification Section Number, followed by a decimal point.
 - k. Sequential Submittal Tracking Number, followed by a decimal point.
 - l. Sequential Re-Submittal Revision Number (when applicable).
 - m. Drawing number and detail references, as appropriate.
 - n. Location(s) where product is to be installed, as appropriate.
 - o. Other necessary identification.

- E. Deviations: The GC shall identify deviations from the Contract Documents on submittals. Any proposed substitutions shall be clearly marked "SUBMITTED AS EQUAL". The Architect and the Architect's Engineers may request that any product not so marked that is installed may be removed.
- F. Additional Paper Copies: Unless additional copies are required for final submittal, and unless the Architect observes noncompliance with provisions in the Contract Documents, initial submittal may serve as final submittal.
- G. Transmittal: The GC shall assemble each submittal individually and appropriately for transmittal and handling. Transmit each submittal using a transmittal form. Architect will return submittals, without review, received from sources other than The GC.
 - 1. The GC shall not group submittals from different Specification Sections.
 - 2. The GC shall limit submittals under the same Specification Section to no more than five (5) products.
 - 3. Transmittal Form: Use The GC's standard transmittal form. Provide locations on form for the following information:
 - a. Project name.
 - b. Date.
 - c. Destination (To:).
 - d. Source (From:).
 - e. Names of sub-Contractor, manufacturer, and supplier.
 - f. Category and type of submittal.
 - g. Submittal purpose and description.
 - h. Specification Section Title.
 - i. Specification Section Number, followed by a decimal point.
 - j. Sequential Submittal Tracking Number, followed by a decimal point.
 - k. Sequential Re-Submittal Revision Number (when applicable).
 - l. Drawing number and detail references, as appropriate.
 - m. Transmittal number.
 - n. Submittal and transmittal distribution record.
 - o. Remarks.
 - p. Signature of transmitter.
 - 4. On an attached separate sheet, prepared on The GC's letterhead, record relevant information, requests for data, revisions other than those requested by the Architect on previous submittals, and deviations from requirements in the Contract Documents, including minor variations and limitations. Include same identification information as related submittal.
- H. Resubmittals: Make resubmittals in same form and number of copies as initial submittal.
 - 1. Note date and content of previous submittal.
 - 2. Note date and content of revision in label or title block and clearly indicate extent of revision.
 - 3. Resubmit submittals until they are marked with approval notation from Architect's action stamp.

- I. Distribution: The GC shall furnish copies of final submittals to manufacturers, sub-Contractors, suppliers, fabricators, installers, authorities having jurisdiction, and others as necessary for performance of construction activities. Show distribution on transmittal forms.
- J. Submittal Copies on Site / Use for Construction: The GC and its full-time superintendent are required to maintain a complete submittal file on site using only final submittals that are marked with approval notation of the Architect's action stamp. The Owner and the Architect have the right to review that the GC and its full-time superintendent are maintaining this file and required information flow to sub-Contractors.

PART 2 - PRODUCTS

2.1 SUBMITTAL PROCEDURES

- A. General Submittal Procedure Requirements: The GC shall prepare and submit submittals required by individual Specification Sections. Types of submittals are indicated in individual Specification Sections.
 - 1. Action Submittals: Submit three paper copies of each submittal, unless otherwise indicated. Architect will return two copies.
 - 2. Informational Submittals: Submit two paper copies of each submittal, unless otherwise indicated. Architect will not return copies.
 - 3. Closeout Submittals and Maintenance Material Submittals: Comply with requirements specified in Division 01 Section "Closeout Procedures."
 - 4. Certificates and Certifications Submittals: Provide a statement that includes signature of entity responsible for preparing certification. Certificates and certifications shall be signed by an officer or other individual authorized to sign documents on behalf of that entity.
 - a. Provide a notarized statement on original paper copy certificates and certifications where indicated.
 - 5. Test and Inspection Reports Submittals: Comply with requirements specified in Division 01 Section "Quality Requirements."
- B. Product Data: The GC shall collect information into a single submittal for each element of construction and type of product or equipment.
 - 1. If information must be specially prepared for submittal because standard published data are not suitable for use, submit as Shop Drawings, not as Product Data.
 - 2. Mark each copy of each submittal to show which products and options are applicable.
 - 3. Include the following information, as applicable:
 - a. Manufacturer's catalog cuts.
 - b. Manufacturer's product specifications.
 - c. Standard color charts.
 - d. Statement of compliance with specified referenced standards.
 - e. Testing by recognized testing agency.
 - f. Application of testing agency labels and seals.

- g. Notation of coordination requirements.
 - h. Availability and delivery time information.
4. For equipment, include the following in addition to the above, as applicable:
 - a. Wiring diagrams showing factory-installed wiring.
 - b. Printed performance curves.
 - c. Operational range diagrams.
 - d. Clearances required to other construction, if not indicated on accompanying Shop Drawings.
 5. Submit Product Data before or concurrent with physical Samples.
 6. Submit Product Data in the following formats:
 - a. Electronic versions in .pdf format, collated, including GC & Sub-Contractor mark-ups in red (clearly identifying specific submitted products being proposed), color-charts (w/ actual card stock color-charts & sample chains by mail).
 7. Shop Drawings: The GC and its sub-Contractors shall prepare Project-specific information, drawn accurately to scale. Do not base Shop Drawings on reproductions of the Contract Documents or standard printed data.
- C. PDF Format Drawings: The GC is advised that .pdf drawings are not a 100% accurate source of information in terms of scale.
1. Preparation: Fully illustrate requirements in the Contract Documents. Include the following information, as applicable:
 - a. Identification of products by Section Number.
 - b. Schedules.
 - c. Compliance with specified standards.
 - d. Notation of coordination requirements.
 - e. Notation of dimensions established by field measurement.
 - f. Relationship and attachment to adjoining construction clearly indicated.
 - g. Seal and signature of professional engineer if specified.
 2. Sheet Size: Except for templates, patterns, and similar full-size drawings, submit Shop Drawings on sheets at least 8-1/2 by 11 inches but no larger than 30 by 42 inches.
 3. Submit Shop Drawings in the following formats:
 - a. Electronic versions in .pdf format, collated, including GC & Sub-Contractor mark-ups in red (clearly identifying specific submitted products being proposed), color-charts (w/ actual card stock color-charts & sample chains by mail).
- D. Samples: The GC shall Submit Samples for review of kind, color, pattern, and texture for a check of these characteristics with other elements and for a comparison of these characteristics between submittal and actual component as delivered and installed.
1. Transmit Samples that contain multiple, related components such as accessories, together in one submittal package, limit: no more than five (5) products per Section.
 2. Identification: Attach label on unexposed side of Samples that includes the following:
 - a. Generic description of Sample.
 - b. Product name and name of manufacturer.

- c. Sample source.
 - d. Number and title of applicable Specification Section.
- 3. Disposition: The GC and its full-time superintendent shall maintain sets of approved Samples at Project site, available for quality-control comparisons throughout the course of construction activity. Sample sets may be used to determine final acceptance of construction associated with each set.
 - a. Samples that may be incorporated into the Work are indicated in individual Specification Sections. Such Samples must be in an undamaged condition at time of use.
 - b. Samples not incorporated into the Work, or otherwise designated as Owner's property, are the property of The GC.
- 4. Samples for Initial Selection: The GC shall submit manufacturer's color samples consisting of units or sections of units showing the full range of colors, textures, and patterns available. Do not submit color print-outs of color samples for selection, only submit manufacturer's actual product samples. Manufacturer's color charts are to be considered a supplement to actual samples.
 - a. Number of Samples: The GC shall submit one full set of available choices where color, pattern, texture, or similar characteristics are required to be selected from manufacturer's product line. The Architect will return submittal with options selected.
- 5. Samples for Verification: The GC shall submit full-size units or Samples of size indicated, prepared from same material to be used for the Work, cured and finished in manner specified, and physically identical with material or product proposed for use, and that show full range of color and texture variations expected. Samples include, but are not limited to, the following: partial sections of manufactured or fabricated components; small cuts or containers of materials; complete units of repetitively used materials; swatches showing color, texture, and pattern; color range sets; and components used for independent testing and inspection.
 - a. Number of Samples: The GC shall submit three (3) sets of Samples. The Architect will retain two (2) Sample sets; one (1) for the Owner, one (1) for the Architect and one (1) remainder will be returned.
 - 1) Submit a single Sample where assembly details, workmanship, fabrication techniques, connections, operation, and other similar characteristics are to be demonstrated.
 - 2) If variation in color, pattern, texture, or other characteristic is inherent in material or product represented by a Sample, submit at least three sets of paired units that show approximate limits of variations.
- E. The GC's Construction Schedule: The GC shall comply with requirements specified in Division 01 Section "Construction Progress Documentation."
- F. Application for Payment: The GC shall comply with requirements specified in Division 01 Section "Payment Procedures."

- G. Schedule of Values: The GC shall comply with requirements specified in Division 01 Section "Payment Procedures."
- H. Subcontract List: The GC shall prepare a written summary identifying individuals or firms proposed for each portion of the Work, including those who are to furnish products or equipment fabricated to a special design. Include the following information in tabular form:
1. Name, address, and telephone number of entity performing subcontract or supplying products.
 2. Number and title of related Specification Section(s) covered by subcontract.
 3. Drawing number and detail references, as appropriate, covered by subcontract.
 4. Submit subcontract list in the following format:
 - a. Number of Copies: Three (3) paper copies of sub-Contractor list, unless otherwise indicated. The Architect will return two copies.
- I. Qualification Data: The GC shall obtain/prepare & submit written information that demonstrates capabilities and experience of firm or person. Include lists of completed projects with project names and addresses, contact information of architects and owners, and other information specified.
- J. Welding Certificates: The GC shall obtain & submit written certification that welding procedures and personnel comply with requirements in the Contract Documents. Submit record of Welding Procedure Specification and Procedure Qualification Record on American Welding Society (AWS) forms. Include names of firms and personnel certified.
- K. Installer Certificates: The GC shall obtain & submit written statements on manufacturer's letterhead certifying that Installer complies with requirements in the Contract Documents and, where required, is authorized by manufacturer for this specific Project.
- L. Manufacturer Certificates: The GC shall obtain & submit written statements on manufacturer's letterhead certifying that manufacturer complies with requirements in the Contract Documents. Include evidence of manufacturing experience where required.
- M. Product Certificates: The GC shall obtain & submit written statements on manufacturer's letterhead certifying that product complies with requirements in the Contract Documents.
- N. Material Certificates: The GC shall obtain & submit written statements on manufacturer's letterhead certifying that material complies with requirements in the Contract Documents.
- O. Material Test Reports: The GC shall obtain & submit reports written by a qualified testing agency, on testing agency's standard form, indicating and interpreting test results of material for compliance with requirements in the Contract Documents.
- P. Product Test Reports: The GC shall obtain & submit written reports indicating current product produced by manufacturer complies with requirements in the Contract Documents. Base reports on evaluation of tests performed by manufacturer and witnessed by a qualified testing agency, or on comprehensive tests performed by a qualified testing agency.

- Q. Research Reports: The GC shall obtain & submit written evidence, from a model code organization acceptable to authorities having jurisdiction, that product complies with building code in effect for Project. Include the following information:
1. Name of evaluation organization.
 2. Date of evaluation.
 3. Time period when report is in effect.
 4. Product and manufacturers' names.
 5. Description of product.
 6. Test procedures and results.
 7. Limitations of use.
- R. Schedule of Tests and Inspections: The GC shall comply with requirements specified in Division 01 Section "Quality Requirements."
- S. Preconstruction Test Reports: The GC shall obtain & submit reports written by a qualified testing agency, on testing agency's standard form, indicating and interpreting results of tests performed before installation of product, for compliance with performance requirements in the Contract Documents.
- T. Compatibility Test Reports: The GC shall obtain & submit reports written by a qualified testing agency, on testing agency's standard form, indicating and interpreting results of compatibility tests performed before installation of product. Include written recommendations for primers and substrate preparation needed for adhesion.
- U. Field Test Reports: The GC shall prepare & submit reports indicating and interpreting results of field tests performed either during installation of product or after product is installed in its final location, for compliance with requirements in the Contract Documents.
- V. Maintenance Data: The GC shall comply with requirements specified in Division 01 Section "Operation and Maintenance Data."
- W. Design Data: The GC shall prepare & submit written and graphic information, including, but not limited to, performance and design criteria, list of applicable codes and regulations, and calculations. Include list of assumptions and other performance and design criteria and a summary of loads. Include load diagrams if applicable. Provide name and version of software, if any, used for calculations. Include page numbers.
- X. Waste Management Plan: The GC shall provide waste management plan as specified in section 017419.
- Y. Indoor Construction Air Quality Plan: The GC shall provide Indoor Air Construction Air Quality plan as specified in section 015000.

2.2 DELEGATED-DESIGN SERVICES

- A. Performance and Design Criteria: Where professional design services or certifications by a design professional are specifically required of the GC by the Contract Documents, provide products and systems complying with specific performance and design criteria indicated.

1. If criteria indicated are not sufficient to perform services or certification required, submit a written request for additional information to the Architect.
- B. Delegated-Design Services Certification: In addition to Shop Drawings, Product Data, and other required submittals, the GC shall submit three paper copies of certificate, signed and sealed by the responsible design professional, for each product and system specifically assigned to The GC to be designed or certified by a design professional.
 1. The GC shall indicate that products and systems comply with performance and design criteria in the Contract Documents. Include list of codes, loads, and other factors used in performing these services.

PART 3 - EXECUTION

3.1 THE GC'S REVIEW

- A. Action and Informational Submittals: The GC shall review each submittal and check for coordination with other Work of the Contract and for compliance with the Contract Documents. Note corrections and field dimensions. Mark with approval stamp before submitting to the Architect.
- B. Project Closeout and Maintenance/Material Submittals: The GC shall refer to requirements in Division 01 Section "Closeout Procedures."
- C. Approval Stamp: The GC shall stamp each submittal with a uniform, approval stamp in red. Include Project name and location, submittal number, Specification Section title and number, name of reviewer, date of The GC's approval, and statement certifying that submittal has been reviewed, checked, and approved for compliance with the Contract Documents.
 1. Stamp or statement shall include the following: "The GC represents that he has determined and verified all materials, field measurements, and field construction criteria related thereto or will do so, and that he has checked and coordinated the information contained within such submittals with the requirements of the Work and of the Contract Documents."

3.2 ARCHITECT'S ACTION

- A. General: The Architect will not review submittals that do not bear the GC's approval stamp and will return them without action.
- B. Action Submittals: The Architect will review each submittal, make marks to indicate corrections or modifications required, and return it. The Architect will stamp each submittal with an action stamp and will mark stamp appropriately to indicate action, as follows:
 1. No Exception Taken: Final Unrestricted Release. Work may proceed, provided it complies with the Contract Documents.
 2. Correct As Noted: Final But Conditional Release. Work may proceed, provided it complies with the notations and corrections on submittals and with Contract Documents.

Architect's comments shall be considered a part of the original submittal. Should The GC disagree with any such comments, so notify the Architect within fourteen (14) days after receipt of such transmittal and before commencing work on the items in question. Failing this, The GC shall be deemed to have agreed to such comments by the Architect and to have accepted full responsibility for implementing them at no additional cost to the Owner.

3. **Revise & Resubmit:** Returned for Resubmittal. Do not proceed with the work at the site or allow submittal at site. Fabrication in shop or factory may proceed on items not affected by the Architect's comments only. Revise submittal in accordance with notations thereon, and resubmit without delay to obtain a different action marking. Revise and Resubmit
 4. **Submit Specified Item:** Resubmit using a specified item. Where submittal is rejected and returned for resubmittal of a specified product. Consult product section for list of acceptable manufacturers.
 5. **Rejected:** Where submittal is returned for other reasons, with the Architect's explanation included.
- C. **Informational Submittals:** The Architect will review each informational submittal and will not return it. The Architect will return informational submittals with written comment if it does not comply with the contract document requirements. The Architect will forward each informational submittal to appropriate party.
- D. Partial submittals prepared for a portion of the Work by the GC will be reviewed when use of partial submittals has been received prior approval from the Architect.
- E. Incomplete submittals prepared & submitted by the GC are not acceptable, will be considered nonresponsive, and will be returned without review.
- F. Submittals not required by the Contract Documents may not be reviewed and may be discarded.
- G. The GC and its sub-Contractors shall not consider non-compliance with the Contract Documents (even if reviewed by the Architect as part of the submittal process), as justification for the use of unspecified products.

END OF SECTION

SECTION 014000 - QUALITY REQUIREMENTS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section includes administrative and procedural requirements for quality assurance and quality control.
- B. Testing and inspecting services are required to verify compliance with requirements specified or indicated. These services do not relieve the General Contractor of responsibility for compliance with the Contract Document requirements.
 - 1. Specific quality-assurance and -control requirements for individual construction activities are specified in the Sections that specify those activities. Requirements in those Sections may also cover production of standard products.
 - 2. Specified tests, inspections, and related actions do not limit the GC's other quality-assurance and -control procedures that facilitate compliance with the Contract Document requirements.
 - 3. Requirements for the GC to provide quality-assurance and -control services required by the Architect, the Owner, or authorities having jurisdiction are not limited by provisions of this Section.
- C. Related Sections:
 - 1. Division 01 Section "Allowances" for testing and inspecting allowances.
 - 2. Division 01 Section "Construction Progress Documentation" for developing a schedule of required tests and inspections.
 - 3. Divisions 02 through 48 Sections for specific test and inspection requirements.

1.3 DEFINITIONS

- A. Quality-Assurance Services: Activities, actions, and procedures performed before and during execution of the Work to guard against defects and deficiencies and substantiate that proposed construction will comply with requirements.
- B. Quality-Control Services: Tests, inspections, procedures, and related actions during and after execution of the Work to evaluate that actual products incorporated into the Work and completed construction comply with requirements. Services do not include contract enforcement activities performed by the Architect.

- C. Mockups: are required whether specified in a specific section, or not, in order to confirm the GC's and its sub-Contractor's understanding of construction of substrates and finishes to the Architect and Owner. Mockups shall be full size physical assemblies that are constructed on-site. Mockups are constructed to verify selections made under sample submittals; to demonstrate aesthetic effects and, where indicated, qualities of materials and execution; to review coordination, testing, or operation; to show interface between dissimilar materials; and to demonstrate compliance with specified installation tolerances. Mockups are not Samples. Unless otherwise indicated, approved mockups establish the standard by which the Work will be judged.
1. Laboratory Mockups: Full-size, physical assemblies constructed at testing facility to verify performance characteristics.
 2. Integrated Exterior Mockups: Mockups of the exterior envelope erected separately from the building but on the project site, consisting of multiple products, assemblies and subassemblies.
 3. Room Mockups: Mockups of typical interior spaces complete with wall, floor, and ceiling finishes, doors, windows, millwork, casework, specialties, furnishings and equipment, and lighting.
- D. Preconstruction Testing: Tests and inspections performed specifically for the Project before products and materials are incorporated into the Work to verify performance or compliance with specified criteria.
- E. Product Testing: Tests and inspections that are performed by an NRTL, an NVLAP, or a testing agency qualified to conduct product testing and acceptable to authorities having jurisdiction, to establish product performance and compliance with specified requirements.
- F. Source Quality-Control Testing: Tests and inspections that are performed at the source, i.e., plant, mill, factory, or shop.
- G. Field Quality-Control Testing: Tests and inspections that are performed on-site for installation of the Work and for completed Work.
- H. Testing Agency: An entity engaged to perform specific tests, inspections, or both. Testing laboratory shall mean the same as testing agency.
- I. Installer/Applicator/Erector: The GC or another entity engaged by the GC as an employee, sub-Contractor, or sub-sub-Contractor, to perform a particular construction operation, including installation, erection, application, and similar operations.
1. Use of trade-specific terminology in referring to a trade or entity does not require that certain construction activities be performed by accredited or unionized individuals, or that requirements specified apply exclusively to specific trade or trades.
- J. Experienced: When used with an entity or individual, "experienced" means having successfully completed a minimum of five previous projects similar in nature, size, and extent to this Project; being familiar with special requirements indicated; and having complied with requirements of authorities having jurisdiction.

1.4 CONFLICTING REQUIREMENTS

- A. Referenced Standards: If compliance with two or more standards is specified and the standards establish different or conflicting requirements for minimum quantities or quality levels, comply with the most stringent requirement. Refer conflicting requirements that are different, but apparently equal, to Architect for a decision before proceeding.
- B. Minimum Quantity or Quality Levels: The quantity or quality level shown or specified shall be the minimum provided or performed. The actual installation may comply exactly with the minimum quantity or quality specified, or it may exceed the minimum within reasonable limits. To comply with these requirements, indicated numeric values are minimum or maximum, as appropriate, for the context of requirements. Refer uncertainties to the Architect for a decision before proceeding.

1.5 ACTION SUBMITTALS

- A. Shop Drawings: For mockups, the GC shall provide plans, sections, and elevations, indicating materials and size of mockup construction.
 - 1. Indicate manufacturer and model number of individual components.
 - 2. Provide axonometric drawings for conditions difficult to illustrate in two dimensions.

1.6 INFORMATIONAL SUBMITTALS

- A. Testing Agency Qualifications: For testing agencies specified in "Quality Assurance" Article to demonstrate their capabilities and experience. The GC shall include proof of qualifications in the form of a recent report on the inspection of the testing agency by a recognized authority.
- B. Schedule of Tests and Inspections: The GC shall prepare in tabular form and include the following:
 - 1. Specification Section number and title.
 - 2. Entity responsible for performing tests and inspections.
 - 3. Description of test and inspection.
 - 4. Identification of applicable standards.
 - 5. Identification of test and inspection methods.
 - 6. Number of tests and inspections required.
 - 7. Time schedule or time span for tests and inspections.
 - 8. Requirements for obtaining samples.
 - 9. Unique characteristics of each quality-control service.

1.7 REPORTS AND DOCUMENTS

- A. Test and Inspection Reports: The GC shall prepare and submit certified written reports specified in other Sections. Include the following:
 - 1. Date of issue.
 - 2. Project title and number.

3. Name, address, and telephone number of testing agency.
4. Dates and locations of samples and tests or inspections.
5. Names of individuals making tests and inspections.
6. Description of the Work and test and inspection method.
7. Identification of product and Specification Section.
8. Complete test or inspection data.
9. Test and inspection results and an interpretation of test results.
10. Record of temperature and weather conditions at time of sample taking and testing and inspecting.
11. Comments or professional opinion on whether tested or inspected Work complies with the Contract Document requirements.
12. Name and signature of laboratory inspector.
13. Recommendations on retesting and re-inspecting.

B. **Manufacturer's Technical Representative's Field Reports:** The GC shall obtain & prepare written information documenting manufacturer's technical representative's tests and inspections specified in other Sections. Include the following:

1. Name, address, and telephone number of technical representative making report.
2. Statement on condition of substrates and their acceptability for installation of product.
3. Statement that products at Project site comply with requirements.
4. Summary of installation procedures being followed, whether they comply with requirements and, if not, what corrective action was taken.
5. Results of operational and other tests and a statement of whether observed performance complies with requirements.
6. Statement whether conditions, products, and installation will affect warranty.
7. Other required items indicated in individual Specification Sections.

C. **Factory-Authorized Service Representative's Reports:** The GC shall obtain & prepare written information documenting manufacturer's factory-authorized service representative's tests and inspections specified in other Sections. Include the following:

1. Name, address, and telephone number of factory-authorized service representative making report.
2. Statement that equipment complies with requirements.
3. Results of operational and other tests and a statement of whether observed performance complies with requirements.
4. Statement whether conditions, products, and installation will affect warranty.
5. Other required items indicated in individual Specification Sections.

D. **Permits, Licenses, and Certificates:** For Owner's records, the GC shall obtain, prepare & submit copies of permits, licenses, certifications, inspection reports, releases, jurisdictional settlements, notices, receipts for fee payments, judgments, correspondence, records, and similar documents, established for compliance with standards and regulations bearing on performance of the Work.

1.8 QUALITY ASSURANCE

A. **General:** Qualifications paragraphs in this article establish the minimum qualification levels required; individual Specification Sections specify additional requirements.

- B. **Manufacturer Qualifications:** A firm experienced in manufacturing products or systems similar to those indicated for this Project and with a record of successful in-service performance, as well as sufficient production capacity to produce required units.
- C. **Fabricator Qualifications:** A firm experienced in producing products similar to those indicated for this Project and with a record of successful in-service performance, as well as sufficient production capacity to produce required units.
- D. **Installer Qualifications:** A firm or individual experienced in installing, erecting, or assembling work similar in material, design, and extent to that indicated for this Project, whose work has resulted in construction with a record of successful in-service performance.
- E. **Professional Engineer Qualifications:** A professional engineer who is legally qualified to practice in jurisdiction where Project is located and who is experienced in providing engineering services of the kind indicated. Engineering services are defined as those performed for installations of the system, assembly, or product that are similar to those indicated for this Project in material, design, and extent.
- F. **Specialists:** Certain Specification Sections require that specific construction activities shall be performed by entities who are recognized experts in those operations. Specialists shall satisfy qualification requirements indicated and shall be engaged for the activities indicated.
 - 1. Requirements of authorities having jurisdiction shall supersede requirements for specialists.
- G. **Testing Agency Qualifications:** An NRTL, an NVLAP, or an independent agency with the experience and capability to conduct testing and inspecting indicated, as documented according to ASTM E 329; and with additional qualifications specified in individual Sections; and where required by authorities having jurisdiction, that is acceptable to authorities.
 - 1. NRTL: A nationally recognized testing laboratory according to 29 CFR 1910.7.
 - 2. NVLAP: A testing agency accredited according to NIST's National Voluntary Laboratory Accreditation Program.
- H. **Manufacturer's Technical Representative Qualifications:** An authorized representative of manufacturer who is trained and approved by manufacturer to observe and inspect installation of manufacturer's products that are similar in material, design, and extent to those indicated for this Project.
- I. **Factory-Authorized Service Representative Qualifications:** An authorized representative of manufacturer who is trained and approved by manufacturer to inspect installation of manufacturer's products that are similar in material, design, and extent to those indicated for this Project.
- J. **Preconstruction Testing:** Where testing agency is indicated to perform preconstruction testing for compliance with specified requirements for performance and test methods, comply with the following:
 - 1. GC responsibilities include the following:
 - a. Provide test specimens representative of proposed products and construction.

- b. Submit specimens in a timely manner with sufficient time for testing and analyzing results to prevent delaying the Work.
 - c. Provide sizes and configurations of test assemblies, mockups, and laboratory mockups to adequately demonstrate capability of products to comply with performance requirements.
 - d. Build site-assembled test assemblies and mockups using installers who will perform same tasks for Project.
 - e. Build laboratory mockups at testing facility using personnel, products, and methods of construction indicated for the completed Work.
 - f. When testing is complete, remove test specimens, assemblies, mockups; do not reuse products on Project.
- 2. Testing Agency Responsibilities: The GC shall obtain, prepare & submit a certified written report of each test, inspection, and similar quality-assurance service to the Architect. The GC shall interpret tests and inspections and state in each report whether tested and inspected work complies with or deviates from the Contract Documents.
- K. Mockups: Before installing portions of the Work requiring mockups, the GC shall build mockups for each form of construction and finish required to comply with the following requirements, using materials indicated for the completed Work:
 - 1. Build mockups in location and of size indicated or, if not indicated, as directed by Architect.
 - 2. Notify the Architect seven days in advance of dates and times when mockups will be constructed.
 - 3. Employ supervisory personnel who will oversee mockup construction. Employ workers that will be employed during the construction at the Project.
 - 4. Demonstrate the proposed range of aesthetic effects and workmanship.
 - 5. Obtain the Architect's approval of mockups before starting work, fabrication, or construction.
 - a. Allow seven (7) days for initial review and each re-review of each mockup.
 - 6. Maintain mockups during construction in an undisturbed condition as a standard for judging the completed Work.
 - 7. Demolish and remove mockups when directed, unless otherwise indicated.
- L. Laboratory Mockups: The GC shall comply with requirements of preconstruction testing and those specified in individual Specification Sections in Divisions 02 through 48.

1.9 QUALITY CONTROL

- A. Owner Responsibilities: Where quality-control services are indicated as the Owner's responsibility, the Owner will engage a qualified testing agency to perform these services.
 - 1. The Owner will furnish the GC with names, addresses, and telephone numbers of testing agencies engaged and a description of types of testing and inspecting they are engaged to perform.
 - 2. Payment for these services will be made from testing and inspecting allowances, as authorized by Change Orders.

3. Costs for retesting and re-inspecting construction that replaces or is necessitated by work that failed to comply with the Contract Documents will be charged to the GC.
- B. GC Responsibilities: Tests and inspections not explicitly assigned to the Owner are the GC's responsibility. The GC shall perform additional quality-control activities required to verify that the Work complies with requirements, whether specified or not.
1. Unless otherwise indicated, provide quality-control services specified and those required by authorities having jurisdiction. Perform quality-control services required of the GC by authorities having jurisdiction, whether specified or not.
 2. Where services are indicated as the GC's responsibility, engage a qualified testing agency to perform these quality-control services.
 - a. The GC shall not employ same entity engaged by the Owner, unless agreed to in writing by the Owner.
 3. The GC shall notify testing agencies at least 24 hours in advance of time when Work that requires testing or inspecting will be performed.
 4. Where quality-control services are indicated as the GC's responsibility, submit a certified written report, in duplicate, of each quality-control service.
 5. Testing and inspecting requested by the GC and not required by the Contract Documents are the GC's responsibility.
 6. The GC shall submit additional copies of each written report directly to authorities having jurisdiction, when they so direct.
- C. Manufacturer's Field Services: Where indicated, the GC shall engage a factory-authorized service representative to inspect field-assembled components and equipment installation, including service connections. The GC shall report results in writing as specified in Division 01 Section "Submittal Procedures."
- D. Manufacturer's Technical Services: Where indicated, the GC shall engage a manufacturer's technical representative to observe and inspect the Work. Manufacturer's technical representative's services include participation in pre-installation conferences, examination of substrates and conditions, verification of materials, observation of Installer activities, inspection of completed portions of the Work, and submittal of written reports.
- E. Retesting/Re-inspecting: Regardless of whether original tests or inspections were the GC's responsibility, the GC shall provide quality-control services, including re-testing and re-inspecting, for construction that replaced Work that failed to comply with the Contract Documents.
- F. Testing Agency Responsibilities: Cooperate with the Architect and the GC in performance of duties. Provide qualified personnel to perform required tests and inspections.
1. Notify the Architect and the GC promptly of irregularities or deficiencies observed in the Work during performance of its services.
 2. Determine the location from which test samples will be taken and in which in-situ tests are conducted.
 3. Conduct and interpret tests and inspections and state in each report whether tested and inspected work complies with or deviates from requirements.

4. Submit a certified written report, in duplicate, of each test, inspection, and similar quality-control service through the GC.
 5. Do not release, revoke, alter, or increase the Contract Document requirements or approve or accept any portion of the Work.
 6. Do not perform any duties of the GC.
- G. Associated Services: The GC shall cooperate with agencies performing required tests, inspections, and similar quality-control services, and provide reasonable auxiliary services as requested. Notify agency sufficiently in advance of operations to permit assignment of personnel. The GC shall provide the following:
1. Access to the Work.
 2. Incidental labor and facilities necessary to facilitate tests and inspections.
 3. Adequate quantities of representative samples of materials that require testing and inspecting. Assist agency in obtaining samples.
 4. Facilities for storage and field curing of test samples.
 5. Delivery of samples to testing agencies.
 6. Preliminary design mix proposed for use for material mixes that require control by testing agency.
 7. Security and protection for samples and for testing and inspecting equipment at Project site.
- H. Coordination: The GC shall coordinate sequence of activities to accommodate required quality-assurance and -control services with a minimum of delay and to avoid necessity of removing and replacing construction to accommodate testing and inspecting.
1. Schedule times for tests, inspections, obtaining samples, and similar activities.
- I. Schedule of Tests and Inspections: The GC shall prepare a schedule of tests, inspections, and similar quality-control services required by the Contract Documents. Coordinate and submit concurrently with GC's construction schedule. Update as the Work progresses. .
1. Distribution: The GC shall distribute schedule to the Owner, the Architect, testing agencies, and each party involved in performance of portions of the Work where tests and inspections are required.
- J. Action Items: The GC shall prepare and maintain a written list of Action Items pertaining to any work determined by the GC, the Owner and/or the Architect to be in need of additional attention, repair, or replacement. Action Items will be reviewed during monthly Requisition Meetings by the Architect regarding their status. The GC shall make every effort to complete identified and logged Action Items on a monthly basis. Action Items are intended to be dealt with by the GC and their Sub-Contractors as the work progresses and not left unresolved until the end of the job.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION

3.1 TEST AND INSPECTION LOG

- A. The GC shall prepare a record of tests and inspections. Include the following:
 - 1. Date test or inspection was conducted.
 - 2. Description of the Work tested or inspected.
 - 3. Date test or inspection results were transmitted to Architect.
 - 4. Identification of testing agency or special inspector conducting test or inspection.
- B. The GC shall maintain test & inspection log at Project site, post changes and modifications as they occur and provide access to test and inspection log for the Architect's reference during normal working hours.

3.2 REPAIR AND PROTECTION

- A. General: On completion of testing, inspecting, sample taking, and similar services, The GC shall repair damaged construction and restore substrates and finishes.
 - 1. The GC shall provide materials and comply with installation requirements specified in other Specification Sections or matching existing substrates and finishes.
 - 2. The GC shall restore patched areas and extend restoration into adjoining areas with durable seams that are as invisible as possible.
 - 3. The GC shall comply with the Contract Document requirements for cutting and patching in Division 01 Section "Execution."
- B. The GC shall protect construction as indicated and exposed by or for quality-control service activities. Areas subject to foot traffic shall be fully protected with Ramboard or equal, i.e. "wall to wall", immediately after installation in order to avoid damage or soiling of finished flooring materials/products by construction workers.
- C. Repair and protection are GC's responsibility, regardless of the assignment of responsibility for quality-control services.

END OF SECTION

SECTION 014200 - REFERENCES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 DEFINITIONS

- A. General: Basic Contract definitions are included in the Conditions of the Contract.
- B. "Approved": When used to convey the Architect's action on the General Contractor's submittals, applications, and requests, "approved" is limited to Architect's duties and responsibilities as stated in the Conditions of the Contract.
- C. "Directed": A command or instruction by the Architect. Other terms including "requested," "authorized," "selected," "required," and "permitted" have the same meaning as "directed."
- D. "Indicated": Requirements expressed by graphic representations or in written form on Drawings, in Specifications, and in other Contract Documents. Other terms including "shown," "noted," "scheduled," and "specified" have the same meaning as "indicated."
- E. "Regulations": Laws, ordinances, statutes, and lawful orders issued by authorities having jurisdiction, and rules, conventions, and agreements within the construction industry that control performance of the Work.
- F. "Furnish": Supply and deliver to Project site, ready for unloading, unpacking, assembly, installation, and similar operations.
- G. "Install": Operations at the Project site including unloading, temporarily storing, unpacking, assembling, erecting, placing, anchoring, applying, working to dimension, finishing, curing, protecting, cleaning, and similar operations.
- H. "Provide": Furnish and install, complete and ready for the intended use.
- I. "Project Site": Space available for performing construction activities. The extent of Project site is shown on Drawings and may or may not be identical with the description of the land on which Project is to be built.
- J. Substantial Completion: Refer to Section 3-A Standard General Conditions.

1.3 INDUSTRY STANDARDS

- A. Applicability of Standards: Unless the Contract Documents include more stringent requirements, applicable construction industry standards have the same force and effect as if

bound or copied directly into the Contract Documents to the extent referenced. Such standards are made a part of the Contract Documents by reference.

- B. Publication Dates: Comply with standards in effect as of date of the Contract Documents unless otherwise indicated.
- C. Copies of Standards: Each entity engaged in construction on Project should be familiar with industry standards applicable to its construction activity. Copies of applicable standards are not bound with the Contract Documents.
 - 1. Where copies of standards are needed to perform a required construction activity, obtain copies directly from publication source.

1.4 ABBREVIATIONS AND ACRONYMS

- A. Industry Organizations: Where abbreviations and acronyms are used in Specifications or other Contract Documents, they shall mean the recognized name of the entities indicated in Thomson Gale's "Encyclopedia of Associations" or in Columbia Books' "National Trade & Professional Associations of the U.S."
- B. Code Agencies: Where abbreviations and acronyms are used in Specifications or other Contract Documents, they shall mean the recognized name of the entities in the following list. Names, telephone numbers, and Web sites are subject to change and are believed to be accurate and up-to-date as of the date of the Contract Documents.

IAPMO	International Association of Plumbing and Mechanical Officials www.iapmo.org	(909) 472-4100
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ICC	International Code Council www.iccsafe.org	(888) 422-7233
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ICC-ES	ICC Evaluation Service, Inc. www.icc-es.org	(800) 423-6587 (562) 699-0543
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NFPA	NFPA (National Fire Protection Association) www.nfpa.org	(800) 344-3555 (617) 770-3000
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UBC	Uniform Building Code (See ICC)	
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- C. Federal Government Agencies: Where abbreviations and acronyms are used in Specifications or other Contract Documents, they shall mean the recognized name of the entities in the following list. Names, telephone numbers, and Web sites are subject to change and are believed to be accurate and up-to-date as of the date of the Contract Documents.

EPA	Environmental Protection Agency www.epa.gov	(202) 272-0167
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OSHA	Occupational Safety & Health Administration	(800) 321-6742
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www.osha.gov

(202) 693-1999

USDA Department of Agriculture
www.usda.gov

(202) 720-2791

- D. Standards and Regulations: Where abbreviations and acronyms are used in Specifications or other Contract Documents, they shall mean the recognized name of the standards and regulations in the following list. Names, telephone numbers, and Web sites are subject to change and are believed to be accurate and up-to-date as of the date of the Contract Documents.

ADAAG Americans with Disabilities Act (ADA) (800) 872-2253
Architectural Barriers Act (ABA) (202) 272-0080
Accessibility Guidelines for Buildings and Facilities
Available from U.S. Access Board
www.access-board.gov

- E. State Government Agencies: Where abbreviations and acronyms are used in Specifications or other Contract Documents, they shall mean the recognized name of the entities in the following list. Names, telephone numbers, and Web sites are subject to change and are believed to be accurate and up-to-date as of the date of the Contract Documents.

BGS State of Maine Bureau of General Services

DOE State of Maine Department of Education

MDEP State of Maine Department of Environmental Protection

MDOT State of Maine Department of Transportation

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION

SECTION 015000 - TEMPORARY FACILITIES & IAQ MANAGEMENT

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section includes requirements for temporary utilities, support facilities, and security and protection facilities.
- B. Related Sections:
 - 1. Division 01 Section "Summary" for work restrictions and limitations on utility interruptions.
 - 2. Division 31 Section "Dewatering" for disposal of ground water at Project site.

1.3 USE CHARGES

- A. General: Installation and removal of and use charges for temporary facilities shall be included in the Contract Sum unless otherwise indicated. The General Contractor shall allow other entities to use temporary services and facilities without cost, including, but not limited to, the Owner, the Architect, testing agencies, and authorities having jurisdiction.
- B. Services Provided by the Owner: The Owner agrees to provide the GC with the following services from existing building utility connections:
 - 1. Sewer Service connection & use at no additional cost for temporary sewer service installations provided by the GC (if applicable).
 - 2. Water Service connection & use at no additional cost for temporary water service installations provided by the GC.
 - 3. Electrical Power Service connection & use at no additional cost for temporary electrical service installations provided by the GC.
 - 4. Telephone/FAX/DSL line connection(s) at no additional cost for temporary telephone/fax/DSL service installations provided by the GC.
 - 5. Internet Service connection & use at no additional cost for temporary internet service installations provided by the GC.
- C. Heating Fuel: Unless agreed otherwise, the GC shall pay for fuel required for temporary heating (if applicable).

1.4 INFORMATIONAL SUBMITTALS

- A. Construction Site Plan: The GC shall prepare plan(s) for & show temporary facilities, utility hookups, staging & storage areas, parking areas for construction personnel, access routes to and from building project areas, and areas where construction personnel are permitted.
- B. Erosion- and Sedimentation-Control Plan: The GC shall show compliance with requirements of EPA Construction General Permit or authorities having jurisdiction, whichever is more stringent (if applicable).
- C. Cold-Weather Procedures: The GC shall provide detailed description of methods, materials, and equipment to be used to comply with cold-weather requirements to protect install concrete and masonry (if applicable).
- D. Moisture-Protection Plan: The GC shall describe procedures and controls for protecting materials and construction from water absorption and damage, including delivery, handling, and storage provisions for materials subject to water absorption or water damage, discarding water-damaged materials, protocols for mitigating water intrusion into completed Work, and replacing water damaged Work.
 - 1. The GC shall indicate sequencing of work that requires water, such as sprayed fire-resistive materials, plastering, and terrazzo grinding, and describe plans for dealing with water from these operations. Show procedures for verifying that wet construction has dried sufficiently to permit installation of finish materials.
- E. Dust-Control and HVAC Construction Indoor Air Quality Control Plan: If applicable, the GC shall submit indoor air Quality Management Plan to meet or exceed SMACNA Indoor Air Quality Guidelines for Occupied Buildings During Construction (1995). Permanent air handling units shall not be used to achieve air quality during construction. The GC shall submit coordination drawing and narrative that indicates the dust-control and HVAC-control measures proposed for use, proposed locations, and proposed time frame for their operation. The GC shall identify further options if proposed measures are later determined to be inadequate. Include the following:
 - 1. Locations of dust-control partitions at each phase of the work.
 - 2. HVAC system isolation schematic drawing and list of isolation procedures including sealing all exposed air inlets, outlets, openings, grilles, ducts, plenums, etc. during construction using poly.
 - 3. All ductwork ends will be sealed at the end of each day until completed.
 - 4. Location of proposed air filtration system discharge.
 - 5. Other dust-control measures.
 - 6. Waste management plan.
 - 7. Reference mechanical specifications for building flush-out and coordinate with commissioning agent.
 - 8. Any paint not containing a low VOC rating will be done prior to ceiling and carpet installation. All workers must wear masks for all spray painting, concrete grinding, or other dust or fume inducing activities. During the installation of finishes and other VOC emitting materials, ventilate with 100% outside air with the use of HEPA filters in order to maintain a constant flow of clean air in the building work space. This is only to be performed in ideal weather conditions defined as a temperature between 55 degrees F and 85 degrees F and humidity between 30% and 60%.

9. Use vacuum dust removal system with sheetrock sanding, or enclosed space welding.
10. Provide positive pressure and exhaust system in the building during construction.
11. Schedule construction so no diesel or gasoline engines are operated in the enclosed building.
12. The job site will be a no smoking job site.
13. Discuss the IAQ management plan at all pre-construction meetings and weekly progress meetings.
14. The IAQ Management Plan will be distributed to all employees, sub-Contractors, the Architect and the Owner.

F. IAQ SUBMITTALS

1. The GC shall submit indoor air quality plan during construction as outlined above.
2. The GC shall submit monthly photographs made by the GC indicating compliance with the IAQ plan.
3. The GC shall provide cut sheets on the filtration media used during construction and during the flush out period.

1.5 QUALITY ASSURANCE

- A. Electric Service: The GC shall comply with NECA, NEMA, and UL standards and regulations for temporary electric service and install service to comply with NFPA 70.
- B. Tests and Inspections: The GC shall arrange for authorities having jurisdiction to test and inspect each temporary utility before use, and obtain required certifications and permits.
- C. Protection: The GC shall provide protection, including repair/replacement if damaged, for the following:
 1. Entryway doors.
 2. Interior corridors.
 3. Existing materials & fixtures designated for removal, salvage & re-installation.
 4. Interior pathways to existing toilets.
 5. Existing toilet flooring & fixtures designated for use by the GC.
 6. All newly installed floor finishes (until Substantial Completion).
 7. All newly installed steel door panels (until Substantial Completion).

1.6 PROJECT CONDITIONS

- A. Accessible Areas: The GC shall respect the situation of performing its duties in an occupied building and shall only use the designated & protected entries, corridors, and pathways as indicated for use by the GC, its staff and its sub-Contractors during the entire construction period.
- B. Scope Area Limitation Signage: The GC is responsible to post temporary signage reading “NO CONSTRUCTION PERSONNEL PERMITTED BEYOND THIS POINT,” whether indicated or not in a manner that conforms with OSHA requirements for safety on a construction site.
- C. Temporary Use of Permanent Facilities: The GC shall engage installer of each permanent service to assume responsibility for operation, maintenance, and protection of each permanent

service during its use as a construction facility before the Owner's acceptance, regardless of previously assigned responsibilities.

- D. Frost Protection: If applicable, the GC shall protect footings from freezing temperatures and prevent frost from occurring beneath footings. Frozen water found on soil or concrete surface shall be reason for rejection of protection method. Provide corrective measures within 24 hours after notice of condition is given. Evidence of frost at these locations shall be reason for rejection, removal, and replacement at no additional cost to the Owner.

PART 2 - PRODUCTS

2.1 MATERIALS

- A. Vinyl Fencing: Standard 3 foot high, orange construction fence with steel posts.
- B. Polyethylene Sheet: Reinforced, fire-resistive sheet, 10 mils minimum thickness, with flame-spread rating of 15 or less per ASTM E 84.
- C. Insulation: Un-faced mineral-fiber batt, manufactured from rock wool; with maximum flame-spread and smoke-developed indexes of 25 and 50, respectively.
- D. Building Cardboard: Heavy duty, Ramboard or equal building cardboard, rolled out parallel to long dimension of area to be protected, all joints overlapping min. 2", all joints taped with 3" wide continuous masking tape, installed prior to start of construction, maintained during construction, removed upon Project completion.
- E. Luan Plywood: New 3/8" thick, 4'0"x8'0" sheets laid staggered, all joints taped with 3" wide continuous duct tape, installed prior to start of construction, maintained during construction, removed upon Project completion.
- F. Plywood: New 5/8" thick, 4'0"x8'0" sheets attached to temporary wood structures as indicated with 2" ring-shank nails, installed prior to start of construction, maintained during construction, removed upon Project completion.
- G. Plywood: New 5/8" thick, 4'0"x8'0" sheets attached to existing structures as indicated without causing damage, installed prior to start of construction, maintained during construction, removed upon Project completion.
- H. Wooden Stud Framing: New 2"x4" pine stud wall framing, installed in a manner that does not damage existing finishes, or permanent installations.
- I. Temporary Hardware: New heavy duty galvanized metal, 5-knuckle hinges, door handles on either side of door panel, spring door closing mechanism, heavy-duty lockable latch w/ padlock.
- J. Construction Signage: Plastic, color signs designating access & egress routes, construction area, project site orientation, emergency information, no smoking, etc., in accordance with and as required by OSHA and project site conditions.

2.2 TEMPORARY FACILITIES

- A. The GC shall provide temporary meeting space at the project site. This space will be sufficient in size to accommodate the GC and its staff, with a separate Conference space capable of handling a minimum of ten (10) persons comfortably.
- B. Storage and Fabrication Sheds: If so desired, the GC shall provide sheds sized, furnished, and equipped to accommodate materials and equipment for construction operations.
 - 1. Store combustible materials apart from building.
 - 2. Use of lockable, weather-tight shipping containers on wooden skids is acceptable, coordinate size & location with the Owner and the Architect.
 - 3. Area around storage sheds shall be outfitted with low wooden platforms to avoid creating muddy areas.

2.3 EQUIPMENT

- A. Fire Extinguishers: The GC shall provide portable, UL rated; with class and extinguishing agent as required by locations and classes of fire exposures in each temporary facility, number according to size.
- B. Heating Equipment: If applicable, unless Owner authorizes use of permanent heating system, provide gas/oil fired space heaters that are UL labeled and approved for construction space heating by appropriate agency. Provide adequate ventilation and thermostatic control. Heaters shall be located outside the building and combustion gases shall be vented outside the building. Maintain observation of units in operation.
 - 1. The Owner is not providing heat within the confines of the project scope area. The permanent existing heating/ventilation/air-conditioning system shall not be used during the entire construction period by the Owner's facilities and maintenance staff.
 - 2. The GC shall protect all of the existing heating/ventilation/air conditioning units located within the project scope area, whether indicated or not, to the complete satisfaction of the Owner and the Architect from dust infiltration and potential damage from construction activity
 - 3. The GC shall photographically document the existing condition of the existing heating/ventilation/air-conditioning system and submit digital photography to the Architect prior to the start of construction.
 - 4. The GC shall repair/replace any damage to the existing HVAC units caused during construction.
 - 5. Use of gasoline-burning space heaters, open-flame heaters, or salamander-type heating units is prohibited.
 - 6. Heating Units: Listed and labeled for type of fuel being consumed, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.
 - 7. Permanent HVAC System: May not be used during construction, the GC shall clean the existing and new HVAC equipment in the project area upon substantial completion.

PART 3 - EXECUTION

3.1 INSTALLATION, GENERAL

- A. The GC shall locate facilities where they will serve Project adequately and result in minimum interference with performance of the Work. Relocate and modify facilities as required by progress of the Work.
 - 1. The GC shall locate facilities to limit site disturbance as specified in Division 01 Section "Summary."
- B. The GC shall provide each facility ready for use when needed to avoid delay. Do not remove until facilities are no longer needed or are replaced by authorized use of completed permanent facilities.

3.2 TEMPORARY UTILITY INSTALLATION

- A. General: The GC shall install temporary service or connect to existing service.
 - 1. Arrange with utility company, Owner, and existing users for time when service can be interrupted, if necessary, to make connections for temporary services.
 - 2. The Owner is providing electrical service located within the project building at no charge to the GC.
 - 3. The GC shall provide, install & maintain all temporary electrical facilities located within the project scope area.
 - 4. The GC shall provide, install & maintain all temporary electrical connections to the temporary facilities located adjacent to the project building area.
 - 5. The GC shall inspect the existing electrical system prior to start of construction, provide written list of concerns (if any), to the Owner & the Architect.
 - 6. The GC shall maintain code compliant use of the temporary electrical service during construction, and repair any/all damage to existing electrical system deemed to be caused by construction activity upon completion.
- B. Water Service: The Owner is providing temporary water service located within the project building at no charge to the GC.
 - 1. The GC shall provide, install & maintain all temporary water service facilities located within the project scope area.
 - 2. The GC shall provide, install & maintain all temporary water connections to the temporary facilities located adjacent to the project building area (if applicable).

3. The GC shall install water service and distribution piping in sizes and pressures adequate for construction.
- C. Sewers and Drainage: The GC shall provide temporary utilities to remove effluent lawfully (if applicable).
1. The GC is strictly prohibited from using existing sink drains, water fountain drains, toilet drains and floor drains for dumping of any construction related liquids, chemicals, paints, solvents, or other fluid waste whatsoever.
- D. Sanitary Facilities: The GC shall provide temporary toilets, wash facilities, and drinking water for use of construction personnel. Comply with requirements of authorities having jurisdiction for type, number, location, operation, and maintenance of fixtures and facilities.
- E. Heating: If applicable, the GC shall provide temporary heating required by construction activities for curing or drying of completed installations or for protecting installed construction from adverse effects of low temperatures or high humidity.
1. The GC shall select equipment that will not have a harmful effect on existing installations, completed installations or elements being installed.
 2. The GC shall maintain a minimum temperature of 50 deg F in permanently enclosed portions of building for normal construction activities, and 65 deg F for finishing activities and areas where finished Work has been installed.
 - a. Refer to Divisions 2 through 16 for additional temporary heat, ventilation, and humidity requirements for products in those Sections.
 3. The GC shall provide temporary heat to protect all concrete and masonry work during installation as well as other trades needing specific heat requirements to perform and protect their work.
 4. The GC shall protect all concrete slabs on grade, footings and foundations not below the frost line shall be from freezing either by heating or protecting with insulation until substantial completion (if applicable).
 5. The GC shall not be charged for operating costs resulting from the use of the permanent heating/ventilation systems prior to "substantial completion". The GC shall extend warranty periods for such systems at the GC's expense so that the Owner gets the fully intended warranty period effective the day of "Substantial Completion".
 6. Prior to operation of permanent equipment for temporary heating purposes, the GC shall verify that installation is approved for operation, equipment is lubricated and filters are in place. Provide and pay for operation, maintenance, and replacement of filters and worn or consumed parts.
- F. Ventilation and Humidity Control: If applicable, tThe GC shall provide temporary ventilation required by construction activities for curing or drying of completed installations or for protecting installed construction from adverse effects of high humidity. The GC shall select equipment that will not have a harmful effect on completed installations or elements being installed. Coordinate ventilation requirements to produce ambient condition required and minimize energy consumption.
1. The GC shall be responsible to provide dehumidifiers or humidifiers required to perform the installation of any specified construction that requires specific humidity controls.

- G. Electric Lighting: The GC shall provide all temporary lighting required for the duration of construction.
- H. Telephone Service: The Owner is providing temporary DSL telephone service and temporary high-speed wireless internet service located within the project building and/or the temporary field offices located nearby at no charge to the GC.
 - 1. The Owner shall provide temporary telephone connections in common-use facilities for use by all construction personnel.
 - 2. The Owner shall install separate telephone lines for each field office.
 - 3. The Owner shall provide additional telephone lines for the following:
 - a. Provide phone/answering machine on full-time superintendent's telephone.
 - b. Provide data/internet installation for the sole use of the Clerk-of-the-Works.
 - 1) The Owner shall arrange for all temporary installation and pay for all temporary installation charges.
 - 2) Monthly phone charges will be paid by the Owner.
 - 3) The GC shall not abuse the temporary telephone/data systems being provided by the Owner in terms of excessive long distance, or inappropriate use of the internet.
 - 4. The GC shall post a list of important telephone numbers.
 - a. Police and fire departments.
 - b. Ambulance service.
 - c. GC's home office.
 - d. Architect's office.
 - e. Engineers' offices.
 - f. Owner's office.
 - g. Principal sub-Contractors' field and home offices.
 - 5. Cell Phones: The GC may also wish to use cellular telephone(s) for its full-time superintendent & staff, including voice messaging service.

3.3 SUPPORT FACILITIES INSTALLATION

- A. General: The GC shall comply with the following:
 - 1. Provide construction for temporary offices, shops, and sheds located within construction area or within 30 feet of building lines that is noncombustible according to ASTM E 136. Comply with NFPA 241 (if applicable).
 - 2. Maintain support facilities until the Architect schedules Substantial Completion inspection. Remove after Substantial Completion. Personnel remaining after Substantial Completion will be permitted to use permanent facilities, under conditions acceptable to Owner.
- B. Temporary Roads and Parking Areas: If applicable, the GC shall construct and maintain temporary roads and parking areas adequate to support loads and to withstand exposure to traffic during construction period. Locate temporary roads and parking areas within construction limits indicated on Drawings.

1. The GC shall provide a reasonably level, graded, well-drained subgrade of satisfactory soil material, compacted to not less than 95 percent of maximum dry density in the top 6 inches.
 2. The GC shall provide gravel paving course of sub-base material not less than 3 inches thick; roller compacted to a level, smooth, dense surface.
 3. The GC shall provide dust-control treatment that is non-polluting and non-tracking. Reapply treatment as required to minimize dust.
- C. Traffic Controls: The GC shall comply with requirements of authorities having jurisdiction.
1. The GC shall protect existing site improvements to remain including curbs, pavement, and utilities.
 2. The GC shall maintain access for fire-fighting equipment and access to fire hydrants.
- D. Parking: If available, the GC shall coordinate temporary existing parking designated for use by the GC, its sub-Contractors and other construction personnel with the Owner. If not available the GC shall provide temporary parking areas use by the GC, its sub-Contractors and other construction personnel.
- E. Dewatering Facilities and Drains: The GC shall comply with requirements of authorities having jurisdiction. The GC shall Maintain Project site, excavations, and construction free of water.
1. The GC shall dispose of rainwater in a lawful manner that will not result in flooding Project or adjoining properties nor endanger permanent Work or temporary facilities.
 2. The GC shall remove snow and ice as required to minimize accumulations.
 3. The GC shall repair damage prior to substantial completion.
- F. Project Signs:
1. Temporary Signs: The GC shall provide signs as required to inform public and individuals seeking entrance to Project.
 - a. Provide temporary, directional signs for construction personnel and visitors.
 2. The GC shall maintain and touchup signs so they are legible at all times.
 3. The GC shall remove all temporary signage prior to project close-out.
- G. Waste Disposal Facilities: The GC shall comply with requirements specified in Division 01 Section "Construction Waste Management and Disposal."
- H. Lifts and Hoists: The GC shall provide facilities necessary for hoisting materials and personnel.
1. Truck cranes and similar devices used for hoisting materials are considered "tools and equipment" and not temporary facilities.
- I. Temporary Stairs: If applicable, until permanent stairs are available, the GC shall provide temporary stairs where ladders are not adequate. If new stairs of any type are installed, the GC shall provide protection to avoid damage to the new installation finishes.

3.4 SECURITY AND PROTECTION FACILITIES INSTALLATION

- A. Environmental Protection: The GC shall provide protection, operate temporary facilities, and conduct construction as required to comply with environmental regulations and that minimize possible air, waterway, and subsoil contamination or pollution or other undesirable effects.
 - 1. The GC shall comply with work restrictions specified in Division 01 Section "Summary."
- B. Temporary Erosion and Sedimentation Control: If applicable, the GC shall comply with requirements specified in Division 31 Section "Temporary Erosion and Sedimentation Control."
- C. Storm-Water Control: If applicable, the GC shall comply with requirements of authorities having jurisdiction. Provide barriers in and around excavations and subgrade construction to prevent flooding by runoff of storm-water from heavy rains.
- D. Tree and Plant Protection: If applicable, the GC shall install temporary fencing located as indicated or outside the drip line of trees to protect vegetation from damage from construction operations. Protect tree root systems from excessive equipment load damage, flooding, and erosion.
- E. Site Enclosure Fence: If applicable, the GC shall prior to commencing with construction shall, furnish and install site enclosure fence in a manner that will prevent people and animals from easily entering site except by entrance gates.
 - 1. Extent of Fence: As required to enclose entire Project site or portion determined sufficient to accommodate construction operations.
- F. Security Enclosure and Lockup: If applicable, the GC shall install temporary enclosure around partially completed areas of construction. Provide lockable entrances to prevent unauthorized entrance, vandalism, theft, and similar violations of security. Lock entrances at end of each work day.
- G. Barricades, Warning Signs, and Lights: The GC shall comply with requirements of authorities having jurisdiction for erecting structurally adequate barricades, including warning signs and lighting.
- H. Temporary Enclosures: If applicable, the GC shall provide temporary enclosures for protection of construction, in progress and completed, from exposure, foul weather, other construction operations, and similar activities. Provide temporary weather-tight enclosure for building exterior.
 - 1. Where heating or cooling is needed and permanent enclosure is not complete, insulate temporary enclosures.
- I. Temporary Fire Protection: The GC shall install and maintain temporary fire-protection facilities of types needed to protect against reasonably predictable and controllable fire losses. Comply with NFPA 241.
 - 1. The GC shall prohibit smoking on entire campus.

2. The GC shall supervise welding operations, combustion-type temporary heating units, and similar sources of fire ignition according to requirements of authorities having jurisdiction.
3. The GC shall develop and supervise an overall fire-prevention and -protection program for personnel at Project site. Review needs with local fire department and establish procedures to be followed. Instruct personnel in methods and procedures. Post warnings and information.
4. If applicable, the GC shall provide hoses for fire protection of sufficient length to reach construction areas. Hang hoses with a warning sign stating that hoses are for fire-protection purposes only and are not to be removed. Match hose size with outlet size and equip with suitable nozzles.

3.5 MOISTURE AND MOLD CONTROL

- A. The GC is responsible to protect points of entry as indicated and to maintain a weather tight building during construction by closing existing windows and doors at the end of each work day, over weekends and during severe storm events.
- B. GC's Moisture-Protection Plan: The GC shall avoid trapping water in finished work. Document visible signs of mold that may appear during construction.
- C. Exposed Construction Phase: Before installation of weather barriers, when materials are subject to wetting and exposure and to airborne mold spores, the GC shall protect as follows:
 1. The GC shall protect porous materials from water damage.
 2. The GC shall protect stored and installed material from flowing or standing water.
 3. The GC shall keep porous and organic materials from coming into prolonged contact with concrete.
 4. The GC shall remove standing water from decks.
 5. The GC shall keep deck openings covered or dammed.
- D. Partially Enclosed Construction Phase: If applicable, after installation of weather barriers but before full enclosure and conditioning of building, when installed materials are still subject to infiltration of moisture and ambient mold spores, the GC shall protect as follows:
 1. The GC shall not load or install drywall or other porous materials or components, or items with high organic content, into partially enclosed building.
 2. The GC shall keep interior spaces reasonably clean and protected from water damage.
 3. The GC shall periodically collect and remove waste containing cellulose or other organic matter.
 4. The GC shall discard off site or replace water-damaged material.
 5. The GC shall not install material that is wet.
 6. The GC shall discard off site, replace or clean stored or installed material that begins to grow mold.
 7. The GC shall perform work in a sequence that allows any wet materials adequate time to dry before enclosing the material in drywall or other interior finishes.
- E. Controlled Construction Phase of Construction: If applicable, after completing and sealing of the building enclosure but prior to the full operation of permanent HVAC systems, the GC shall maintain as follows:

1. The GC shall control moisture and humidity inside building by maintaining effective dry-in conditions.
2. The GC shall comply with manufacturer's written instructions for temperature, relative humidity, and exposure to water limits.
 - a. The GC is aware that Hygroscopic materials that may support mold growth, including wood and gypsum-based products, that become wet during the course of construction and remain wet for 48 hours are considered defective.
 - b. The GC shall measure moisture content of materials that have been exposed to moisture during construction operations or after installation. The GC shall record daily readings over a forty-eight hour period. Identify materials containing moisture levels higher than allowed. The GC shall report findings in writing to Architect.
 - c. The GC shall remove & replace materials that cannot be completely restored to their manufactured moisture level within 48 hours.

3.6 OPERATION, TERMINATION, AND REMOVAL

- A. Supervision: The GC shall enforce strict discipline in use of temporary facilities. To minimize waste and abuse, the GC shall limit availability of temporary facilities to essential and intended uses.
- B. Maintenance: The GC shall maintain facilities in good operating condition until removal.
 1. The GC shall maintain operation of temporary enclosures, heating, cooling, humidity control, ventilation, and similar facilities on a 24-hour basis where required to achieve indicated results and to avoid possibility of damage.
- C. Temporary Facility Changeover: The GC shall not change over from using temporary security and protection facilities to permanent facilities until successful Substantial Completion.
- D. Termination and Removal: The GC shall remove each temporary facility when need for its service has ended, when it has been replaced by authorized use of a permanent facility, or no later than Substantial Completion. The GC shall complete or, if necessary, restore permanent construction that may have been delayed because of interference with temporary facility. The GC shall repair damaged Work, clean exposed surfaces, and replace construction that cannot be satisfactorily repaired.
 1. Materials and facilities that constitute temporary facilities are property of the GC. The Owner reserves right to take possession of Project identification signs.
 2. The GC shall remove temporary roads and paved areas not intended for or acceptable for integration into permanent construction. Where area is intended for landscape development, remove soil and aggregate fill that do not comply with requirements for fill or subsoil. Remove materials contaminated with road oil, asphalt and other petrochemical compounds, and other substances that might impair growth of plant materials or lawns. Repair or replace street paving, curbs, and sidewalks at temporary entrances, as required by authorities having jurisdiction.
 3. The GC shall, at Substantial Completion, repair, renovate, and clean permanent facilities used during construction period. Comply with final cleaning requirements specified in Division 01 Section "Closeout Procedures."

4. Failure by the GC, including it's Sub-Contractors to respect the Owner's existing facilities in any manner, may result in the Owner revoking the rights and privileges described herein in part or in whole.

END OF SECTION

SECTION 016000 - PRODUCT REQUIREMENTS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section includes administrative and procedural requirements for selection of products for use in Project; product delivery, storage, and handling; manufacturers' standard warranties on products; special warranties; and comparable products.
- B. Related Sections:
 - 1. Division 01 Section "Allowances" for products selected under an allowance.
 - 2. Division 01 Section "Alternates" for products selected under an alternate.
 - 3. Division 01 Section "Substitution Procedures" for requests for substitutions.
 - 4. Division 01 Section "References" for applicable industry standards for products specified.

1.3 DEFINITIONS

- A. Products: Items obtained for incorporating into the Work, whether purchased for Project or taken from previously purchased stock. The term "product" includes the terms "material," "equipment," "system," and terms of similar intent.
 - 1. Named Products: Items identified by manufacturer's product name, including make or model number or other designation shown or listed in manufacturer's published product literature, that is current as of date of the Contract Documents.
 - 2. New Products: Items that have not previously been incorporated into another project or facility. Products salvaged or recycled from other projects are not considered new products.
- B. Basis-of-Design Product Specification: A specification in which a specific manufacturer's product is named and accompanied by the words "basis-of-design product," including make or model number or other designation, to establish the significant qualities related to type, function, dimension, in-service performance, physical properties, appearance, and other characteristics for purposes of evaluating comparable products of additional manufacturers named in the specification.

1.4 ACTION SUBMITTALS

- A. Basis-of-Design Product Specification Submittal: The General Contractor shall comply with requirements in Division 01 Section "Submittal Procedures." Show compliance with requirements.

1.5 QUALITY ASSURANCE

- A. Compatibility of Options: If the GC is given option of selecting between two or more products for use on Project, select product compatible with products previously selected, even if previously selected products were also options.
 - 1. Each sub-Contractor is responsible for providing products and construction methods compatible with products and construction methods of other sub-Contractors.
 - 2. If a dispute arises between sub-Contractors over concurrently selectable but incompatible products, the Architect will determine which products shall be used.
- B. Products with asbestos: The GC shall be aware that Asbestos containing materials are not to be purchased or installed in this project.

1.6 PRODUCT DELIVERY, STORAGE, AND HANDLING

- A. The GC shall deliver, store, and handle products using means and methods that will prevent damage, deterioration, and loss, including theft and vandalism. Comply with manufacturer's written instructions.
- B. Delivery and Handling:
 - 1. The GC shall schedule delivery to minimize long-term storage at Project site and to prevent overcrowding of construction spaces.
 - 2. The GC shall coordinate delivery with installation time to ensure minimum holding time for items that are flammable, hazardous, easily damaged, or sensitive to deterioration, theft, and other losses.
 - 3. The GC shall deliver products to Project site in an undamaged condition in manufacturer's original sealed container or other packaging system, complete with labels and instructions for handling, storing, unpacking, protecting, and installing.
 - 4. The GC shall inspect products on delivery to determine compliance with the Contract Documents and to determine that products are undamaged and properly protected.
- C. Storage:
 - 1. The GC shall store products to allow for inspection and measurement of quantity or counting of units.
 - 2. The GC shall store materials in a manner that will not endanger Project structure.
 - 3. The GC shall store products that are subject to damage by the elements, under cover in a weather-tight enclosure above ground, with ventilation adequate to prevent condensation.
 - 4. The GC shall store cementitious products and materials on elevated platforms.
 - 5. The GC shall store foam plastic from exposure to sunlight, except to extent necessary for period of installation and concealment.

6. The GC shall comply with product manufacturer's written instructions for temperature, humidity, ventilation, and weather-protection requirements for storage.
7. The GC shall protect stored products from damage and liquids from freezing.
8. The GC shall provide a secure location and enclosure at Project site for storage of materials and equipment by Owner's construction forces. Coordinate location with Owner.
9. The GC shall protect installed products, equipment & horizontal surfaces from damage after installation until close-out.

1.7 PRODUCT WARRANTIES

- A. Warranties specified in other Sections shall be in addition to, and run concurrent with, other warranties required by the Contract Documents. Manufacturer's disclaimers and limitations on product warranties do not relieve GC of obligations under requirements of the Contract Documents.
 1. Manufacturer's Warranty: Written warranty furnished by individual manufacturer for a particular product and specifically endorsed by manufacturer to Owner.
 2. Special Warranty: Written warranty required by the Contract Documents to provide specific rights for Owner.
- B. Special Warranties: The GC shall prepare a written document that contains appropriate terms and identification, ready for execution.
 1. Manufacturer's Standard Form: Modified to include Project-specific information and properly executed.
 2. Specified Form: When specified forms are included with the Specifications, prepare a written document using indicated form properly executed.
 3. Refer to Divisions 02 through 49. Sections for specific content requirements and particular requirements for submitting special warranties.
- C. Submittal Time: The GC shall comply with requirements in Division 01 Section "Closeout Procedures."

PART 2 - PRODUCTS

2.1 PRODUCT SELECTION PROCEDURES

- A. General Product Requirements: The GC shall provide products that comply with the Contract Documents, are undamaged and, unless otherwise indicated, are new at time of installation.
 1. The GC shall provide products complete with accessories, trim, finish, fasteners, and other items needed for a complete installation and indicated use and effect.
 2. Standard Products: If available, and unless custom products or nonstandard options are specified, the GC shall provide standard products of types that have been produced and used successfully in similar situations on other projects.
 3. Owner reserves the right to limit selection to products with warranties not in conflict with requirements of the Contract Documents.

4. Where products are accompanied by the term "as selected," the Architect will make selection.
5. Descriptive, performance, and reference standard requirements in the Specifications establish salient characteristics of products.
6. Or Equal: Where products are specified by name and accompanied by the term "or equal" or "or approved equal" or "or approved substitute" or approved," the GC shall comply with provisions in "Product Substitutions" Article to obtain approval for use of an unnamed product.

B. Product Selection Procedures:

1. Product: Where Specifications name a single manufacturer and product, the GC shall provide the named product that complies with requirements. Comparable products or substitutions for GC's convenience will not be considered.
2. Manufacturer/Source: Where Specifications name a single manufacturer or source, the GC shall provide a product by the named manufacturer or source that complies with requirements. Comparable products or substitutions for GC's convenience will not be considered.
3. Products:
 - a. Restricted List: Where Specifications include a list of names of both manufacturers and products, the GC shall provide one of the products listed that complies with requirements. Substitutions for the GC's convenience will not be considered.
 - b. Non-restricted List: Where Specifications include a list of names of both available manufacturers and products, the GC shall provide one of the products listed, or an unnamed product, that complies with requirements. Comply with requirements in "Substitution Procedures" Section for consideration of an unnamed product.
4. Manufacturers:
 - a. Restricted List: Where Specifications include a list of manufacturers' names, the GC shall provide a product by one of the manufacturers listed that complies with requirements. Substitutions for GC's convenience will not be considered.
 - b. Non-restricted List: Where Specifications include a list of available manufacturers, the GC shall provide a product by one of the manufacturers listed, or a product by an unnamed manufacturer, that complies with requirements. Comply with requirements in "Substitution Procedures" Section for consideration of an unnamed product.
5. Basis-of-Design Product: Where Specifications name a product, or refer to a product indicated on Drawings, and include a list of manufacturers, the GC shall provide the specified or indicated product or a comparable product by one of the other named manufacturers. Drawings and Specifications indicate sizes, profiles, dimensions, and other characteristics that are based on the product named. Comply with requirements in "Substitution Procedures" Section for consideration of an unnamed product.

- C. Visual Matching Specification: Where Specifications require "match Architect's sample", the GC shall provide a product that complies with requirements and matches Architect's sample. Architect's decision will be final on whether a proposed product matches.

1. If no product available within specified category matches and complies with other specified requirements, the GC shall comply with requirements in Division 01 Section "Substitution Procedures" for proposal of product.
- D. Visual Selection Specification: Where Specifications include the phrase "as selected by Architect from manufacturer's full range" or similar phrase, the GC shall select a product that complies with requirements. The Architect will select color, gloss, pattern, density, or texture from manufacturer's product line that includes both standard and premium items.

PART 3 - EXECUTION (Not Used)

END OF SECTION

SECTION 017300 - EXECUTION

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section includes general administrative and procedural requirements governing execution of the Work including, but not limited to, the following:
 - 1. Construction layout.
 - 2. Field engineering and surveying.
 - 3. Installation of the Work.
 - 4. Cutting and patching.
 - 5. Coordination of Owner-installed products.
 - 6. Progress cleaning.
 - 7. Starting and adjusting.
 - 8. Protection of installed construction.
 - 9. Correction of the Work.
- B. Related Sections:
 - 1. Division 01 Section "Submittal Procedures" for submitting surveys.
 - 2. Division 01 Section "Closeout Procedures" for submitting final property survey with Project Record Documents, recording of Owner-accepted deviations from indicated lines and levels, and final cleaning.

1.3 DEFINITIONS

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

1.4 INFORMATIONAL SUBMITTALS

- A. Qualification Data: The General Contractor shall submit for land surveyor (if applicable).
- B. Certificates: The GC shall submit certificate signed by land surveyor certifying that location and elevation of improvements comply with requirements (if applicable).

- C. Landfill Receipts: The GC shall submit copy of receipts issued by a landfill facility, licensed to accept hazardous materials, for hazardous waste disposal.
- D. Certified Surveys: The GC shall submit two copies signed by land surveyor (if applicable).
- E. Final Property Survey: The GC shall submit 10 copies showing the Work performed and record survey data (if applicable).

1.5 QUALITY ASSURANCE

- A. Land Surveyor Qualifications: A professional land surveyor who is legally qualified to practice in jurisdiction where Project is located and who is experienced in providing land-surveying services of the kind indicated.
- B. Cutting and Patching: Comply with requirements for and limitations on cutting and patching of construction elements.
 - 1. Structural Elements: When cutting and patching structural elements, the GC shall notify Architect of locations and details of cutting and await directions from the Architect before proceeding. The GC shall shore, brace, and support structural element during cutting and patching. The GC shall not cut and patch structural elements in a manner that could change their load-carrying capacity or increase deflection
 - 2. Operational Elements: The GC shall not cut and patch operating elements and related components in a manner that results in reducing their capacity to perform as intended or that results in increased maintenance or decreased operational life or safety.
 - 3. Other Construction Elements: The GC shall not cut and patch other construction elements or components in a manner that could change their load-carrying capacity, that results in reducing their capacity to perform as intended, or that results in increased maintenance or decreased operational life or safety.
 - 4. Visual Elements: The GC shall not cut and patch construction in a manner that results in visual evidence of cutting and patching. The GC shall not cut and patch exposed construction in a manner that would, in Architect's opinion, reduce the building's aesthetic qualities. The GC shall remove and replace construction that has been cut and patched in a visually unsatisfactory manner.
- C. Manufacturer's Installation Instructions: The GC shall obtain and maintain on-site manufacturer's written recommendations and instructions for installation of products and equipment.

1.6 WARRANTY

- A. Existing Warranties: The GC shall remove, replace, patch, and repair materials and surfaces cut or damaged during installation or cutting and patching operations, by methods and with materials so as not to void existing warranties.

PART 2 - PRODUCTS

2.1 MATERIALS

- A. General: The GC shall comply with requirements specified in other Sections.
 - 1. For projects requiring compliance with sustainable design and construction practices and procedures, The GC shall utilize products for patching that comply with requirements of Division 01 Section "Sustainable Design Requirements."
- B. In-Place Materials: The GC shall use materials for patching identical to in-place materials. For exposed surfaces, the GC shall use materials that visually match in-place adjacent surfaces to the fullest extent possible.
 - 1. If identical materials are unavailable or cannot be used, the GC shall use materials that, when installed, will provide a match acceptable to the Architect for the visual and functional performance of in-place materials. The GC shall submit alternate materials complying with the above to the Architect prior to installation, or prepare a mock-up on site for the Architect's review and approval prior to proceeding.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Existing Conditions: The existence and location of underground and other utilities and construction indicated as existing are not guaranteed. Before beginning sitework, the GC shall investigate and verify the existence and location of underground utilities, mechanical and electrical systems, and other construction affecting the Work.
 - 1. Before construction, the GC shall verify the location and invert elevation at points of connection of sanitary sewer, storm sewer, and water-service piping; underground electrical services, and other utilities.
 - 2. The GC shall furnish location data for work related to Project that must be performed by public utilities serving Project site.
- B. Examination and Acceptance of Conditions: Before proceeding with each component of the Work, the GC shall examine substrates, areas, and conditions, with Installer or Applicator present where indicated, for compliance with requirements for installation tolerances and other conditions affecting performance. The GC shall record observations and submit them to the Architect for review and comment prior to proceeding with construction.
 - 1. Written Report: Where a written report listing conditions detrimental to performance of the Work is required by other Sections, the GC shall include the following:
 - a. Description of the Work.
 - b. List of detrimental conditions, including substrates.
 - c. List of unacceptable installation tolerances.
 - d. Recommended corrections.

2. The GC shall verify compatibility with and suitability of substrates, including compatibility with existing finishes or primers.
3. The GC shall examine roughing-in for mechanical and electrical systems to verify actual locations of connections before equipment and fixture installation.
4. The GC shall examine walls, floors, and roofs for suitable conditions where products and systems are to be installed.
5. The GC shall proceed with installation only after unsatisfactory conditions have been corrected. Proceeding with the Work indicates acceptance of surfaces and conditions.

3.2 PREPARATION

- A. Existing Utility Information: The GC shall furnish information to Architect that is necessary to adjust, move, or relocate existing utility structures, utility poles, lines, services, or other utility appurtenances located in or affected by construction. Coordinate with authorities having jurisdiction.
- B. Field Measurements: The GC shall take field measurements as required to fit the Work properly and recheck measurements before installing each product. Where portions of the Work are indicated to fit to other construction, The GC shall verify dimensions of other construction by field measurements before fabrication. The GC shall coordinate fabrication schedule with construction progress to avoid delaying the Work.
- C. Space Requirements: The GC shall verify space requirements and dimensions of items shown diagrammatically on Drawings.
- D. Review of Contract Documents and Field Conditions: Immediately on discovery of the need for clarification of the Contract Documents caused by differing field conditions outside the control of the GC, The GC shall submit a request for information to Architect according to requirements in Division 01 Section "Project Management and Coordination."

3.3 CONSTRUCTION LAYOUT

- A. Verification: Before proceeding to lay out the Work, The GC shall verify layout information shown on Drawings, in relation to the property survey and existing benchmarks. If discrepancies are discovered, notify the GC shall Architect promptly.
- B. General: The GC shall engage a land surveyor to lay out the Work using accepted surveying practices. Under the supervision of the GC, the land surveyor shall:
 1. Establish benchmarks and control points to set lines and levels at each story of construction and elsewhere as needed to locate each element of Project.
 2. Establish dimensions within tolerances indicated. Do not scale Drawings to obtain required dimensions.
 3. Inform installers of lines and levels to which they must comply.
 4. Check the location, level and plumb, of every major element as the Work progresses.
 5. Notify the Architect when deviations from required lines and levels exceed allowable tolerances.
 6. Close site surveys with an error of closure equal to or less than the standard established by authorities having jurisdiction.

7. Locate and lay out site improvements, including pavements, grading, fill and topsoil placement, utility slopes, and rim and invert elevations.
- C. Building Lines and Levels: Under the supervision of the GC, the land surveyor shall:
1. Locate and lay out control lines and levels for structures, building foundations, column grids, and floor levels, including those required for mechanical and electrical work. Transfer survey markings and elevations for use with control lines and levels. Level foundations and piers from two or more locations.
 2. Maintain a record log of layout control work. Record deviations from required lines and levels. Include beginning and ending dates and times of surveys, weather conditions, name and duty of each survey party member, and types of instruments and tapes used. Make the log available for reference by Architect.

3.4 FIELD ENGINEERING

- A. Identification: The Owner will identify existing benchmarks, control points, and property corners.
- B. Reference Points: The GC shall locate existing permanent benchmarks, control points, and similar reference points before beginning the Work. Preserve and protect permanent benchmarks and control points during construction operations.
1. The GC shall not change or relocate existing benchmarks or control points without prior written approval of Architect.
 2. The GC shall report lost or destroyed permanent benchmarks or control points promptly.
 3. The GC shall report the need to relocate permanent benchmarks or control points to Architect before proceeding.
 4. The GC shall replace lost or destroyed permanent benchmarks and control points promptly.
 5. The GC shall base replacements on the original survey control points.
- C. Benchmarks: The GC shall establish and maintain a minimum of two permanent benchmarks on Project site, referenced to data established by survey control points. The GC shall comply with authorities having jurisdiction for type and size of benchmark.
1. The GC shall record benchmark locations, with horizontal and vertical data, on Project Record Documents.
 2. Where the actual location or elevation of layout points cannot be marked, the GC shall provide temporary reference points sufficient to locate the Work.
 3. The GC shall remove temporary reference points when no longer needed.
 4. The GC shall restore marked construction to its original condition.
- D. Certified Survey: On completion of foundation walls, major site improvements, and other work requiring field-engineering services, the GC shall prepare a certified survey showing dimensions, locations, angles, and elevations of construction and sitework.
- E. Final Property Survey: The GC shall engage a land surveyor to prepare a final property survey showing significant features (real property) for Project. The GC shall include on the survey a

certification, signed by land surveyor, that principal metes, bounds, lines, and levels of Project are accurately positioned as shown on the survey.

1. The GC shall show boundary lines, monuments, streets, site improvements and utilities, existing improvements and significant vegetation, adjoining properties, acreage, grade contours, and the distance and bearing from a site corner to a legal point.
2. Recording: At Substantial Completion, the GC shall have the final property survey recorded by or with authorities having jurisdiction as the official "property survey."

3.5 INSTALLATION

- A. General: The GC shall locate the Work and components of the Work accurately, in correct alignment and elevation, as indicated.
 1. The GC shall make vertical work plumb and make horizontal work level.
 2. Where space is limited, The GC shall install components to maximize space available for maintenance and ease of removal for replacement.
 3. The GC shall conceal pipes, ducts, and wiring in finished areas, unless otherwise indicated.
 4. The GC shall maintain minimum headroom clearance of 96 inches in occupied spaces and 90 inches in unoccupied spaces.
- B. The GC shall comply with manufacturer's written instructions and recommendations for installing products in applications indicated.
- C. The GC shall install products at the time and under conditions that will ensure the best possible results.
- D. The GC shall maintain conditions required for product performance until Substantial Completion.
- E. The GC shall conduct construction operations so no part of the Work is subjected to damaging operations or loading in excess of that expected during normal conditions of occupancy.
- F. Tools and Equipment: The GC shall not use tools or equipment that produce harmful noise levels.
- G. Templates: The GC shall obtain and distribute to the parties involved templates for work specified to be factory prepared and field installed.
- H. Shop Drawings: The GC shall check Shop Drawings of other work to confirm that adequate provisions are made for locating and installing products to comply with indicated requirements.
- I. Attachment: The GC shall provide blocking and attachment plates and anchors and fasteners of adequate size and number to securely anchor each component in place, accurately located and aligned with other portions of the Work. Where size and type of attachments are not indicated, the GC shall verify size and type required for load conditions.
 1. Mounting Heights: Where mounting heights are not indicated, the GC shall mount components at heights directed by Architect.

2. The GC shall allow for building movement, including thermal expansion and contraction.
 3. The GC shall coordinate installation of anchorages, including furnishing of 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. The GC shall deliver such items to Project site in time for installation.
- J. Joints: The GC shall make joints of uniform width. Where joint locations in exposed work are not indicated, the GC shall arrange joints for the best visual effect. The GC shall fit exposed connections together to form hairline joints.
- K. Hazardous Materials: The GC shall use products, cleaners, and installation materials that are not considered hazardous.

3.6 CUTTING AND PATCHING

- A. Cutting and Patching, General: The GC shall employ skilled workers to perform cutting and patching. The GC shall proceed with cutting and patching at the earliest feasible time, and complete without delay.
1. The GC shall cut in-place construction to provide for installation of other components or performance of other construction, and subsequently patch as required to restore surfaces to their original condition.
- B. Temporary Support: The GC shall provide temporary support of work to be cut.
- C. Protection: The GC shall protect in-place construction during cutting and patching to prevent damage. Provide protection from adverse weather conditions for portions of Project that might be exposed during cutting and patching operations.
- D. Adjacent Occupied Areas: Where interference with use of adjoining areas or interruption of free passage to adjoining areas is unavoidable, the GC shall coordinate cutting and patching in accordance with requirements of Division 01 Section "Summary."
- E. Existing Utility Services and Mechanical/Electrical Systems: Where existing services/systems are required to be removed, relocated, or abandoned, the GC shall bypass such services/systems before cutting to prevent interruption to occupied areas.
- F. Cutting: The GC shall cut in-place construction by sawing, drilling, breaking, chipping, grinding, and similar operations, including excavation, using methods least likely to damage elements retained or adjoining construction. If possible, the GC shall review proposed procedures with original Installer; comply with original Installer's written recommendations.
1. In general, the GC shall use hand or small power tools designed for sawing and grinding, not hammering and chopping. Cut holes and slots neatly to minimum size required, and with minimum disturbance of adjacent surfaces. Temporarily cover openings when not in use.
 2. Finished Surfaces: The GC shall cut or drill from the exposed or finished side into concealed surfaces.
 3. Concrete and Masonry: The GC shall cut using a cutting machine, such as an abrasive saw or a diamond-core drill.

4. Excavating and Backfilling: The GC shall comply with requirements in applicable Division 31 Sections where required by cutting and patching operations.
 5. Mechanical and Electrical Services: The GC shall cut off pipe or conduit in walls or partitions to be removed. The GC shall cap, valve, or plug and seal remaining portion of pipe or conduit to prevent entrance of moisture or other foreign matter after cutting.
 6. The GC shall proceed with patching after construction operations requiring cutting are complete.
- G. Patching: The GC shall Patch construction by filling, repairing, refinishing, closing up, and similar operations following performance of other work. The GC shall patch with durable seams that are as invisible as practicable. The GC shall provide materials and comply with installation requirements specified in other Sections, where applicable.
1. Inspection: Where feasible, the GC shall test and inspect patched areas after completion to demonstrate physical integrity of installation.
 2. Exposed Finishes: The GC shall restore exposed finishes of patched areas and extend finish restoration into retained adjoining construction in a manner that will minimize evidence of patching and refinishing.
 - a. The GC shall clean piping, conduit, and similar features before applying paint or other finishing materials.
 - b. The GC shall restore damaged pipe covering to its original condition.
 3. Floors and Walls: If applicable, where walls or partitions that are removed extend one finished area into another, the GC shall patch and repair floor and wall surfaces in the new space. The GC shall provide an even surface of uniform finish, color, texture, and appearance. The GC shall remove in-place floor and wall coverings and replace with new materials, if necessary, to achieve uniform color and appearance.
 - a. Where patching occurs in a painted surface, the GC shall prepare substrate and apply primer and intermediate paint coats appropriate for substrate over the patch, and apply final paint coat over entire unbroken surface containing the patch. The GC shall provide additional coats until patch blends with adjacent surfaces.
 4. Ceilings: If applicable, the GC shall patch, repair, or rehang in-place ceilings as necessary to provide an even-plane surface of uniform appearance.
 5. Exterior Building Enclosure: The GC shall patch components in a manner that restores enclosure to a weather-tight condition.
- H. Cleaning: The GC shall clean areas and spaces where cutting and patching are performed. The GC shall remove paint, mortar, oils, putty, and similar materials from adjacent finished surfaces.

3.7 OWNER-INSTALLED PRODUCTS

- A. Site Access: The GC shall provide access to Project site for Owner's construction personnel.
- B. Coordination: The GC shall coordinate construction and operations of the Work with work performed by Owner's construction personnel.

1. Construction Schedule: The GC shall inform the Owner of the GC's preferred construction schedule for the Owner's portion of the Work. The GC shall adjust construction schedule based on a mutually agreeable timetable. The GC shall notify the Owner if changes to schedule are required due to differences in actual construction progress.
2. Pre-installation Conferences: The GC shall include Owner's construction personnel at pre-installation conferences covering portions of the Work that are to receive the Owner's work. The GC shall attend pre-installation conferences conducted by the Owner's construction personnel if portions of the Work depend on the Owner's construction.

3.8 PROGRESS CLEANING

- A. General: The GC shall clean Project site and work areas daily, including common areas.
- B. Enforcement & Disposal: The GC shall enforce requirements strictly and dispose of materials lawfully.
 1. The GC shall comply with requirements in NFPA 241 for removal of combustible waste materials and debris.
 2. The GC shall not hold waste materials more than seven days during normal weather or three days if the temperature is expected to rise above 80 deg F.
 3. The GC shall containerize hazardous and unsanitary waste materials separately from other waste, marking containers appropriately and disposing of legally, according to regulations.
 - a. The GC shall utilize containers intended for holding waste materials of type to be stored.
 4. The GC shall coordinate progress cleaning for joint-use areas where more than one installer has worked.
- C. Site: The GC shall maintain Project site free of waste materials and debris.
- D. Work Areas: The GC shall clean areas where work is in progress to the level of cleanliness necessary for proper execution of the Work.
 1. The GC shall remove liquid spills promptly.
 2. Where dust would impair proper execution of the Work, the GC shall broom-clean or vacuum the entire work area, as appropriate.
- E. For general construction, each trade shall pick up the debris and rubbish, generated by that trade, and dispose of in dumpsters furnished by the GC.
- F. Installed Work: The GC shall keep installed work clean and protected from potential damage. Clean installed surfaces according to written instructions of manufacturer or fabricator of product installed, using only cleaning materials specifically recommended. If specific cleaning materials are not recommended, use cleaning materials that are not hazardous to health or property and that will not damage exposed surfaces.

- G. Concealed Spaces: The GC shall remove debris from concealed spaces before enclosing the space.
- H. Exposed Surfaces in Finished Areas: The GC shall clean exposed surfaces and protect as necessary to ensure freedom from damage and deterioration at time of Substantial Completion.
- I. Waste Disposal: The GC shall not bury or burn waste materials on-site.
- J. The GC shall not wash waste materials down sewers or into waterways.
- K. The GC shall comply with waste disposal requirements in Division 01 Section "Construction Waste Management and Disposal."
- L. During handling and installation, The GC shall clean and protect construction in progress and adjoining materials already in place. The GC shall apply protective covering to ensure protection from damage or deterioration at Substantial Completion.
- M. The GC shall clean and provide maintenance on completed construction as frequently as necessary through the remainder of the construction period. The GC shall adjust and lubricate operable components to ensure operability without damaging effects.
- N. Limiting Exposures: The GC shall supervise construction operations to assure that no part of the construction, completed or in progress, is subject to harmful, dangerous, damaging, or otherwise deleterious exposure during the construction period.

3.9 STARTING AND ADJUSTING

- A. If applicable, the GC shall coordinate startup and adjusting of equipment and operating components with requirements in Division 01 Section "General Commissioning Requirements."
- B. If applicable, the GC shall start equipment and operating components to confirm proper operation.
- C. If applicable, the GC shall remove malfunctioning units, replace with new units, and retest.
- D. If applicable, the GC shall adjust equipment for proper operation.
- E. If applicable, the GC shall adjust operating components for proper operation without binding.
- F. If applicable, the GC shall test each piece of equipment to verify proper operation.
- G. If applicable, the GC shall test and adjust controls and safeties.
- H. If applicable, the GC shall replace damaged and malfunctioning controls and equipment.
- I. Manufacturer's Field Service: The GC shall comply with qualification requirements in Division 01 Section "Quality Requirements."

3.10 PROTECTION OF INSTALLED CONSTRUCTION

- A. The GC shall provide final protection and maintain conditions that ensure installed Work is without damage or deterioration at time of Substantial Completion.
- B. If applicable, the GC shall comply with manufacturer's written instructions for temperature and relative humidity.
- C. If applicable, the GC shall protect resilient flooring against mars, marks, indentations, and other damage from construction operations and placement of equipment and fixtures during the remainder of construction period.
 - 1. If applicable, the GC shall provide protection over products installed on floor surfaces with undyed, untreated heavy duty building paper (Ram Board or equal), with min. 3" overlapping joints, taped continuously with min. 4" wide masking tape until inspection for Substantial Completion.
 - 2. If applicable, the GC shall not move heavy and sharp objects directly over floor surfaces.
 - 3. If applicable, the GC shall place plywood or hardboard panels over flooring and under objects while they are being moved.
 - 4. If applicable, the GC shall slide or roll objects over panels without moving protective panels, or damaging protective building paper cover.
- D. If applicable, the GC shall protect roofing materials against cuts, marks, indentations, and other damage from construction operations and placement of equipment and fixtures during the remainder of construction period.
 - 1. If applicable, the GC shall cover roofing products with plywood or suitable protection cover until inspection for Substantial Completion.
 - 2. If applicable, the GC shall not move heavy and sharp objects directly over roof surfaces.
 - 3. If applicable, the GC shall place plywood or hardboard panels over roofing and under objects while they are being moved.
 - 4. If applicable, the GC shall slide or roll objects over panels without moving panels.

3.11 CORRECTION OF THE WORK

- A. The GC shall repair or remove and replace defective construction.
- B. The GC shall restore damaged substrates and finishes.
 - 1. The GC is aware that repairing includes replacing defective parts, refinishing damaged surfaces, touching up with matching materials, and properly adjusting operating equipment.
- C. The GC shall restore permanent facilities used during construction to their specified condition.
- D. The GC shall remove and replace damaged surfaces that are exposed to view if surfaces cannot be repaired without visible evidence of repair.
- E. The GC shall repair components that do not operate properly.

- F. The GC shall remove and replace operating components that cannot be repaired.
- G. If applicable, the GC shall remove and replace chipped, scratched, and broken glass or reflective surfaces.

END OF SECTION

SECTION 017419 - CONSTRUCTION WASTE MANAGEMENT AND DISPOSAL

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 administrative and procedural requirements for the following:
 - 1. Recycling nonhazardous demolition and construction waste.
 - 2. Disposing of nonhazardous demolition and construction waste.
- B. Related Sections include the following:
 - 1. Division 01 Section "Temporary Facilities and Controls" for environmental-protection measures during construction.
 - 2. Division 04 Section "Unit Masonry" for disposal requirements for masonry waste.

1.3 DEFINITIONS

- A. Construction Waste: Building and site improvement materials and other solid waste resulting from construction, remodeling, renovation, or repair operations. Construction waste includes packaging.
- B. Demolition Waste: Building and site improvement materials resulting from demolition or selective demolition operations.
- C. Disposal: Removal off-site of demolition and construction waste and subsequent sale, recycling, reuse, or deposit in landfill or incinerator acceptable to authorities having jurisdiction.
- D. Recycle: Recovery of demolition or construction waste for subsequent processing in preparation for reuse.
- E. Salvage: Recovery of demolition or construction waste and subsequent sale or reuse in another facility.
- F. Salvage and Reuse / Reinstall: Recovery of demolition or construction waste and subsequent incorporation into the Work.

1.4 PERFORMANCE GOALS

- A. Recycle Goals: The Owner's goal is to have the General Contractor salvage and recycle non-hazardous demolition and construction waste. The goal is to recycle or salvage at least 50% (by weight from the total waste stream) construction, demolition, and land clearing waste with an alternative goal of recycling and/or salvaging 75% of that waste. Waste to recycle include the following materials:

1. Demolition Waste: (as applicable to the Project)

- a. Asphaltic concrete paving.
- b. Concrete.
- c. Concrete reinforcing steel.
- d. Brick.
- e. Concrete masonry units.
- f. Wood studs.
- g. Wood joists.
- h. Plywood and oriented strand board.
- i. Wood paneling.
- j. Wood trim.
- k. Structural and miscellaneous steel.
- l. Rough hardware.
- m. Roofing.
- n. Insulation.
- o. Doors and frames.
- p. Door hardware.
- q. Windows.
- r. Glazing.
- s. Metal studs.
- t. Equipment.
- u. Cabinets.
- v. Plumbing fixtures.
- w. Piping.
- x. Supports and hangers.
- y. Valves.
- z. Sprinklers.
- aa. Mechanical equipment.
- bb. Refrigerants.
- cc. Electrical conduit.
- dd. Copper wiring.
- ee. Lighting fixtures.
- ff. Lamps.
- gg. Ballasts.
- hh. Electrical devices.
- ii. Switchgear and panel-boards.
- jj. Transformers.
- kk. Other.

2. Construction Waste:

- a. Site-clearing waste.

- b. Masonry and CMU.
 - c. Lumber.
 - d. Wood sheet materials.
 - e. Wood trim.
 - f. Metals.
 - g. Roofing.
 - h. Insulation.
 - i. Carpet and pad.
 - j. Piping.
 - k. Electrical conduit.
 - l. Packaging: Regardless of salvage/recycle goal indicated above, the GC shall salvage or recycle 100 percent of the following uncontaminated packaging materials:
 - 1) Paper.
 - 2) Cardboard
 - 3) Boxes. (breakdown all cardboard and boxes)
 - 4) Plastic sheet and film.
 - 5) Polystyrene packaging (separate & bag all polystyrene for recycling).
 - 6) Wood crates.
 - 7) Plastic pails.
 - 8) Pallets: have the supplier of equipment on pallets remove them for re-use on future projects.
 - 9) All scrap carpet shall be rolled and recycled.
 - m. Other.
3. The GC shall provide on-site separate roll-off containers for each item listed below:
- 1) Metals.
 - 2) Resilient flooring.
 - 3) Suspended ceiling products.
 - 4) Concrete.
 - 5) Cardboard.
 - 6) Gypsum products.
 - 7) Wood Products.
 - 8) Insulation.
 - 9) Other.
4. Combining the above listed waste containers is acceptable, provided the waste recipient company accepts such waste combinations.
5. The GC shall provide a list of companies and locations where each of these containers shall be transported.

1.5 SUBMITTALS

- A. Statement of Refrigerant Recovery: The GC shall provide written statements, signed by refrigerant recovery technician responsible for recovering refrigerant, stating that all refrigerant that was present was recovered and that recovery was performed according to EPA regulations. The GC shall include name and address of technician and date refrigerant was recovered.

- B. The GC shall submit a Construction Waste Management Plan to the Architect at the beginning of the project indicating the company that will haul each material and where the materials will be hauled.
- C. The GC shall provide Bills of Lading weight slips to Architect indicating where recycled material was sent and maintain a spreadsheet and distribute updated copies to the project team on a monthly basis.

1.6 QUALITY ASSURANCE

- A. Refrigerant Recovery Technician Qualifications: Certified by EPA-approved certification program.
- B. Regulatory Requirements: The GC shall comply with hauling and disposal regulations of authorities having jurisdiction.
- C. Waste Management Conference: the GC shall conduct conference at Project site to comply with requirements in Division 01 Section "Project Management and Coordination." Review methods and procedures related to waste management including, but not limited to, the following:
 - 1. Review and discuss waste management plan including responsibilities of Waste Management Coordinator.
 - 2. Review requirements for documenting quantities of each type of waste and its disposition.
 - 3. Review and finalize procedures for materials separation and verify availability of containers and bins needed to avoid delays.
 - 4. Review procedures for periodic waste collection and transportation to recycling and disposal facilities.
 - 5. Review waste management requirements for each trade.
- D. GC and Sub-Contractor Responsibility: the GC shall ensure that it will be the responsibility of every sub-Contractor on the project to properly dispose of the waste they generate in the appropriate container(s). The GC will monitor the waste sorting procedure to insure that the waste is properly sorted. If a sub-Contractor is not complying with the Waste Management Plan, the GC shall accept responsibility and immediately correct the situation. The GC shall discuss this program and remind sub-contractors of the importance of recycling and sorting waste.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION

3.1 SALVAGING DEMOLITION WASTE

- A. Salvaged Items for Sale and Donation is not permitted on the Project site.

3.2 RECYCLING DEMOLITION AND CONSTRUCTION WASTE, GENERAL

- A. General: The GC shall recycle paper, plastic and beverage containers used by on-site workers.
- B. Recycling Receivers and Processors: List below is provided for information only; available recycling receivers and processors include, but are not limited to, the following:
 - 1. Sandy River Waste, Route 2, Farmington, ME (207-778-3254) will recycle paper, cardboard, cans, bottles, some plastics.
 - 2. Almighty Waste (207-782-4000) and division of ERRCO, Epping NH (603-679-2626). Recycler of construction and demolition without having to separate materials
 - 3. Pike Industries in Augusta, ME (207-782-2411) will recycle asphalt paving.
 - 4. Cousineau Bark & Wood, Wilton, ME will chip clean dimensional lumber (without nails or paint).
 - 5. Boralex, Inc., Livermore Falls, ME will recycle OSB, plywood and particleboard (no pressure treated materials)
 - 6. Grimm Industries, Topsham, ME (207-729-2191) will recycle metals.
 - 7. Cassella Hampden, ME (888-485-1469).
 - 8. Other Recycling Receivers and Processors as proposed by the GC, that meet the specified requirements herein.
- C. Procedures: The GC shall separate recyclable waste from other waste materials, trash, and debris. The GC shall separate recyclable waste by type at Project site to the maximum extent practical.
 - 1. The GC shall provide appropriately marked containers or bins for controlling recyclable waste until they are removed from Project site. The GC shall include list of acceptable and unacceptable materials at each container and bin.
 - a. The GC shall inspect containers and bins for contamination and remove contaminated materials if found.
 - 2. The GC shall stockpile processed materials on-site without intermixing with other materials. Place, grade, and shape stockpiles to drain surface water.
 - 3. The GC shall cover stockpiles to prevent windblown dust.
 - 4. The GC shall stockpile materials away from construction area.
 - 5. The GC shall not store within drip line of remaining trees.
 - 6. The GC shall store components off the ground and protect from the weather.
 - 7. The GC shall remove recyclable waste off Owner's property and transport to recycling receiver or processor.
 - 8. The GC shall provide Bills of Lading weight slips to Architect indicating where recycled material was sent and maintain a spreadsheet and distribute updated copies to the project team on a monthly basis.

3.3 RECYCLING DEMOLITION WASTE

- A. Asphaltic Paving: The GC shall break up and transport existing asphalt paving to an asphalt-recycling facility.

- B. Concrete: The GC shall break up and transport existing concrete as indicated to a concrete-recycling facility.
- C. Masonry: The GC shall remove metal reinforcement, anchors, and ties from masonry and sort with other metals.
 - 1. The GC shall pulverize masonry to maximum 1-1/2-inch size.
 - a. The GC shall crush masonry and screen to comply with requirements in Division 31 Section "Earth Moving" for use as general fill or satisfactory soil for fill or sub-base.
 - 2. The GC shall clean and stack undamaged, whole masonry units on wood pallets.
- D. Wood Materials: The GC shall sort and stack members according to size, type, and length. The GC shall separate lumber, engineered wood products, panel products, and treated wood materials.
- E. Metals: The GC shall separate metals by type.
 - 1. Structural Steel: The GC shall stack members according to size, type of member, and length.
 - 2. The GC shall remove and dispose of bolts, nuts, washers, and other rough hardware.
- F. Asphalt Shingle Roofing: The GC shall separate organic and glass-fiber asphalt shingles and felts. Remove and dispose of nails, staples, and accessories separately.
- G. Equipment: The GC shall drain tanks, piping, and fixtures. Seal openings with caps or plugs. The GC shall protect equipment from exposure to weather.
- H. Plumbing Fixtures: The GC shall separate by type and size.
- I. Piping: The GC shall reduce piping to straight lengths and store by type and size. Separate supports, hangers, valves, sprinklers, and other components by type and size.
- J. Lighting Fixtures: The GC shall separate lamps by type and protect from breakage.
- K. Electrical Devices: The GC shall separate switches, receptacles, switchgear, transformers, meters, panel-boards, circuit breakers, and other devices by type.
- L. Conduit: The GC shall reduce conduit to straight lengths and store by type and size.
- M. Other.

3.4 RECYCLING CONSTRUCTION WASTE

- A. Packaging:
 - 1. Cardboard and Boxes: The GC shall break down packaging into flat sheets. The GC shall bundle and store in a dry location.
 - 2. Polystyrene Packaging: The GC shall separate and bag materials.

3. Pallets: As much as possible, the GC shall require deliveries using pallets to remove pallets from Project site. For pallets that remain on-site, the GC shall break down pallets into component wood pieces and comply with requirements for recycling wood.
 4. Crates: The GC shall Break down crates into component wood pieces and comply with requirements for recycling wood.
- B. Site-Clearing Wastes: The GC shall chip brush, branches, and trees on-site or at landfill facility.
- C. Wood Materials:
1. Clean Cut-Offs of Lumber: The GC shall grind or chip into small pieces.
 2. Clean Sawdust: The GC shall bag sawdust that does not contain painted or treated wood in contractor weight plastic garbage bags, do not overfill.

3.5 DISPOSAL OF WASTE

- A. General: Except for items or materials to be salvaged, recycled, or otherwise reused, the GC shall remove waste materials from Project site/campus and legally dispose of them in a landfill or incinerator acceptable to authorities having jurisdiction.
1. Except as otherwise specified, the GC shall not allow waste materials that are to be disposed of to accumulate on-site.
 2. The GC shall remove and transport debris in a manner that will prevent spillage on adjacent surfaces and areas.
- B. Burning: The GC shall not burn waste materials.
- C. Disposal: The GC shall transport waste materials off Owner's property and legally dispose of them.
- D. The GC is advised that the Owner has determined that all debris resulting from removals performed by the GC and/or his Sub-Contractors must be completely removed from the Owner's property.
- E. It is absolutely prohibited to deposit any removal or construction debris on the Owner's property.

END OF SECTION

SECTION 017700 - CLOSEOUT PROCEDURES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section includes administrative and procedural requirements for contract closeout, including, but not limited to, the following:
 - 1. Substantial Completion procedures.
 - 2. Final completion procedures.
 - 3. Warranties.
 - 4. Final cleaning.
- B. Related Sections:
 - 1. Division 01 Section "Execution" for progress cleaning of Project site.
 - 2. Division 01 Section "Operation and Maintenance Data" for operation and maintenance manual requirements.
 - 3. Division 01 Section "Project Record Documents" for submitting Record Drawings, Record Specifications, and Record Product Data.
 - 4. Division 01 Section "Demonstration and Training" for requirements for instructing Owner's personnel.
 - 5. Divisions 02 through 48 Sections for specific closeout and special cleaning requirements for the Work in those Sections.
 - 6. All Commissioning requirements of related sections of the specifications.

1.3 SUBSTANTIAL COMPLETION

- A. Preliminary Procedures: Before requesting inspection for determining date of Substantial Completion, the General Contractor shall complete the following:
 - 1. The GC shall prepare a list of items to be completed and corrected (punch list), the value of items on the list, and reasons why the Work is not complete.
 - 2. The GC shall advise the Owner of pending insurance changeover requirements.
 - 3. The GC shall submit specific warranties, workmanship bonds, maintenance service agreements, final certifications, and similar documents.
 - 4. The GC shall obtain and submit releases permitting the Owner unrestricted use of the Work and access to services and utilities.
 - 5. The GC shall include occupancy permits, operating certificates, and similar releases.

6. The GC shall prepare and submit Project Record Documents, operation and maintenance manuals, damage or settlement surveys, property surveys, and similar final record information.
7. The GC shall deliver tools, spare parts, extra materials, and similar items to location designated by Owner. The GC shall label with manufacturer's name and model number where applicable.
8. The GC shall make final changeover of permanent locks and deliver keys to the Owner.
9. The GC shall advise Owner's personnel of changeover in security provisions.
10. The GC shall complete startup testing of systems.
11. The GC shall submit test/adjust/balance records.
12. The GC shall terminate and remove temporary facilities from Project site, along with mockups, construction tools, and similar elements.
13. The GC shall advise Owner of changeover in heat and other utilities.
14. The GC shall submit changeover information related to Owner's occupancy, use, operation, and maintenance.
15. The GC shall complete final cleaning requirements, including touchup painting.
16. The GC shall touch up and otherwise repair and restore marred exposed finishes to eliminate visual defects.

B. Inspection: The GC shall submit a written request for inspection for Substantial Completion. On receipt of request, the Architect will either proceed with inspection or notify Contractor of unfulfilled requirements. The Architect will prepare the Certificate of Substantial Completion after successful inspection or will notify the GC of items, either on the GC's list or additional items identified by the Architect, that must be completed or corrected before certificate will be issued.

1. Re-inspection: The GC shall request re-inspection when the Work identified in previous inspections as incomplete is completed or corrected.
2. Results of completed inspection will form the basis of requirements for final completion.

1.4 FINAL COMPLETION

A. Preliminary Procedures: Before requesting final inspection for determining final completion, the GC shall complete the following:

1. The GC shall submit a final Application for Payment according to Division 01 Section "Payment Procedures."
2. The GC shall submit certified copy of Architect's Substantial Completion inspection list of items to be completed or corrected (punch list), endorsed and dated by the Architect. The certified copy of the list shall state that each item has been completed or otherwise resolved for acceptance.
3. The GC shall submit evidence of final, continuing insurance coverage complying with insurance requirements.
4. The GC shall instruct Owner's personnel in operation, adjustment, and maintenance of products, equipment, and systems. The GC shall submit demonstration and training video recordings.

B. Inspection: The GC shall submit a written request for final inspection for acceptance. On receipt of request, the Architect will either proceed with inspection or notify GC of unfulfilled requirements. The Architect will process a final Certificate for Payment after inspection or will

notify the GC of construction that must be completed or corrected before said certificate will be issued.

1. Re-inspection: The GC shall request re-inspection when the Work identified in previous inspections as incomplete is completed or corrected.

1.5 LIST OF INCOMPLETE ITEMS (PUNCH LIST)

- A. Organization of List: The GC shall include name and identification of each space and area affected by construction operations for incomplete items and items needing correction including, if necessary, areas disturbed by the GC that are outside the limits of construction.
 1. The GC shall organize list of spaces in sequential order, starting with exterior areas first and proceeding from lowest floor to highest floor.
 2. The GC shall organize items applying to each space by major element, including categories for ceiling, individual walls, floors, equipment, and building systems.
 3. The GC shall include the following information at the top of each page:
 - a. Project name.
 - b. Date.
 - c. Name of the Architect.
 - d. Name of the GC.
 - e. Name of the GC's sub-Contractor(s).
 - f. Page number.
 4. The GC shall submit list of incomplete items in the following format:
 - a. Electronic copies, unless otherwise indicated.

1.6 WARRANTIES

- A. Submittal Time: The GC shall submit written warranties on request of the Architect for designated portions of the Work where commencement of warranties other than date of Substantial Completion is indicated.
- B. Partial Occupancy: The GC shall submit properly executed warranties within 15 days of completion of designated portions of the Work that are completed and occupied or used by the Owner during construction period by separate agreement with the GC.
- C. The GC shall organize warranty documents into an orderly sequence based on the table of contents of the Project Manual.
 1. The GC shall bind original warranties and bonds in heavy-duty, three-ring, vinyl-covered, loose-leaf binders, thickness as necessary to accommodate contents, and sized to receive 8-1/2-by-11-inch paper.
 2. The GC shall provide heavy paper dividers with plastic-covered tabs for each separate warranty.
 3. The GC shall mark tabs to identify the product or installation.

4. The GC shall provide a typed description of the product or installation, including the name of the product and the name, address, and telephone number of Installer.
 5. The GC shall identify each binder on the front and spine with the typed or printed title "WARRANTIES," Project name, and name of the GC.
 6. The GC shall scan warranties and bonds and assemble complete warranty and bond submittal package into a single indexed electronic .pdf file with links enabling navigation to each item. The GC shall provide two (2) thumb-drives containing all scanned items.
 7. The GC shall provide table of contents at beginning of document.
- D. The GC shall provide additional copies of each warranty to include in operation and maintenance manuals.

PART 2 - PRODUCTS

2.1 MATERIALS

- A. Cleaning Agents: The GC shall use cleaning materials and agents recommended by manufacturer or fabricator of the surface to be cleaned. The GC shall not use cleaning agents that are potentially hazardous to health or property or that might damage finished surfaces.
1. The GC shall use cleaning products that meet Green Seal GS-37, or if GS-37 is not applicable, use products that comply with the California Code of Regulations maximum allowable VOC levels.

PART 3 - EXECUTION

3.1 FINAL CLEANING

- A. General: The GC shall perform final cleaning. The GC shall conduct cleaning and waste-removal operations to comply with local laws and ordinances and Federal and local environmental and antipollution regulations.
- B. Cleaning: The GC shall employ experienced workers or professional cleaners for final cleaning. The GC shall clean each surface or unit to condition expected in an average commercial building cleaning and maintenance program. The GC shall comply with manufacturer's written instructions.
1. The GC shall complete the following cleaning operations before requesting inspection for certification of Substantial Completion for entire Project or for a portion of Project:
 - a. The GC shall clean Project site, yard, and grounds, in areas disturbed by construction activities, including landscape development areas, of rubbish, waste material, litter, and other foreign substances.
 - b. The GC shall sweep paved areas broom clean. The GC shall remove petrochemical spills, stains, and other foreign deposits.
 - c. The GC shall rake grounds that are neither planted nor paved to a smooth, even-textured surface.

- d. The GC shall remove tools, construction equipment, machinery, and surplus material from Project site.
- e. The GC shall remove snow and ice to provide safe access to building.
- f. The GC shall clean exposed exterior and interior hard-surfaced finishes to a dirt-free condition, free of stains, films, and similar foreign substances. The GC shall avoid disturbing natural weathering of exterior surfaces. The GC shall restore reflective surfaces to their original condition.
- g. The GC shall remove debris and surface dust from limited access spaces, including roofs, plenums, shafts, trenches, equipment vaults, manholes, attics, and similar spaces.
- h. The GC shall sweep concrete floors broom clean in unoccupied spaces.
- i. The GC shall vacuum carpet and similar soft surfaces, removing debris and excess nap; shampoo if visible soil or stains remain.
- j. The GC shall clean transparent materials, including mirrors and glass in doors and windows. The GC shall remove glazing compounds and other noticeable, vision-obscuring materials. The GC shall replace chipped or broken glass and other damaged transparent materials. The GC shall polish mirrors and glass, taking care not to scratch surfaces.
- k. The GC shall remove labels that are not permanent.
- l. The GC shall touch up and otherwise repair and restore marred, exposed finishes and surfaces. The GC shall replace finishes and surfaces that cannot be satisfactorily repaired or restored or that already show evidence of repair or restoration.
 - 1) The GC shall not paint over "UL" and other required labels and identification, including mechanical and electrical nameplates.
- m. The GC shall wipe surfaces of mechanical and electrical equipment, elevator equipment, and similar equipment. The GC shall remove excess lubrication, paint and mortar droppings, and other foreign substances.
- n. The GC shall replace parts subject to operating conditions during construction that may impede operation or reduce longevity.
- o. The GC shall clean plumbing fixtures to a sanitary condition, free of stains, including stains resulting from water exposure.
- p. The GC shall replace disposable air filters and clean permanent air filters. The GC shall clean exposed surfaces of diffusers, registers, and grills.
- q. The GC shall clean ducts, blowers, and coils if units were operated without filters during construction or that display contamination with particulate matter upon inspection.
 - 1) The GC shall clean HVAC system in compliance with NADCA Standard 1992-01. Provide written report upon completion of cleaning.
- r. The GC shall clean light fixtures, lamps, globes, and reflectors to function with full efficiency. The GC shall replace burned-out bulbs, and those noticeably dimmed by hours of use, and defective and noisy starters in fluorescent and mercury vapor fixtures to comply with requirements for new fixtures.
- s. The GC shall leave Project clean and ready for occupancy.

C. Construction Waste Disposal: The GC shall comply with waste disposal requirements in Division 01 Section "Construction Waste Management and Disposal."

END OF SECTION

SECTION 017823 - OPERATION AND MAINTENANCE DATA

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. If applicable, this Section includes administrative and procedural requirements for preparing operation and maintenance manuals, including the following:
 - 1. Operation and maintenance documentation directory.
 - 2. Operation manuals for systems, subsystems, and equipment.
 - 3. Maintenance manuals for the care and maintenance of products, materials, and finishes, systems and equipment.
- B. Related Sections include the following:
 - 1. Division 01 Section "Submittal Procedures" for submitting copies of submittals for operation and maintenance manuals.
 - 2. Division 01 Section "Closeout Procedures" for submitting operation and maintenance manuals.
 - 3. Division 01 Section "Project Record Documents" for preparing Record Drawings for operation and maintenance manuals.
 - 4. Divisions 02 through 48 Sections for specific operation and maintenance manual requirements for the Work in those Sections.

1.3 DEFINITIONS

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

1.4 SUBMITTALS

- A. Initial Submittal: The General Contractor shall submit two (2) draft copies of each manual at least fifteen (15) days before requesting inspection for Substantial Completion for general scope, format & content review. The GC shall include a complete operation and maintenance directory. The Architect will return one copy of draft and mark whether general scope, format & content of manual are acceptable within five (5) days.

- B. Final Submittal: Based on the Architect's initial submittal review and comments, The GC shall complete and submit one copy of each manual in final form at least fifteen (15) days before final inspection. The Architect will review the manual for completeness, denote and return the copy with final comments within fifteen (15) days after final inspection.
 - 1. The GC shall then correct or modify each manual to comply with Architect's comments.
 - 2. The GC shall submit 3 copies of each corrected manual within fifteen (15) days of receipt of the Architect's comments.

1.5 COORDINATION

- A. Where operation and maintenance documentation includes information on installations by more than one factory-authorized service representative, the GC shall assemble and coordinate information furnished by representatives and prepare manuals.

PART 2 - PRODUCTS

2.1 OPERATION AND MAINTENANCE DOCUMENTATION DIRECTORY

- A. Organization: The GC shall include a section in the directory for each of the following:
 - 1. List of documents.
 - 2. List of systems.
 - 3. List of equipment.
 - 4. Table of contents.
- B. List of Systems and Subsystems: The GC shall list systems alphabetically. The GC shall include references to operation and maintenance manuals that contain information about each system.
- C. List of Equipment: The GC shall list equipment for each system, organized alphabetically by system. For pieces of equipment not part of system, the GC shall list alphabetically in separate list.
- D. Tables of Contents: The GC shall include a table of contents for each emergency, operation, and maintenance manual.
- E. Identification: In the documentation directory and in each operation and maintenance manual, the GC shall identify each system, subsystem, and piece of equipment with same designation used in the Contract Documents. If no designation exists, the GC shall assign a designation according to ASHRAE Guideline 4, "Preparation of Operating and Maintenance Documentation for Building Systems."

2.2 MANUALS, GENERAL

- A. Organization: Unless otherwise indicated, the GC shall organize each manual into a separate section for each system and subsystem, and a separate section for each piece of equipment not

part of a system. The GC shall insure that each manual shall contain the following materials, in the order listed:

1. Title page.
 2. Table of contents.
 3. Manual contents.
- B. Title Page: The GC shall enclose title page in transparent plastic sleeve. Include the following information:
1. Subject matter included in manual.
 2. Name and address of the Project.
 3. Name and address of the Owner.
 4. Date of submittal.
 5. Name, address, and telephone number of the GC.
 6. Name, address, and telephone number of the sub-Contractor.
 7. Name and address of the Architect.
 8. Cross-reference to related systems in other operation and maintenance manuals.
- C. Table of Contents: The GC shall list each product included in manual, identified by product name, indexed to the content of the volume, and cross-referenced to Specification Section number in Project Manual.
1. If operation or maintenance documentation requires more than one volume to accommodate data, the GC shall include comprehensive table of contents for all volumes in each volume of the set.
- D. Manual Contents: The GC shall organize into sets of manageable size. The GC shall arrange contents alphabetically by system, subsystem, and equipment. If possible, the GC shall assemble instructions for subsystems, equipment, and components of one system into a single binder.
1. Binders: The GC shall use heavy-duty, 3-ring, vinyl-covered, loose-leaf binders, in thickness necessary to accommodate contents, sized to hold 8-1/2-by-11-inch paper; with clear plastic sleeve on spine to hold label describing contents and with pockets inside covers to hold folded oversize sheets.
 - a. If two or more binders are necessary to accommodate data of a system, the GC shall organize data in each binder into groupings by subsystem and related components.
 - b. The GC shall cross-reference other binders if necessary to provide essential information for proper operation or maintenance of equipment or system.
 - c. The GC shall identify each binder on front and spine, with printed title "OPERATION AND MAINTENANCE MANUAL," Project title or name, and subject matter of contents.
 - d. The GC shall indicate volume number for multiple-volume sets.
 2. Dividers: The GC shall use heavy-paper dividers with plastic-covered tabs for each section. The GC shall mark each tab to indicate contents. The GC shall include typed list of products and major components of equipment included in the section on each divider, cross-referenced to Specification Section number and title of Project Manual.

3. Protective Plastic Sleeves: The GC shall use transparent plastic sleeves designed to enclose diagnostic software diskettes for computerized electronic equipment.
4. Supplementary Text: The GC shall prepare supplementary information on 8-1/2-by-11-inch white bond paper.
5. Drawings: The GC shall attach reinforced, punched binder tabs on drawings and bind with text.
 - a. If oversize drawings are necessary, the GC shall fold drawings to same size as text pages and use as foldouts.
 - b. If drawings are too large to be used as foldouts, the GC shall fold and place drawings in labeled envelopes and bind envelopes in rear of manual. At appropriate locations in manual, the GC shall insert typewritten pages indicating drawing titles, descriptions of contents, and drawing locations.

2.3 OPERATION MANUALS

- A. Content: In addition to requirements in this Section, the GC shall include operation data required in individual Specification Sections and the following information:
 1. System, subsystem, and equipment descriptions.
 2. Performance and design criteria if Contractor is delegated design responsibility.
 3. Operating standards.
 4. Operating procedures.
 5. Operating logs.
 6. Wiring diagrams.
 7. Control diagrams.
 8. Piped system diagrams.
 9. Precautions against improper use.
 10. License requirements including inspection and renewal dates.
- B. Descriptions: The GC shall include the following:
 1. Product name and model number.
 2. Manufacturer's name.
 3. Equipment identification with serial number of each component.
 4. Equipment function.
 5. Operating characteristics.
 6. Limiting conditions.
 7. Performance curves.
 8. Engineering data and tests.
 9. Complete nomenclature and number of replacement parts.
- C. Operating Procedures: The GC shall include the following, as applicable:
 1. Startup procedures.
 2. Equipment or system break-in procedures.
 3. Routine and normal operating instructions.
 4. Regulation and control procedures.
 5. Instructions on stopping.
 6. Normal shutdown instructions.

7. Seasonal and weekend operating instructions.
 8. Required sequences for electric or electronic systems.
 9. Special operating instructions and procedures.
- D. Systems and Equipment Controls: The GC shall describe the sequence of operation, and diagram controls as installed.
- E. Piped Systems: The GC shall diagram piping as installed, and identify color-coding where required for identification.

2.4 PRODUCT MAINTENANCE MANUAL

- A. Content: The GC shall organize manual into a separate section for each product, material, and finish. The GC shall include source information, product information, maintenance procedures, repair materials and sources, and warranties and bonds, as described below.
- B. Source Information: The GC shall list each product included in manual, identified by product name and arranged to match manual's table of contents. For each product, the GC shall list name, address, and telephone number of Installer or supplier and maintenance service agent, and cross-reference Specification Section number and title in Project Manual.
- C. Product Information: The GC shall include the following, as applicable:
1. Product name and model number.
 2. Manufacturer's name.
 3. Color, pattern, and texture.
 4. Material and chemical composition.
 5. Reordering information for specially manufactured products.
- D. Maintenance Procedures: The GC shall include manufacturer's written recommendations and the following:
1. Inspection procedures.
 2. Types of cleaning agents to be used and methods of cleaning.
 3. List of cleaning agents and methods of cleaning detrimental to product.
 4. Schedule for routine cleaning and maintenance.
 5. Repair instructions.
- E. Repair Materials and Sources: The GC shall include lists of materials and local sources of materials and related services.
- F. Warranties and Bonds: The GC shall include copies of warranties and bonds and lists of circumstances and conditions that would affect validity of warranties or bonds.
1. The GC shall include procedures to follow and required notifications for warranty claims.

2.5 SYSTEMS AND EQUIPMENT MAINTENANCE MANUAL

- A. Content: For each system, subsystem, and piece of equipment not part of a system, the GC shall include source information, manufacturers' maintenance documentation, maintenance

procedures, maintenance and service schedules, spare parts list and source information, maintenance service contracts, and warranty and bond information, as described below.

- B. Source Information: The GC shall list each system, subsystem, and piece of equipment included in manual, identified by product name and arranged to match manual's table of contents. For each product, the GC shall list name, address, and telephone number of Installer or supplier and maintenance service agent, and cross-reference Specification Section number and title in Project Manual.
- C. Manufacturers' Maintenance Documentation: The GC shall provide the Manufacturers' maintenance documentation including the following information for each component part or piece of equipment:
 - 1. Standard printed maintenance instructions and bulletins.
 - 2. Drawings, diagrams, and instructions required for maintenance, including disassembly and component removal, replacement, and assembly.
 - 3. Identification and nomenclature of parts and components.
 - 4. List of items recommended to be stocked as spare parts.
- D. Maintenance Procedures: The GC shall include the following information and items that detail essential maintenance procedures:
 - 1. Test and inspection instructions.
 - 2. Troubleshooting guide.
 - 3. Precautions against improper maintenance.
 - 4. Disassembly; component removal, repair, and replacement; and reassembly instructions.
 - 5. Aligning, adjusting, and checking instructions.
 - 6. Demonstration and training videotape, if available.
- E. Maintenance and Service Schedules: The GC shall include service and lubrication requirements, list of required lubricants for equipment, and separate schedules for preventive and routine maintenance and service with standard time allotment.
 - 1. Scheduled Maintenance and Service: The GC shall tabulate actions for daily, weekly, monthly, quarterly, semiannual, and annual frequencies.
 - 2. Maintenance and Service Record: The GC shall include manufacturers' forms for recording maintenance.
- F. Spare Parts List and Source Information: The GC shall include lists of replacement and repair parts, with parts identified and cross-referenced to manufacturers' maintenance documentation and local sources of maintenance materials and related services.
- G. Maintenance Service Contracts: The GC shall include copies of maintenance agreements with name and telephone number of service agent.
- H. Warranties and Bonds: The GC shall include copies of warranties and bonds and lists of circumstances and conditions that would affect validity of warranties or bonds.
 - 1. The GC shall include procedures to follow and required notifications for warranty claims.

PART 3 - EXECUTION

3.1 MANUAL PREPARATION

- A. The GC shall submit Operation and Maintenance manual for all items in all divisions 02 through 48 including but not limited to product information and maintenance of the following items (as applicable): flooring materials, wall finishes, windows, doors, curtain wall, hardware, fixed and moveable furniture, the architect's interior and exterior color scheme, keying schedule, sprinkler system, coil and overhead doors, roofing, solar tubes, bleachers, divider walls, operable partitions, lockers, handicapped lift, elevator, plumbing heating ventilating and air conditioning equipment, all electrical and technology equipment.
- B. Operation and Maintenance Documentation Directory: The GC shall prepare a separate manual that provides an organized reference to emergency, operation, and maintenance manuals.
- C. Product Maintenance Manual: The GC shall assemble a complete set of maintenance data indicating care and maintenance of each product, material, and finish incorporated into the Work.
- D. Operation and Maintenance Manuals: The GC shall assemble a complete set of operation and maintenance data indicating operation and maintenance of each system, subsystem, and piece of equipment not part of a system.
 - 1. The GC shall engage a factory-authorized service representative to assemble and prepare information for each system, subsystem, and piece of equipment not part of a system.
 - 2. The GC shall prepare a separate manual for each system and subsystem, in the form of an instructional manual for use by Owner's operating personnel.
- E. Manufacturers' Data: Where manuals contain manufacturers' standard printed data, the GC shall include only sheets pertinent to product or component installed. The GC shall mark each sheet to identify each product or component incorporated into the Work. If data include more than one item in a tabular format, the GC shall identify each item using appropriate references from the Contract Documents. The GC shall identify data applicable to the Work and delete references to information not applicable.
 - 1. The GC shall prepare supplementary text if manufacturers' standard printed data are not available and where the information is necessary for proper operation and maintenance of equipment or systems.
- F. Drawings: The GC shall prepare drawings supplementing manufacturers' printed data to illustrate the relationship of component parts of equipment and systems and to illustrate control sequence and flow diagrams. The GC shall coordinate these drawings with information contained in Record Drawings to ensure correct illustration of completed installation.
 - 1. The GC shall not use original Project Record Documents as part of operation and maintenance manuals.
 - 2. The GC shall comply with requirements of newly prepared Record Drawings in Division 01 Section "Project Record Documents."

- G. The GC shall comply with Division 01 Section "Closeout Procedures" for schedule for submitting operation and maintenance documentation.

END OF SECTION

SECTION 017839 - PROJECT RECORD DOCUMENTS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. This Section includes administrative and procedural requirements for Project Record Documents, including the following:
 - 1. Record Drawings.
 - 2. Record Specifications.
 - 3. Record Product Data.
- B. Related Sections include the following:
 - 1. Division 01 Section "Closeout Procedures" for general closeout procedures.
 - 2. Division 01 Section "Operation and Maintenance Data" for operation and maintenance manual requirements.
 - 3. Divisions 02 through 48 Sections for specific requirements for Project Record Documents of the Work in those Sections.

1.3 SUBMITTALS

- A. Record Drawings: The General Contractor shall comply with the following:
 - 1. General: The GC shall update and maintain one complete set of record drawings in the GC's field office on a weekly basis. The GC shall neatly record any and all changes to the design, discovered existing conditions, alternate routing of piping, or other pertinent information using red pencil. The Owner and the Architect may inspect this record drawing set at any time during the construction period.
 - 2. The GC may elect to use electronic set of record drawings in .pdf format, with red records of changes, etc.. In this instance the GC shall ensure that this electronic set is backed up daily to avoid potential data loss.
 - 3. Number of Copies: The GC shall submit one (1) set of marked-up Record Prints within fifteen (15) days after successful substantial completion.
- B. Record Specifications: The GC shall submit one copy of Project's Specifications, including addenda and contract modifications.
- C. Record Product Data: The GC shall submit one copy of each Product Data submittal.

1. Where Record Product Data is required as part of operation and maintenance manuals, The GC shall submit marked-up Product Data as an insert in manual instead of submittal as Record Product Data.

PART 2 - PRODUCTS

2.1 RECORD DRAWINGS

- A. Record Prints: The GC shall maintain one set of blue- or black-line white prints of the Contract Drawings and Shop Drawings.
 1. Preparation: The GC shall mark Record Prints to show the actual installation where installation varies from that shown originally. The GC shall require individual or entity who obtained record data, whether individual or entity is Installer, sub-Contractor, or similar entity, to prepare the marked-up Record Prints.
 - a. The GC shall give particular attention to information on concealed elements that would be difficult to identify or measure and record later.
 - b. The GC shall accurately record information in an understandable drawing technique.
 - c. The GC shall record data as soon as possible after obtaining it.
 - d. The GC shall record and check the markup before enclosing concealed installations.
 2. Content: Types of items requiring the GC to mark include, but are not limited to, the following:
 - a. Dimensional changes to Drawings.
 - b. Revisions to details shown on Drawings.
 - c. Depths of foundations below first floor.
 - d. Locations and depths of underground utilities.
 - e. Revisions to routing of piping and conduits.
 - f. Revisions to electrical circuitry.
 - g. Actual equipment locations.
 - h. Duct size and routing.
 - i. Locations of concealed internal utilities.
 - j. Changes made by Change Order.
 - k. Changes made following Architect's written orders.
 - l. Details not on the original Contract Drawings.
 - m. Field records for variable and concealed conditions.
 - n. Record information on the Work that is shown only schematically.
 3. The GC shall mark the Contract Drawings or Shop Drawings, whichever is most capable of showing actual physical conditions, completely and accurately. If Shop Drawings are marked, the GC shall show cross-reference on the Contract Drawings.
 4. The GC shall mark record sets with erasable, red-colored pencil.
 5. The GC shall use other colors to distinguish between changes for different categories of the Work at same location.

6. The GC shall mark important additional information that was either shown schematically or omitted from original Drawings.
 7. The GC shall note Construction Change Directive numbers, alternate numbers, Change Order numbers, and similar identification, where applicable.
- B. Format: The GC shall identify and date each Record Drawing; include the designation "PROJECT RECORD DRAWING" in a prominent location.
1. Record Prints: The GC shall organize Record Prints and newly prepared Record Drawings into manageable sets.
 2. The GC shall bind each set with durable paper cover sheets.
 3. The GC shall include identification on cover sheets.
 4. Identification: As follows:
 - a. Project name.
 - b. Date.
 - c. Designation "PROJECT RECORD DRAWINGS."
 - d. Name of Architect.
 - e. Name of Contractor.

2.2 RECORD SPECIFICATIONS

- A. Preparation: The GC shall mark Specifications to indicate the actual product installation where installation varies from that indicated in Specifications, addenda, and contract modifications.
1. The GC shall give particular attention to information on concealed products and installations that cannot be readily identified and recorded later.
 2. The GC shall mark copy with the proprietary name and model number of products, materials, and equipment furnished, including substitutions and product options selected.
 3. The GC shall record the name of manufacturer, supplier, Installer, and other information necessary to provide a record of selections made.
 4. The GC shall for each principal product, indicate whether Record Product Data has been submitted in operation and maintenance manuals instead of submitted as Record Product Data.
 5. The GC shall note related Change Orders, Record Product Data, and Record Drawings where applicable.

2.3 RECORD PRODUCT DATA

- A. Preparation: The GC shall mark Product Data to indicate the actual product installation where installation varies substantially from that indicated in Product Data submittal.
1. The GC shall give particular attention to information on concealed products and installations that cannot be readily identified and recorded later.
 2. The GC shall include significant changes in the product delivered to Project site and changes in manufacturer's written instructions for installation.
 3. The GC shall note related Change Orders, Record Specifications, and Record Drawings where applicable.

2.4 MISCELLANEOUS RECORD SUBMITTALS

- A. The GC shall assemble miscellaneous records required by other Specification Sections for miscellaneous record keeping and submittal in connection with actual performance of the Work.
- B. The GC shall bind or file miscellaneous records and identify each, ready for continued use and reference.

PART 3 - EXECUTION

3.1 RECORDING AND MAINTENANCE

- A. Recording: The GC shall maintain one copy of each submittal during the construction period for Project Record Document purposes.
- B. The GC shall post changes and modifications to Project Record Documents as they occur; do not wait until the end of Project.
- C. Maintenance of Record Documents and Samples: The GC shall store Record Documents and Samples in the field office apart from the Contract Documents used for construction.
- D. The GC shall not use Project Record Documents for construction purposes.
- E. The GC shall maintain Record Documents in good order and in a clean, dry, legible condition, protected from deterioration and loss.
- F. The GC shall provide access to Project Record Documents for the Owner's and the Architect's reference during normal working hours.

END OF SECTION

SECTION 017900 - DEMONSTRATION AND TRAINING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. This Section includes administrative and procedural requirements for instructing Owner's personnel, including the following:
 - 1. Demonstration of operation of systems, subsystems, and equipment.
 - 2. Training in operation and maintenance of systems, subsystems, and equipment.
 - 3. Demonstration and training DVD's.
- B. Related Sections include the following:
 - 1. Division 01 Section "Project Management and Coordination" for requirements for pre-instruction conferences.
 - 2. Divisions 02 through 48 Sections for specific requirements for demonstration and training for products in those Sections.

1.3 SUBMITTALS

- A. Instruction Program: The General Contractor shall submit two copies of outline of instructional program for demonstration and training, including a schedule of proposed dates, times, length of instruction time, and instructors' names for each training module. The GC shall include learning objective and outline for each training module.
 - 1. At completion of training, submit one complete training manual for Owner's use for each training module.
- B. Attendance Record: For each training module, the GC shall submit list of participants and length of instruction time.
- C. Evaluations: For each participant and for each training module, the GC shall submit results and documentation of performance-based test.
- D. Demonstration and Training DVD's: the GC shall submit two copies within seven days of end of each training module.
 - 1. Identification: On each copy, the GC shall provide an applied label with the following information:

- a. Name of Project.
 - b. Name and address of photographer.
 - c. Name of Architect.
 - d. Name of Contractor.
 - e. Date DVD was recorded.
 - f. Description of vantage point, indicating location, direction (by compass point), and elevation or story of construction.
2. Transcript: The GC shall prepare transcripts on 8-1/2-by-11-inch paper, punched and bound in heavy-duty, 3-ring, vinyl-covered binders. The GC shall mark appropriate identification on front and spine of each binder. The GC shall include a cover sheet with same label information as the corresponding DVD. The GC shall include name of Project and date of DVD on each page.

1.4 QUALITY ASSURANCE

- A. Instructor Qualifications: A factory-authorized service representative, complying with requirements in Division 01 Section "Quality Requirements," experienced in operation and maintenance procedures and training.
- B. Photographer Qualifications: A professional photographer/videographer who is experienced photographing construction projects.
- C. Pre-instruction Conference: The GC shall conduct conference at Project site to comply with requirements in Division 01 Section "Project Management and Coordination." Review methods and procedures related to demonstration and training including, but not limited to, the following:
 - 1. Inspect and discuss locations and other facilities required for instruction.
 - 2. Review and finalize instruction schedule and verify availability of educational materials, instructors' personnel, audiovisual equipment, and facilities needed to avoid delays.
 - 3. Review required content of instruction.
 - 4. For instruction that must occur outside, review weather and forecasted weather conditions and procedures to follow if conditions are unfavorable.

1.5 COORDINATION

- A. Coordinate instruction schedule with Owner's operations. The GC shall adjust the schedule as required to minimize disrupting Owner's operations.
- B. The GC shall coordinate instructors, including providing notification of dates, times, length of instruction time, and course content.
- C. The GC shall coordinate content of training modules with content of approved emergency, operation, and maintenance manuals. The GC shall not submit instruction program until operation and maintenance data has been reviewed and approved by the Architect.

PART 2 - PRODUCTS

2.1 INSTRUCTION PROGRAM

- A. Program Structure: The GC shall develop an instruction program that includes individual training modules for each system and equipment not part of a system, as required by individual Specification Sections (as applicable to the Project), and as follows:
1. Motorized doors, including overhead coiling doors and overhead coiling grilles.
 2. Equipment, including stage equipment, projection screens, food-service equipment, residential appliances.
 3. Fire-protection systems, including fire alarm fire pumps and fire-extinguishing systems.
 4. Intrusion detection systems.
 5. Conveying systems, including elevators.
 6. Kitchen equipment, including kitchen gas equipment and piping.
 7. Heat generation, including boilers pumps and water distribution piping.
 8. Refrigeration systems, including condensers, pumps and distribution piping.
 9. HVAC systems, including air-handling equipment, air distribution systems and terminal equipment and devices.
 10. HVAC instrumentation and controls.
 11. Electrical service and distribution, including transformers, switchboards, panelboards and motor controls.
 12. Packaged engine generators, including transfer switches.
 13. Lighting equipment and controls.
 14. Communication systems, including intercommunication, surveillance, clocks and programming, voice and data and television equipment.
- B. Training Modules: The GC shall develop a learning objective and teaching outline for each module. The GC shall include a description of specific skills and knowledge that participant is expected to master. For each module, include instruction for the following:
1. Basis of System Design, Operational Requirements, and Criteria: The GC shall include the following:
 - a. System, subsystem, and equipment descriptions.
 - b. Performance and design criteria if Contractor is delegated design responsibility.
 - c. Operating standards.
 - d. Regulatory requirements.
 - e. Equipment function.
 - f. Operating characteristics.
 - g. Limiting conditions.
 - h. Performance curves.
 2. Documentation: The GC shall review the following items in detail:
 - a. Emergency manuals.
 - b. Operations manuals.
 - c. Maintenance manuals.
 - d. Project Record Documents.
 - e. Identification systems.

- f. Warranties and bonds.
 - g. Maintenance service agreements and similar continuing commitments.
- 3. Emergencies: The GC shall include the following, as applicable:
 - a. Instructions on meaning of warnings, trouble indications, and error messages.
 - b. Instructions on stopping.
 - c. Shutdown instructions for each type of emergency.
 - d. Operating instructions for conditions outside of normal operating limits.
 - e. Sequences for electric or electronic systems.
 - f. Special operating instructions and procedures.
- 4. Operations: The GC shall include the following, as applicable:
 - a. Startup procedures.
 - b. Equipment or system break-in procedures.
 - c. Routine and normal operating instructions.
 - d. Regulation and control procedures.
 - e. Control sequences.
 - f. Safety procedures.
 - g. Instructions on stopping.
 - h. Normal shutdown instructions.
 - i. Operating procedures for emergencies.
 - j. Operating procedures for system, subsystem, or equipment failure.
 - k. Seasonal and weekend operating instructions.
 - l. Required sequences for electric or electronic systems.
 - m. Special operating instructions and procedures.
- 5. Adjustments: The GC shall include the following:
 - a. Alignments.
 - b. Checking adjustments.
 - c. Noise and vibration adjustments.
 - d. Economy and efficiency adjustments.
- 6. Troubleshooting: The GC shall include the following:
 - a. Diagnostic instructions.
 - b. Test and inspection procedures.
- 7. Maintenance: The GC shall include the following:
 - a. Inspection procedures.
 - b. Types of cleaning agents to be used and methods of cleaning.
 - c. List of cleaning agents and methods of cleaning detrimental to product.
 - d. Procedures for routine cleaning
 - e. Procedures for preventive maintenance.
 - f. Procedures for routine maintenance.
 - g. Instruction on use of special tools.
- 8. Repairs: The GC shall include the following:

- a. Diagnosis instructions.
- b. Repair instructions.
- c. Disassembly; component removal, repair, and replacement; and reassembly instructions.
- d. Instructions for identifying parts and components.
- e. Review of spare parts needed for operation and maintenance.

PART 3 - EXECUTION

3.1 PREPARATION

- A. The GC shall assemble educational materials necessary for instruction, including documentation and training module. Assemble training modules into a combined training manual.
- B. The GC shall set up instructional equipment at instruction location.

3.2 INSTRUCTION

- A. Facilitator: The GC shall engage a qualified facilitator to prepare instruction program and training modules, to coordinate instructors, and to coordinate between the GC and the Owner for number of participants, instruction times, and location.
- B. The GC shall engage qualified instructors to instruct Owner's personnel to adjust, operate, and maintain systems, subsystems, and equipment not part of a system.
 - 1. The Architect will furnish an instructor to describe basis of system design, operational requirements, criteria, and regulatory requirements.
 - 2. The Owner will furnish an instructor to describe the Owner's operational philosophy.
 - 3. The Owner will furnish the GC with names and positions of participants.
- C. Scheduling: The GC shall provide instruction at mutually agreed on times. For equipment that requires seasonal operation, the GC shall provide similar instruction at start of each season.
 - 1. The GC shall schedule training with the Owner, through the Architect, with at least seven days' advance notice.
- D. Evaluation: At conclusion of each training module, the GC shall assess and document each participant's mastery of module by use of an oral, written, or a demonstration performance-based test.
- E. Cleanup: The GC shall collect used and leftover educational materials and remove from Project site. Remove instructional equipment. The GC shall restore systems and equipment to condition existing before initial training use.

3.3 DEMONSTRATION AND TRAINING DVD'S

- A. General: The GC shall engage a qualified commercial photographer to record demonstration and training videotapes. The GC shall record each training module separately. The GC shall

include classroom instructions and demonstrations, board diagrams, and other visual aids, but not student practice. Videotaped material shall be transferred to DVD by the GC.

1. At beginning of each training module, The GC shall record each chart containing learning objective and lesson outline.
- B. DVD Format: The GC shall provide standard 12 mm DVD.
 - C. Recording: The GC shall mount camera on tripod before starting recording, unless otherwise necessary to show area of demonstration and training, including display of continuous running time.
 - D. Narration: The GC shall describe scenes on DVD by audio narration by microphone while DVD is recorded or dubbing audio narration off-site after DVD is recorded. The GC shall include description of items being viewed. The GC shall describe vantage point, indicating location, direction (by compass point), and elevation or story of construction.
 - E. Transcript: The GC shall provide a typewritten transcript of the narration. Display images and running time captured from videotape opposite the corresponding narration segment.

END OF SECTION

SECTION 03 30 00 - CAST-IN-PLACE CONCRETE

PART 1 GENERAL

1.1 GENERAL PROVISIONS

- A. Drawings and general provisions of the Contract, including Division 1 apply to this Section.
- B. Coordinate work with that of other trades affecting or affected by work of this Section. Cooperate with such trades to assure the steady progress of the work.

1.2 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. Cast-in place concrete, including foundations, exterior slabs, interior slabs, equipment bases, and other concrete work shown on the DRAWINGS.
 - 2. Formwork for cast-in-place concrete.
 - 3. Reinforcing steel and welded wire fabric for cast-in-place concrete.
 - 4. Do all cutting, patching and repairing of concrete which may be required for proper completion of the work.
 - 5. Control and construction joints in slabs.
 - 6. Expansion joint filler at perimeter, isolation joints and other locations of slabs.
 - 7. Concrete Sealer to be applied to interior slabs.
 - B. Install the following items furnished under the designated SECTIONS:
 - 1. Sleeves, inserts, and other items required to be built into the concrete: By trade requiring same.
 - C. Related Work Specified Elsewhere: The following related work is to be performed under the designated SECTIONS:
 - 1. Furnishing and setting of sleeves and inserts for mechanical and electrical work under respective trades.
 - 2. Joint sealing materials: SECTION 079200-JOINT SEALANTS.
 - 3. Foundation insulation: SECTION 072100- THERMAL INSULATION.
- #### 1.3 REFERENCE SPECIFICATIONS
- A. "Specifications for Structural Concrete for Buildings", Sections 1 through 5 by American Concrete Institute (ACI-301).
 - B. "Building Code Requirements for Reinforced Concrete" (ACI-318).
 - C. ACI 117, "Specifications for Tolerances for Concrete Construction and Materials."

- D. Concrete Reinforcing Steel Institute (CRSI) "Manual of Standard Practice."

1.4 QUALITY ASSURANCE; SUBMITTALS

- A. General: Comply with requirements of SECTION 01 33 00 - SUBMITTAL PROCEDURES.
- B. Use adequate numbers of skilled workmen who are thoroughly trained and experienced in the necessary crafts and who are completely familiar with the specified requirements and the methods needed for proper performance of the work of this Section.
- C. Manufacturer Qualifications: A firm experienced in manufacturing ready-mixed concrete products and that complies with ASTM C 94/C 94M requirements for production facilities and equipment.
 - 1. Manufacturer certified according to NRMCA's "Certification of Ready-Mixed Concrete Production Facilities".
- D. Installer Qualifications: A qualified installer who employs on Project personnel qualified as ACI certified Flatwork Technician and Finisher and a supervisor who is an ACI-certified Concrete Flatwork Technician.
- E. Testing Agency Qualifications: If the trial batch method is used to design concrete mixes, testing shall be performed by an independent agency, qualified according to ASTM C 1077 and ASTM E 329 for testing indicated, as documented according to ASTM E 548.
 - 1. Personnel conducting field tests shall be qualified as ACI Concrete Field Testing Technician, Grade 1, according to ACI CP-01 or an equivalent certification program.
- F. Source Limitations: Obtain each type or class of cementitious material of the same brand from same manufacturer's plant, obtain aggregate from one source, and obtain admixtures through one source from a single manufacturer.
- G. Do not commence placement of concrete until mix designs have been reviewed and approved by the Architect and all governmental agencies plant. Also see other requirements for testing as stated in Part 3 of this Section.
- H. Product Data: Submit manufacturer's product data with application and installation instructions for proprietary materials and items, including reinforcement and forming accessories, admixtures, patching compounds, slab sealers, and curing compounds.
- I. Concrete Mix Design: Submit proposed design mixes for each different type and strength of concrete to be used. Provide separate mix designs for any change in ingredients. Optional admixtures are not permitted in mix designs. Include the following items:
 - 1. Mix proportions for all ingredients of the mix. Designate within the submittal where each mix is proposed to be used. Proportions shall be established by one of the following methods in accordance with ACI 301.
 - a. Field experience.
 - b. Trial batch
 - c. Water/cement ratios specified herein.
 - 2. Cement type.

3. Aggregate gradations taken within 3 months from the date of submission. Specify size of coarse aggregate in accordance with ASTM size numbers. Blended coarse aggregates shall have a combined gradation complying with an ASTM designation.
4. Product data for all proprietary items incorporated into the mix including, but not limited to admixtures.
5. Compressive strength results from an independent testing laboratory for mixes designed in accordance with trial batch or field experience methods.
 - a. Trial batches shall be tested within 12 months from the date of submission.
 - b. Submit quantity of tests in accordance with ACI 301. Note that mix designs developed in accordance with the field experience method must include a minimum of 30 consecutive tests, with an allowance for 10 to 30 consecutive tests with a higher average strength required.
 - c. Slump and air content shall be consistent with specifications for this project within tolerances specified within ACI 301.
- J. Provide shop drawings and placement drawings for fabricating and placing reinforcing steel. Show all required information for cutting, bending and placing reinforcing bars and show all accessories and support bars on placing drawings. Indicate suitable marks for placing bars.
- K. Fabrication of any material or performing of any work prior to the final review of the shop drawings will be entirely at the risk of the Contractor.
- L. Manufacturer Certification: Submit verification of the certification of the concrete supplier for compliance with Manufacturer's Certification as specified above.

1.5 NOTIFICATION OF RELATED TRADES

- A. Notify all other trades responsible for installing chases, inserts, sleeves, anchors, louvers, etc., when ready for such installation, and for final checking immediately before concrete is placed. Cooperate with such trades to obtain proper installation.

PART 2 PRODUCTS

2.1 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 the number of joints. Provide form material with sufficient thickness to withstand the 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 1, exterior Grade or better, mill-oiled and edge sealed, with each piece bearing a legible inspection trademark.
- B. Forms for Unexposed Finish Concrete: Form concrete surfaces which will be unexposed in the 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 or adversely affect concrete surfaces, and will not impair subsequent treatments of concrete surfaces.
- D. Form Ties: Provide factory fabricated, removable or snap back of approved design. Wire shall be at least back 1/2 inch from the surface and leave a hole less than 1 inch in diameter after snapped.

2.2 REINFORCING MATERIALS

- A. Reinforcing Bars: ASTM A615 Grade 60, deformed.
- B. Welded Wire Fabric: ASTM A185, Welded Steel Wire Fabric.
- C. Joint Dowel Bars: ASTM A 615/A 615M, Grade 60 (Grade 420), plain-steel bars, cut bars true to length with ends square and free of burrs.
- D. Stainless Steel Joint Dowel Bars: ASTM A666, Type 304, smooth bars.
- E. 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 wire bar type supports complying with CRSI recommendations.
 - 1. For slabs-on-grade, use supports with sand plates or horizontal runners where base material will not support chair legs. Supports fabricated from concrete may be used when approved.
 - 2. For exposed-to-view concrete surfaces, where legs of supports are in contact with the forms, provide supports with legs which are plastic protected (CRSI, Class 1) or stainless steel protected (CRSI Class 2).

2.3 MATERIALS FOR CONCRETE

- A. Cement: Portland Cement, ASTM C150, Type I or II. Type III may be used at the Contractor's option, when approved by the Architect. Use one brand of cement throughout the project for each strength and mix of concrete. Substitution of one the following supplementary cementitious materials for a portion of the Portland Cement is acceptable, subject to percentage limitations specified herein:
 - a. Fly Ash: ASTM C618, Class C or F.
 - b. Ground Granulated Blast-Furnace Slag: ASTM C 989, Grade 100 or 120.
- B. Water: Potable, complying with ASTM C94/C94M.
- C. Aggregate:
 - 1. Normal Weight: Maximum sizes as specified in ACI 301, conforming to ASTM C33, Class 3S.
 - 2. Fine and coarse aggregates shall be regarded as separate ingredients.
 - 3. Blended gradations of coarse aggregate shall have a blend that complies with an aggregate gradation specified in ASTM C33.
 - 5. Aggregates shall be free from injurious amounts of organic impurities.

- D. Admixtures: Provide admixtures certified by manufacturer to be compatible with other admixtures and that will not contribute water-soluble chloride ions exceeding those permitted in hardened concrete. Do not use calcium chloride or admixtures containing calcium chloride.
1. Water reducing agent: "Sonotard WR" by Sonneborn Building Products, "WRDA" by W. R. Grace & Company, "Pozzolith 100" by Master Builders Company, or equal approved by the Architect/Engineer and conforming with ASTM C494 Type A. The water reducing agent must be by the same manufacturer as the air-entraining agent.
 2. Air-entraining agent: "Aerolith" by Sonneborn Building Products, "Darex" by W. R. Grace & Company, "MB-VR" By Master Builders Company, or equal approved by the Architect/Engineer conforming to ASTM C260.
 3. High-Range, Water-Reducing Admixture: ASTM C 494/C 494M, Type F.
 4. No other admixtures may be used without Architect/Engineer approval.

2.4 RELATED MATERIALS

- A. Joint filler at slab perimeters: 3/8 inch thick asphalt impregnated board, of same depth as slab less 3/4" for sealer, by Burke, W.R. Meadows, Johns Manville or Hohmann and Barnard.
- B. Absorptive Cover: Burlap cloth made from Jute or kenaf, weighing approximately 9 oz per sqyd, complying with AASHTO M182, Class 2.
- C. Moisture-Retaining Cover: ASTM C 171, polyethylene film or white burlap-polyethylene sheet.
- D. Non-Shrink Grout: "Embeco Pre-Mixed Grout" by Master Builders, "Por-Rok" Expanding Grout by Hallemite Manufacturing Company, or equal as approved by the Architect/Engineer.
1. Do not use Por-Rok at exterior applications.
- E. Liquid Membrane-Forming Curing Compound: ASTM C309, Type 1, Class B, and VOC Compliant. Provide liquid membrane-forming curing compound equal to "Super Aqua Cure Vox" by The Euclid Chemical Corp., "Kure-N-Seal WB" by Sonneborn-Contech, or "Dress and Seal WB" by L & M Construction Chemicals, Inc.. Liquid curing compounds shall not be used on exterior slabs or interior slabs where its presence may interfere with the bond of successive floor treatments.
- F. Penetrating Liquid Floor Treatment (Interior Slab Sealer): Clear, chemically reactive, waterborne solution of inorganic silicate or silicate materials and proprietary components; odorless; colorless; that penetrates, hardens, and densifies concrete surfaces. Acceptable products include, but are not limited to the following:
1. Ashford Formula; Curecrete Chemical Company
 2. Euco Diamond Hard; Euclid Chemical Company.
 3. Seal Hard; L&M Construction Chemicals.

2.5 STORAGE OF MATERIALS

- A. All materials shall be stored to prevent damage from the elements and other causes.

- B. Cement and aggregates shall be stored in such a manner as to prevent deterioration or intrusion of foreign matter. Any materials which have deteriorated, or which have been damaged, shall not be used for concrete.
- C. Store reinforcing steel on wood skids to protect it from weather, oil, earth and damage from trucking or other construction operations. Reinforcement shall be free from loose mill scale, rust, oil, concrete spatter and other extraneous coatings at the time it is embedded in the concrete.
- D. All forms shall be stored in a neat manner and orderly fashion, protected from the weather and abuse.
- E. Materials which are judged not acceptable for this project shall be immediately removed from the site.

2.6 PROPORTIONING AND DESIGN OF MIXES

- A. Proportions: Prepare design mixtures for each type and strength of concrete, proportioned on the basis of laboratory trial mixture, field test data, or default water-cement ratio given below, according to ACI 301.
 - 1. Use a qualified independent testing agency for preparing and reporting proposed mixture designs based on laboratory trial mixtures.
- B. When acceptable data is not available for either field experience or trial batch design methods, provide normal weight concrete with the following properties:
 - 1. 4500 psi 28-day compressive strength; water-cement ratio, 0.35 maximum (air entrained).
- C. Supplementary Cementitious Materials: Limit percentage, by weight, of cementitious materials other than portland cement in concrete as follows:
 - 1. Fly Ash: 25%
 - 2. Ground-Granulated Blast-Furnace Slag: 50%.
- D. Limit water-soluble, chloride-ion content in hardened concrete to 0.30% by weight of cement.
- E. Admixtures: Use admixtures according to manufacturer's written instructions.
 - 1. Use water-reducing or high-range water-reducing admixture in concrete, as required, for placement and workability.
 - 2. Use high range water-reducing admixture in 4500 psi, air entrained concrete, unless otherwise approved in mix designs prepared by trial batch or field experience methods.
 - 3. Use air entraining admixture in foundations, exterior slabs, and other locations where concrete will be exposed to freeze-thaw cycles.
- F. Air Content: Add air-entraining admixture to concrete exposed to freeze-thaw conditions at manufacturer's prescribed rate to result in concrete at point of placement having an air content as follows within a tolerance of plus or minus 1.5 percent, unless otherwise indicated:
 - 1. Air Content: 5.5 percent for 1-1/2-inch- (38-mm-) nominal maximum aggregate size.

2. Air Content: 6 percent for 1-inch- (25-mm-) nominal maximum aggregate size.
3. Air Content: 6 percent for 3/4-inch- (19-mm-) nominal maximum aggregate size.

2.7 CONCRETE MIXTURES FOR BUILDING ELEMENTS

- A. Footings, foundation piers, exterior and interior slabs, and all other concrete exposed to freeze-thaw cycles in service: Proportion normal-weight concrete mixture as follows:
 1. Minimum Compressive Strength: 4500 psi (31 MPa) at 28 days.
 2. Slump Limit: 4 inches (100 mm) for concrete without high-range water-reducing admixture and 8 inches (200 mm) for concrete with verified slump of 2 to 4 inches (50 to 100 mm) before adding high-range water-reducing admixture plus or minus 1 inch (25 mm).
 3. Air Content: As specified in article 2.6.

2.8 FABRICATING REINFORCEMENT

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

2.9 CONCRETE MIXING

- A. Ready-Mixed Concrete: Measure, batch, mix, and deliver concrete according to ASTM C 94/C 94M, and furnish batch ticket information. Clearly indicate on the batch ticket the time the cement is added to the mix.
 1. When air temperature is between 85 and 90 deg F (30 and 32 deg C), reduce mixing and delivery time from 1-1/2 hours to 75 minutes; when air temperature is above 90 deg F (32 deg C), reduce mixing and delivery time to 60 minutes.
 2. Mixing time will be measured from the time the cement is added to the mix.
 3. Add all admixtures to the mixer as a solution and dispense automatically by a metering device having a measuring accuracy of ± 3 percent.
- B. Retempering: Do not retemper concrete that has set.
 1. Add water only to the extent that the permissible slump and the maximum water-cement ratio is not exceeded. No water may be added to the mix once the deposition of a load has commenced.
 2. Do not alter approved mixtures in any way without the express written approval of the Architect.

PART 3 EXECUTION

3.1 FORMING

- A. Formwork shall conform to ACI 347.
- B. Forms shall be constructed to conform to shapes, lines, and dimensions shown, plumb and straight and shall be maintained sufficiently rigid to prevent deformation under load. Forms shall be sufficiently tight to prevent the leakage of grout. Securely brace and shore forms to prevent displacement and to safely support the construction loads.

- C. Treat forms and form linings with a form release agent applied according to the manufacturer's instructions, by roller, brush or spray to produce a uniform thin film without bubbles or streaks. Apply the release agent in two coats for the first use of the form and in one coat for each additional use.
- D. Removal: Formwork for columns, walls, sides of beams, and other parts not supporting the weight of the concrete may be removed as soon as concrete has hardened sufficiently to resist damage from removal operations
- E. Construct formwork so concrete members and structures are of size, shape, alignment, elevation, and position indicated, within tolerance limits of ACI 117.
- F. Chamfer exterior corners and edges of permanently exposed concrete.

3.2 EMBEDDED ITEMS

- A. Place and secure anchorage devices and other embedded items required for adjoining work that is attached to or supported by cast-in-place concrete. Use setting drawings, templates, diagrams, instructions, and directions furnished with items to be embedded.
 - 1. Install anchor rods, accurately located, to elevations required and complying with tolerances in Section 7.5 of AISC's "Code of Standard Practice for Steel Buildings and Bridges."
 - a. Secure anchor rods to templates before concrete placement. Do not force anchor rods into concrete after it has begun to set.
 - b. Install angles, post bases, and other metal fabrications with integral embedments in accordance with approved shop drawings. Secure to formwork prior to concrete placement

3.3 PLACING REINFORCEMENT

- A. Comply with Concrete Reinforcing Steel Institute's "Manual of Standard Practice", for details and methods of reinforcement placement and supports, and as herein specified.
 - 1. Clean reinforcement of loose rust and mill scale, earth, ice, and other materials which reduce or destroy bond with concrete.
 - 2. 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. The use of lifting hooks for placement of reinforcement in slabs is prohibited.
 - 3. Place reinforcement to obtain specified coverages for concrete protection. 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. Do not place reinforcing bars more than 2 in. beyond the last leg of continuous bar support.
 - 4. Install welded wire fabric 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.

3.4 JOINTS

- A. General: Construct joints true to line with faces perpendicular to surface plane of concrete.
- B. Contraction Joints in Slabs-on-Grade: Form weakened-plane contraction joints, sectioning concrete into areas as indicated. Construct contraction joints for a depth equal to at least one fourth of concrete thickness as follows:
 - 1. Contraction joints can only be used where concrete slabs are uniform thickness. Use construction joints in hunched concrete slabs.
 - 2. Grooved Joints: Form contraction joints after initial floating by grooving and finishing each edge of joint to a radius of 1/8 inch (3.2 mm). Repeat grooving of contraction joints after applying surface finishes. Eliminate groover tool marks on concrete surfaces.
 - 3. Sawed Joints: Form contraction joints with power saws equipped with shatterproof abrasive or diamond-rimmed blades. Cut 1/8-inch- (3.2-mm-) wide joints into concrete when cutting action will not tear, abrade, or otherwise damage surface and before concrete develops random contraction cracks. Sawcuts must be made within 12 hours of concrete placement.
 - 4. Contraction joints may be used interchangeably with construction joints at the contractor's option.
- C. Construction joints shall be formed with keyed bulkheads. Reinforcement shall continue through the joint, and additional reinforcement shall be placed if indicated on the Drawings.
- D. Isolation Joints in Slabs-on-Grade: After removing formwork, install joint-filler strips at slab junctions with vertical surfaces, such as column pedestals, foundation walls, and other locations, as indicated.
 - 1. Extend joint-filler strips full width and depth of joint, terminating flush with finished concrete surface, unless otherwise indicated.
 - 2. Terminate full-width joint-filler strips not less than 1/2 inch (13 mm) or more than 1 inch (25 mm) below finished concrete surface where joint sealants, specified in Division 07 Section "Joint Sealants," are indicated.
 - 3. Install joint-filler strips in lengths as long as practicable. Where more than one length is required, lace or clip sections together.
- E. Doweled Joints: Install specified dowels at mid-depth in slab construction joints. Use stainless steel dowels where indicated.

3.5 PREPARATION OF FORMED 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 manufacturer's directions. Do not allow excess form-coating material to accumulate in forms or to come in contact with concrete surfaces against which fresh concrete will be placed. Apply in compliance with manufacturer's instructions.

3.6 CONCRETE PLACEMENT

- A. Preplacement Inspection: Footing bottoms, reinforcement and all work shall be subject to inspection by Architect or designated representative. Notify 24 hours prior to scheduled placement and obtain approval waiver of inspection prior to placement. Moisten wood forms

immediately before placing concrete where form coatings are not used. Be sure that all debris and other foreign matter is removed from forms. Verify that all embedded items are properly installed.

B. 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 approved 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-ft 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. The loss of slump in pumping or pneumatic conveying equipment shall not exceed 2 in. Concrete shall not be conveyed through pipes made of aluminum or aluminum alloy. Standby equipment shall be provided on the site.
 - d. No concrete shall be placed until the reinforcement has been inspected and approved by the Architect or designated representative.
 - e. Do not use reinforcement as bases for runways for concrete conveying equipment or other construction loads.
4. The maximum free fall of concrete shall be limited to 6 feet.

C. Placing Concrete in Forms: Deposit concrete in forms in horizontal layers not deeper than 18 in. 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 supplemented by hand-spading, rodding or tamping. Use equipment and procedures for consolidation of concrete in accordance with ACI recommended practices.
2. Use vibrators designed to operate with vibratory element 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 in. maximum apart. Place

vibrators to rapidly penetrate placed layer and at least 6 in. into 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.

D. 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 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 strikeoff. Use full 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.

E. 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. Maintain concrete continuously moist, with temperature above 50 degrees F for 7 days after placement.

1. Concrete shall not be placed when the air temperature at the site, as given by the National Weather Service, is below 40 deg. F. ,or is predicted to fall below 40 deg. F. at any time during a period of 72 hours after the placement. If the air temperature falls below 40 deg. F. during the 72 hours and/or anytime up to the end of the seventh full day after the pour, the Contractor shall provide enclosure and heat immediately as necessary to maintain a temperature above 50 degrees F. in the placement area. Refer to the section on CONCRETE CURING AND PROTECTION that follows this section for any additional requirements.
2. Uniformly heat water and aggregates before mixing to obtain a concrete mixture temperature of not less than 50 deg. F, and not more than 80 deg. F at point of placement.
3. Do not use frozen materials or materials containing ice or snow. Do not place concrete on frozen subgrade or on subgrade containing frozen materials.
4. Do not use calcium chloride, salt and other materials containing antifreeze agents or chemical accelerators. The use of a non-chloride accelerator is acceptable only when specifically permitted.
5. All temporary heat, form insulation, insulated blankets, coverings, salt 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.
6. Protect soils beneath concrete foundations from freezing.

F. 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.

3.7 FINISH OF FORMED SURFACES

A. Rough Form Finish (RfFm-Fn): For formed concrete surfaces not exposed-to-view in the finish work or by other construction, unless otherwise indicated. This is the concrete surface having

texture imparted by form facing materials used, 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 (SmFm-Fn): 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 is as-cast concrete surface 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.
- D. Related Unformed Surfaces: At tops of walls, horizontal offset surfaces occurring adjacent to formed surfaces, strike-off smooth and finish with a texture matching adjacent formed surfaces. Continue final surface treatment of formed surfaces uniformly across adjacent unformed surfaces, unless otherwise indicated.

3.8 MONOLITHIC SLAB FINISHES

- A. Float Finish (Flt-Fn): Apply float finish to monolithic slab surfaces to receive trowel finish, broom finish, at fire truck parking bays, and where indicated.
 - 1. After screeding, consolidating, and leveling concrete slabs, do not work surface until ready for floating. Begin floating when surface water has disappeared or when concrete has stiffened sufficiently to permit operation of power-driven floats, or both. Consolidate surface with power-driven floats, or by hand-floating if area is small or inaccessible to power driven floats. Cut down high spots and fill low spots. Repeat float passes and restraightening until surface is left with a uniform, smooth, granular texture. Uniformly slope surfaces where indicated.
- B. Trowel finish (Tr-Fn): 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.
 - 1. After floating, begin first trowel finish operation using a power-driven trowel. Begin final troweling when surface produces a ringing sound as trowel is moved over surface. Consolidate concrete surface by final hand-troweling operation, free of trowel marks, uniform in texture and appearance, Grind smooth any surface defects which would telegraph through applied floor covering system.
 - 2. Finish interior slab surfaces to the following tolerances, according to ASTM E1155 for a randomly trafficked floor surface:
 - a. Unslope Floors: Specified overall values of flatness, F(F) 25; and of levelness, F(L) 20; with minimum local values of flatness, F(F) 17; and of levelness, F(L) 15.
 - b. Sloped Floors: Slope uniformly to elevations specified. Slope lines shall be uniform to a tolerance of plus or minus 1/4" vertical within any 10 foot horizontal measurement.
 - 3. Use approved self-leveling underlayments or trowelable leveling and patching compounds to fill cracks, holes, and depressions at floors failing to meet acceptable surface tolerances. Corrective work at exposed concrete floors shall be determined for the situation.
- C. Non-Slip Broom Finish (NSBrm-Fn): Apply non-slip broom finish to exterior concrete slabs, showers, and elsewhere as indicated. Apply a float finish to surfaces indicated. Slab surface shall

slope uniformly as indicated to a tolerance of plus or minus ¼” when measured with a 10 foot straightedge before brooming.

1. Immediately after float finishing, slightly roughen concrete surface by brooming with fiber bristle broom perpendicular to main traffic route. Coordinate required final finish with Architect before application.

3.9 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 306.1 for cold weather protection and ACI 301 for hot-weather protection during curing and as herein specified. Maintain concrete continuously moist, with temperature above 50 degrees F for 7 days after placement.
- B. Evaporation Retarder: Apply evaporation retarder to unformed concrete surfaces if hot, dry, or windy conditions cause moisture loss approaching 0.2 lb/sq. ft. x h (1 kg/sq. m x h) before and during finishing operations. Apply according to manufacturer's written instructions after placing, screeding, and bull floating or darbying concrete, but before float finishing.
- C. Formed Surfaces: Cure formed concrete surfaces, including underside of beams, supported slabs, and other similar surfaces. If forms remain during curing period, moist cure after loosening forms. If removing forms before end of curing period, continue curing for the remainder of the curing period.
- D. Unformed Surfaces: Begin curing immediately after finishing concrete. Cure unformed surfaces, including floors and slabs and other surfaces.
- E. Cure concrete according to ACI 308.1, by one or a combination of the following methods:
 1. Moisture Curing: Keep surfaces continuously moist for not less than seven days with the following materials:
 - a. Water.
 - b. Continuous water-fog spray.
 - c. Absorptive cover, water saturated, and kept continuously wet. Cover concrete surfaces and edges with 12-inch (300-mm) lap over adjacent absorptive covers.
 2. Moisture-Retaining-Cover Curing: Cover concrete surfaces with moisture-retaining cover for curing concrete, placed in widest practicable width, with sides and ends lapped at least 12 inches (300 mm), and sealed by waterproof tape or adhesive. Cure for not less than seven days. Immediately repair any holes or tears during curing period using cover material and waterproof tape.
 - a. Moisture cure or use moisture-retaining covers to cure concrete surfaces to receive floor coverings.
 - b. Moisture cure or use moisture-retaining covers to cure concrete surfaces to receive concrete sealer.
 3. Curing Compound: Apply uniformly in continuous operation by power spray or roller according to manufacturer's written instructions. Recoat areas subjected to heavy rainfall within three hours after initial application. Maintain continuity of coating and repair damage during curing period.

- a. After curing period has elapsed, remove curing compound without damaging concrete surfaces by method recommended by curing compound manufacturer unless manufacturer certifies curing compound will not interfere with bonding of floor covering used on Project .

3.10 LIQUID FLOOR TREATMENTS

- A. Protective Coating (Sealer) for Interior Slabs where Indicated: Prepare surface and apply in accordance with the manufacturer's specifications. Remove curing compound and other surface contaminants before application. Delay application until as late as practicable in the project schedule, a minimum of 28 days after concrete placement, but prior to the application of deicing salts. Apply in two (2) coats.

3.11 MISCELLANEOUS CONCRETE ITEMS

- A. Filling-In: 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.

3.12 CONCRETE SURFACE REPAIRS

- A. Patching Defective Areas: Repair and patch defective areas with cement mortar immediately after removal of forms, when acceptable to Architect.
 1. Cut out honeycomb, rock pockets, voids over 1/4 in. 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 in. Make edges of cuts perpendicular to the concrete surface. Thoroughly clean, dampen with water and brush-coat the area to be patched with specified 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, cracks, spalls, air bubbles, honeycomb, rock pockets; fins and other projections on surface; and stains and other discolorations that cannot be removed by cleaning. Flush out form tie holes, fill with dry pack mortar, or precast cement cone plugs secured in place with bonding agent.
 1. Repair concealed formed surfaces, where possible, that contain defects that affect the durability of concrete. If defects cannot be repaired, remove and replace concrete.
- C. Repair of Unformed Surfaces: Test unformed surfaces, such as monolithic slabs, for smoothness and verify surface plane to tolerances specified for each surface and finish. Correct low and high areas as herein specified. Test unformed surfaces sloped to drain for trueness of slope, in addition to smoothness, using a template having required slope.

1. Repair finished unformed surfaces that contain defects which affect durability of concrete. Surface defects, as such, include crazing, cracks in excess of 0.01-in. wide or which penetrate to reinforcement or completely through non-reinforced sections regardless of width, spalling, pop-outs, honeycomb, rock pockets, and other objectionable conditions.
2. Correct high areas in unformed surfaces by grinding, after concrete has cured at least 14 days.
3. Correct low areas in unformed surfaces during, or immediately after completion of surface finishing operations by cutting out low areas and replacing with fresh concrete. Finish repaired areas to blend into adjacent concrete. Proprietary patching compounds may be used when acceptable to Architect.
4. Repair defective areas, except random cracks and single holes not exceeding 1-in. diameter, by cutting out and replacing with fresh concrete. Remove defective areas to sound concrete with clean, square cuts and expose reinforcing steel with at least 3/4-in. clearance all around. Dampen concrete surfaces in contact with patching concrete and apply bonding compound. Mix patching concrete of same materials to provide concrete of same type or class as original concrete. Place, compact and finish to blend with adjacent finished concrete. Cure in the same manner as adjacent concrete.
5. Repair isolated random cracks and single holes not over 1 in. in diameter by dry-pack method. Groove top of cracks and cut-out holes to sound concrete and clean of dust, dirt and loose particles. Dampen cleaned concrete surfaces and apply bonding compound. Mix dry-pack, consisting of one part portland cement to 2-1/2 parts fine aggregate passing a No. 16 mesh sieve, using only enough water as required for handling and placing. Place dry-pack after bonding compound has dried. Compact dry-pack mixture in place and finish to match adjacent concrete. Keep patched area continuously moist for not less than 72 hours.
6. Use epoxy-based mortar for structural repairs, where directed by Architect.
7. Repair methods not specified above may be used, subject to acceptance of Architect.

3.13 QUALITY CONTROL TESTING DURING CONSTRUCTION

- A. The owner will employ a testing laboratory to inspect, sample and test the materials and the production of concrete and to submit test reports. See DIVISION 1 for testing responsibilities.
- B. Sampling Fresh Concrete: ASTM C 172, except modified for slump to comply with ASTM C 94.
 1. Slump: ASTM C 143; one test for each concrete load at point of discharge; and one test for each set of compressive strength test specimens.
 2. Air Content: ASTM C 173, volumetric method for lightweight or normal weight concrete; ASTM C 231 pressure method for normal weight concrete; one for each set of compressive strength test specimens.
 3. Concrete Temperature: Test hourly when air temperature is 40 deg. F (4 deg. C) and below, and when 80 deg. F (27 deg. C) and above; and each time a set of compression test specimens made.
 4. Compression Test Specimen: ASTM C 31; one set of 4 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.
 5. Compressive Strength Tests: ASTM C 39; one set of each 50 Cu yds or fraction thereof, of each concrete class placed in any one day or for each 5,000 sqft of surface area placed; 1 specimen tested at 7 days and 2 specimens tested at 28 days. The fourth cylinder shall be used for additional tests as necessary, being retained at laboratory for necessary period as approved by Architect/Engineer.

6. When frequency of testing will provide less than 5 strength tests for a given class of concrete, conduct testing from at least 5 randomly selected batches or from each batch if fewer than 5 are used.
 7. When total quantity of a given class of concrete is less than 50 cu yds, strength test may be waived by Architect if, in his judgment, adequate evidence of satisfactory strength is provided.
 8. When strength of field-cured cylinders is less than 85 percent of companion laboratory-cured cylinders, evaluate current operations and provide corrective procedures for protecting and curing the in-place concrete.
 9. Strength level of concrete will be considered satisfactory if averages of sets of three consecutive strength test results equal or exceed specified compressive strength, and no individual strength test result falls below specified compressive by more than 500 psi.
 10. Test results will be reported in writing to Architect, Building Inspector, and Contractor on the day following the day that tests are made. Reports of compressive strength tests shall contain the project identification name and number, date of concrete placement, name of concrete testing service, concrete type and class, location of concrete batch in structure, design compressive strength at 28 days, concrete mix proportions and materials; compressive breaking strength and type of break for both 7-day tests and 28-day tests.
- C. 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 Architect. Testing service may conduct tests to determine adequacy of concrete by cored cylinders complying with ASTM C 42, 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.

3.14 ACCEPTANCE

- A. Work which meets all applicable requirements given in STRENGTH OF STRUCTURE will be accepted without qualification.
- B. Work which fails to meet one or more requirements given in STRENGTH OF STRUCTURE but which has been repaired to bring it into compliance will be accepted without qualification.
- C. Work which fails to meet one or more requirements and which cannot be brought into compliance may be accepted or rejected as determined by the Architect/Engineer.
- D. Concrete failing to meet the strength requirements of this Section may be required to undergo additional curing as specified by the Architect/Engineer. Modifications may be required to the concrete mix design for the remaining concrete work, at the expense of the Contractor.
- E. Formed surfaces that are not within the tolerances specified may be rejected. If permission is granted to correct the error, such correction shall be directed and in such a manner as to maintain the strength, function and appearance of the structure.
- F. Concrete members cast in the wrong location may be rejected if the strength, appearance, or function of the structure is adversely affected.
- G. Inaccurately formed surfaces exposed to view may be rejected and shall be repaired or removed and replaced if required by the Architect/Engineer.

- H. Finished flatwork exceeding specified tolerances may be repaired by grinding high spots or by patching low spots with an approved epoxy grout.
- I. Concrete exposed to view with defects which adversely affect the appearance of the structure may be repaired if possible. If, in the opinion of the Architect/Engineer, the defects cannot be repaired, the concrete may be accepted or rejected in accordance with the decision of the Architect/Engineer.

3.15 STRENGTH OF STRUCTURE

- A. The strength of the structure in place will be considered potentially deficient if it fails to comply with any requirements which control the strength of the structure, as outlined below:
 - 1. Low concrete strength as evaluated by the requirements of this Section.
 - 2. Reinforcing steel size, quantity, strength, position of arrangement at variance with the project DRAWINGS.
 - 3. Concrete which differed from the required dimensions or locations in such a manner as to reduce the strength.
- B. The work will be accepted or rejected, as the work is produced, by the Architect/Engineer or his authorized representative.

END OF SECTION

SECTION 055000 - METAL FABRICATIONS

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. Steel framing and supports for mechanical & electrical equipment.
 - 2. Steel framing and supports for applications where framing and supports are not specified in other Sections.
 - 3. Uni-Strut support systems.
 - 4. Miscellaneous steel angles.
 - 5. Miscellaneous steel reinforcement rebar & mesh (Concrete Frostwalls, Entry Pads, Housekeeping Pads).

1.3 PERFORMANCE REQUIREMENTS

- A. Thermal Movements: Allow for thermal movements from ambient and surface temperature changes acting on exterior metal fabrications by preventing buckling, opening of joints, overstressing of components, failure of connections, and other detrimental effects.
 - 1. Temperature Change: 120 deg F, ambient; 180 deg F, material surfaces.

1.4 SUBMITTALS

- A. Product Data: For the following:
 - 1. Epoxy Grout.
 - 2. Primer.
 - 3. Powder Coating.
 - 4. Uni-Strut systems.
 - 5. Reinforcement Steel.
 - 6. Steel Wire Mesh.
 - 7. Miscellaneous steel framing, supports & angles.
- B. Shop Drawings: Show fabrication and installation details for all metal fabrications.
 - 1. Include plans, elevations, sections, and details of metal fabrications and their connections. Show anchorage and accessory items.
- C. Welding certificates.

1.5 QUALITY ASSURANCE

- A. Welding Qualifications: Qualify procedures and personnel according to AWS D1.1/D1.1M, "Structural Welding Code - Steel."
- B. Welding Qualifications: Qualify procedures and personnel according to the following:
 - 1. AWS D1.1/D1.1M, "Structural Welding Code - 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.

1.7 COORDINATION

- A. Coordinate selection of shop primers with topcoats to be applied over them. Comply with paint and coating manufacturers' written recommendations to ensure that shop primers and topcoats are compatible with one another.
- B. Coordinate powder coating process, including touch-up repairs after installation, if applicable.

PART 2 - PRODUCTS

2.1 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.

2.2 FERROUS METALS

- A. Recycled Content of Steel Products: Provide products with average recycled content of steel products so postconsumer recycled content plus one-half of pre-consumer 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 otherwise indicated.
- E. Cast Iron: Either gray iron, ASTM A 48/A 48M, or malleable iron, ASTM A 47/A 47M, unless otherwise indicated.

2.3 FASTENERS

- A. Anchors, General: Anchors capable of sustaining, 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.
- B. Post-Installed Anchors: Torque-controlled expansion anchors or chemical anchors.
 - 1. Material for Interior Locations: Carbon-steel components zinc plated to comply with ASTM B 633 or ASTM F 1941, Class Fe/Zn 5, unless otherwise indicated.
 - 2. Material for Exterior Locations and Where Stainless Steel is Indicated: Alloy Group 1 stainless-steel bolts, ASTM F 593, and nuts, ASTM F 594.

2.4 MISCELLANEOUS MATERIALS & PRODUCTS

- 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 Devco 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. Non-shrink, Nonmetallic Grout: Factory-packaged, non-staining, 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.

2.5 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. Shop drill holes for fastening all Welding Booth accessories, as indicated. Field drill holes for all Mechanical & Electrical installations mounted to steel tubes and/or steel walls. Provide metal spacers as required to enable mounting of Mechanical & Electrical installations on steel walls. All Welding Booths shall be uniform in appearance and installation of accessories, Mechanical & Electrical installations.
- C. Form bent-metal corners to smallest radius possible without causing grain separation or otherwise impairing work.
- D. Form exposed work 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 or welds where possible. Where exposed fasteners are required, use Phillips flat-head (countersunk) fasteners unless otherwise indicated. Locate joints where least conspicuous.
- G. Cut, reinforce, drill, and tap metal fabrications as indicated to receive finish hardware, screws, and similar items.
- H. Provide rough carpentry required to set, level, align, protect trench from debris during and after concrete casting work. Coordinate with other works.
- 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 built into concrete, 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.

2.6 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.
 - 1. Furnish inserts for units installed after concrete is placed.
- C. Galvanize miscellaneous framing and supports where indicated.

2.7 STEEL ANGLES

- A. If applicable, fabricate loose steel angles and shapes of size indicated for openings and recesses in cast-in –place concrete slabs at locations indicated in drawings. Fabricate in single lengths for each installation unless otherwise indicated. Weld adjoining members together to form a single unit.

2.8 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.
- C. Finish exposed surfaces to remove tool and die marks and stretch lines, and to blend into surrounding surface.
- D. Manufacturer's standard asphalt coating on Evaporation Trench grates & frames.

2.9 STEEL AND IRON FINISHES

- A. Shop prime iron and steel items not indicated to be galvanized unless they are to be embedded in concrete, sprayed-on fireproofing, or masonry, or unless otherwise indicated.
 - 1. Shop prime with universal shop primer unless indicated.
- B. Preparation for Shop Priming: Prepare surfaces to comply with requirements indicated below:
 - 1. Exterior Items: SSPC-SP 6/NACE No. 3, "Commercial Blast Cleaning."
 - 2. Items Indicated to Receive Zinc-Rich Primer: SSPC-SP 6/NACE No. 3, "Commercial Blast Cleaning."
 - 3. Other Items: SSPC-SP 3, "Power Tool Cleaning."
- C. Shop Priming: Apply shop primer to 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.

- D. Powder Coating: Apply shop primer to comply with SSPC-PA 1, "Paint Application Specification No. 1: Shop, Field, and Maintenance Painting of Steel," for powder coating process.
 - 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 inserts, toggle bolts, through bolts, lag screws, wood screws, and other connectors.
- E. Provide temporary bracing or anchors in formwork for items that are to be built into concrete, or similar construction.
- F. Remove temporary plywood covers, clean trenches and place cast iron grates at Evaporation Trenches just prior to Substantial Completion.

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 ADJUSTING AND CLEANING

- A. Touchup Painting: Immediately after erection, clean field welds, bolted connections, and abraded areas. Paint uncoated and abraded areas with the same material as used for shop painting to comply with SSPC-PA 1 for touching up shop-painted surfaces.
 - 1. Apply by brush or spray to provide a minimum 2.0-mil dry film thickness.
- B. Touchup Painting: Cleaning and touchup painting of field welds, bolted connections, and abraded areas of shop paint are specified in Division 09 Interior & Exterior Painting.
- C. Wood Blocking Painting: Clean & paint to match adjacent steel structure as described in Division 09 Interior & Exterior Painting.

END OF SECTION 055000

SECTION 06 10 00 - ROUGH CARPENTRY

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. Framing with dimension lumber.
 - 2. Wood blocking and nailers.
 - 3. Wood furring.
 - 4. Plywood backing panels.
- B. Related Requirements:
 - 1. Section 013300 "Submittal Procedures".
 - 2. Section 061516 "Wood Decking" for tongue-and-groove roof decking.
 - 3. Section 061600 "Sheathing" for exterior wall sheathing.
 - 4. Section 061800 "Glued-Laminated Construction".

1.3 DEFINITIONS

- A. Exposed Framing: Framing not concealed by other construction.
- B. Dimension Lumber: Lumber of 2 inches nominal or greater but less than 5 inches nominal in least dimension.
- C. Heavy Timber: Lumber of 5 inches nominal or greater in least dimension.
- D. Lumber grading agencies, and the abbreviations used to reference them, include the following:
 - 1. NeLMA: Northeastern Lumber Manufacturers' Association.
 - 2. NLGA: National Lumber Grades Authority.
 - 3. SPIB: The Southern Pine Inspection Bureau.

1.4 SUBMITTALS

- A. Product Data: For each type of process and factory-fabricated product. Indicate component materials and dimensions and include construction and application details.

- 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 ALSC Board of Review.

1.5 QUALITY ASSURANCE

- A. Source Limitations for Engineered Wood Products: Obtain each type of engineered wood product through one source from a single manufacturer.
- B. Framing will be exposed to view. Provide lumber without exposed grade stamps. Submit certification from the grading agency attesting to the species and grade of lumber used for the project.

1.6 DELIVERY, STORAGE, AND HANDLING

- A. Stack lumber flat with spacers between each bundle to provide air circulation. Provide for air circulation around stacks and under coverings.

PART 2 - PRODUCTS

2.1 WOOD PRODUCTS, GENERAL

- A. Lumber: DOC PS 20 and applicable rules of grading agencies indicated. If no grading agency is indicated, provide lumber that complies with the applicable rules of any rules-writing agency certified by the ALSC Board of Review. Provide lumber graded by an agency certified by the ALSC Board of Review to inspect and grade lumber under the rules indicated.
 - 1. Factory mark each piece of lumber with grade stamp of grading agency.
 - 2. 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.

2.2 DIMENSION LUMBER FRAMING

- A. Moisture Content: Provide lumber with moisture content not to exceed 19 percent.
 - 1. Provide kiln-dried lumber with a maximum moisture content of 15% at the time of treatment for preservative-treated lumber.
- B. Framing, Rafters, Joists, and Partitions: No. 2 grade and of the following species:
 - 1. Spruce-pine-fir graded under NLGA rules.
 - 2. Where preservative treated lumber is specified, provide Southern Pine graded under SPIB rules.

2.3 ENGINEERED LUMBER

- A. Laminated Veneer Lumber (LVL) - Provide all members from one manufacturer. The basis of design is Boise Cascade Versa-Lam 2.0 3100. Equal products shall have the following minimum allowable stresses:

1. Flexure: 3100 psi.
2. Shear: 285 psi.
3. Tension Parallel to Grain: 2150 psi.
4. Compression Parallel to Grain: 3000 psi.
5. Compression Perpendicular to Grain: 750 psi.
6. Modulus of Elasticity: 2000 ksi.

2.4 MISCELLANEOUS LUMBER

- A. General: Provide miscellaneous lumber indicated and lumber for support or attachment of other construction, whether indicated or not, including the following:
1. Blocking.
 2. Furring.
 3. Plywood.
- B. For items of dimension lumber size, provide No. 2 grade lumber with 15 percent maximum moisture content of any species.
- C. For blocking not used for attachment of other construction, Utility, Stud, or No. 3 grade lumber of any species may be used provided that it is cut and selected to eliminate defects that will interfere with its attachment and purpose.
- D. For blocking and nailers used for attachment of other construction, select and cut lumber to eliminate knots and other defects that will interfere with attachment of other work.
- E. For furring strips for installing plywood or hardboard paneling, select boards with no knots capable of producing bent-over nails and damage to paneling.

2.3 WOOD BACKING PANELS

- A. Exposed Interior Plywood Wall Sheathing: DOC PS 1, Exposure 1, A-C, in thickness indicated or, if not indicated, not less than 19/32-inch nominal thickness, 5-ply, A side exposed, if applicable.
- B. Electrical Equipment Backing Panels: DOC PS 1, Exposure 1, C-D Plugged, in thickness indicated or, if not indicated, not less than 23/32-inch nominal thickness, 5-ply (if applicable).

2.4 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, pressure-preservative treated, 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: NES NER-272.
- D. Wood Screws: ASME B18.6.1.
- E. Lag Bolts: ASME B18.2.1.
- F. Bolts: Galvanized Steel bolts complying with ASTM A 307, Grade A; with ASTM A 563 hex nuts, flat washers, lock washers or nylon insert lock nuts.
- G. 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. Material: Stainless steel with bolts and nuts complying with ASTM F 593 and ASTM F 594, Alloy Group 1 or 2.

2.5 METAL FRAMING ANCHORS

- A. Basis-of-Design Products: Subject to compliance with requirements, provide Simpson Strong-Tie Co., Inc. or comparable products by one of the following:
 1. Alpine Engineered Products, Inc.
 2. Cleveland Steel Specialty Co.
 3. Harlen Metal Products, Inc.
 4. KC Metals Products, Inc.
 5. Southeastern Metals Manufacturing Co., Inc.
 6. USP Structural Connectors.
- B. Allowable Design Loads: Provide products with allowable design loads, as published by manufacturer, that meet or exceed those of basis-of-design products. Manufacturer's published values shall be determined from empirical data or by rational engineering analysis and demonstrated by comprehensive testing performed by a qualified independent testing agency.
- C. Galvanized Steel Sheet: Hot-dip, zinc-coated steel sheet complying with ASTM A 653/A 653M, G60 coating designation.
 1. Use for interior locations where stainless steel is not indicated.

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 furring, nailers, blocking, and similar supports to comply with requirements for attaching other construction.
- B. Framing Standard: Comply with AF&PA's "Details for Conventional Wood Frame Construction," unless otherwise indicated.
- C. Framing with Engineered Wood Products: Install engineered wood products to comply with manufacturer's written instructions.
- D. Metal Framing Anchors: Install metal framing to comply with manufacturer's written instructions.
- E. Do not splice structural members between supports, unless otherwise indicated.
- F. Provide blocking and framing as indicated and as required to support facing materials, fixtures, specialty items, and trim.
- G. Sort and select lumber so that natural characteristics will not interfere with installation or with fastening other materials to lumber. Do not use materials with defects that interfere with function of member or pieces that are too small to use with minimum number of joints or optimum joint arrangement.
- H. Securely attach rough carpentry work to substrate by anchoring and fastening as indicated, complying with the following:
 - 1. NES NER-272 for power-driven fasteners.
 - 2. Table 2304.9.1, "Fastening Schedule," in ICC's International Building Code.
- I. 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, unless otherwise specified. Make tight connections between members. Install fasteners without splitting wood; do not countersink nail heads, unless otherwise indicated.
- J. For exposed work, arrange fasteners in straight rows parallel with edges of members, with fasteners evenly spaced, and with adjacent rows staggered. Establish and maintain a uniform fastener pattern where fasteners are visible.

3.2 WOOD BLOCKING, AND NAILER INSTALLATION

- A. Install whether indicated, or not 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.

- B. Attach items to substrates to support applied loading. Recess bolts and nuts flush with surfaces, unless otherwise indicated.

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.

3.4 WALL AND PARTITION FRAMING INSTALLATION

- A. General: Provide single bottom plate and double top plates using members of 2-inch nominal thickness whose widths equal that of studs, except single top plate may be used for non-load-bearing partitions and for load-bearing partitions where framing members bearing on partition are located directly over studs. Fasten plates to supporting construction, unless otherwise indicated.
 - 1. Provide continuous horizontal blocking at mid-height of partitions more than 96 inches high, using members of 2-inch nominal thickness and of same width as wall or partitions.
- B. Construct corners and intersections with three or more studs.
- C. Frame openings with multiple studs and headers. Provide nailed header members of thickness equal to width of studs. Support headers on jamb studs.
 - 1. For non-load-bearing partitions, provide double-jamb studs and headers not less than 4-inch nominal depth for openings 48 inches and less in width, 6-inch nominal depth for openings 48 to 72 inches in width, 8-inch nominal depth for openings 72 to 120 inches in width, and not less than 10-inch nominal depth for openings 10 to 12 feet in width.
 - 2. For load-bearing walls, provide double-jamb studs for openings 60 inches and less in width, and triple-jamb studs for wider openings. Provide headers of depth indicated.

3.5 PROTECTION

- A. Protect wood that has been treated with inorganic boron (SBX) from weather. If, despite protection, inorganic boron-treated wood becomes wet, apply EPA-registered borate treatment. Apply borate solution by spraying to comply with EPA-registered label.
- B. Protect rough carpentry from weather. If, despite protection, rough carpentry becomes wet, apply EPA-registered borate treatment. Apply borate solution by spraying to comply with EPA-registered label.

END OF SECTION 061000

SECTION 06 16 00 - SHEATHING

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Wall sheathing.

1.2 DELIVERY, STORAGE, AND HANDLING

- ##### A.
- Stack panels flat with spacers beneath and between each bundle to provide air circulation. Protect sheathing from weather by covering with waterproof sheeting, securely anchored. Provide for air circulation around stacks and under coverings.

PART 2 - PRODUCTS

2.1 WOOD PANEL PRODUCTS

- ##### A.
- Thickness: As indicated.
- ##### B.
- Factory mark panels to indicate compliance with applicable standard.

2.2 WALL SHEATHING

- ##### A.
- Plywood Wall Sheathing: Either DOC PS 1 or DOC PS 2, Exposure 1 sheathing.
1. Span Rating: Not less than 32/16.
 2. Nominal Thickness: Not less than 15/32".
- ##### B.
- Oriented-Strand-Board Wall Sheathing: DOC PS 2, Exposure 1 sheathing.
1. Span Rating: Not less than 32/16.
 2. Nominal Thickness: Not less than 15/32".

2.3 FASTENERS

- ##### A.
- General: Provide fasteners of size and type indicated that comply with requirements specified in this article for material and manufacture.
1. For wall sheathing, provide fasteners with hot-dip zinc coating complying with ASTM A153/A153M.

- B. Nails: ASTM F1667.
- C. Nail size: 8d common, with dimensions 0.131 inch diameter by 2-1/2 inches long.

PART 3 - EXECUTION

3.1 INSTALLATION, GENERAL

- A. Do not use materials with defects that impair quality of sheathing or pieces that are too small to use with minimum number of joints or optimum joint arrangement. Arrange joints so that pieces do not span between fewer than three support members.
- B. Cut panels at penetrations, edges, and other obstructions of work; fit tightly against abutting construction unless otherwise indicated.
- C. Securely attach to substrate by fastening as indicated on the Drawings.
- D. 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. Install fasteners without splitting wood.
- E. Cut and space edges of panels to match spacing of structural support elements. Locate end joints centered over supports.
- F. Coordinate sheathing installation with installation of materials installed over sheathing so sheathing is not exposed to precipitation or left exposed at end of the workday when rain is forecast.

3.2 WOOD STRUCTURAL PANEL INSTALLATION

- A. General: Comply with applicable recommendations in APA Form No. E30, "Engineered Wood Construction Guide," for types of structural-use panels and applications indicated.
- B. Fastening Methods: Fasten panels as indicated below:
 - 1. Wall and Roof Sheathing:
 - a. Nail to wood framing
 - b. Space panels 1/8 inch (3 mm) apart at edges and ends.

3.3 FIELD QUALITY CONTROL

- A. Testing and Inspecting Agency: Owner may engage a qualified testing agency to perform tests and inspections.
- B. Inspectors will prepare test and inspection reports.

END OF SECTION 061600

SECTION 062013 - EXTERIOR FINISH CARPENTRY

1.1 REQUIREMENTS

A. Meet ASHRAE 189.1

1. Regional materials.
2. Certified wood.

1.2 WARRANTY

A. Real Wood Clapboard Siding and Trim (Excluding Finish): 25 years.

1.3 MATERIALS

A. Preservative Treatment by Pressure Process: All exterior lumber and plywood substrates located within 3' of grade.

B. Exterior Standing and Running Trim:

1. Lumber Trim for Unfinished Applications: Pressure-preservative-treated southern pine.
2. Lumber Trim for Painted Finish: White pine or other white softwoods or Northern white cedar, select grade, minimal tiny knots.
3. Moldings for **Painted** Finish: White pine or other white softwoods or Northern white cedar, select grade, minimal tiny knots.

C. Lumber Siding:

1. Real wood, eased edge clapboard Basis of Design: as provided by Robbins Lumber, Inc., 506 Main Street South, P.O. Box 9, Searsport, Maine 04973, tel: 207.342.5221.
2. Website: <https://www.rlco.com/product-descriptions/easededgeclapboard>
3. Species: Eastern white pine or other white softwoods, or Northern white cedar
4. Grade: Premium.
5. Shape: Beveled traditional clapboard w/ eased edges.
6. Thickness: $\frac{3}{4}$ "
7. Width: 8"
8. Length: 6'0" to 16'0"
9. Finish: Smooth prior to painting.
10. Painting Requirements: Treat any and all exposed knots with Kilz Exterior Primer, or proven equal prior to priming. Prime and back-prime all surfaces, including cut edges, 2 finish coats to full coverage as per Section 09 "Interior & Exterior Painting".

D. Plywood Sheathing:

1. Pressure-preservative treated for installations located within 3' of grade.
2. Face Species: Southern pine.
3. B-C grade, B side exposed prior to siding installation.

4. Pattern: Plain.
5. Surface: Smooth.

E. Lumber Soffits:

1. Species: White pine or other white softwoods, or Northern white cedar.
2. Pattern: V-edge, smooth-faced tongue and groove.

F. Fasteners: Stainless steel, unless otherwise indicated.

G. Horizontal Joint Flashing for Siding: Preformed prefinished aluminum; Z-shaped.

H. Insect Screening for Soffit Vents: Aluminum.

I. Continuous Soffit Vents: Aluminum hat channel shape with perforations.

1.4 INSTALLATION

- A. Lumber and moldings for painted applications; primed, including both faces and edges.
- B. Repair/Replace any damaged exterior carpentry installations.

END OF SECTION

SECTION 062023 - INTERIOR FINISH CARPENTRY

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. Interior standing and running trim.
 - 2. Transaction counter in Vestibule (pertains to Sub-Project 2: DMR Office Fit-Out).
- B. Related Sections include the following:
 - 1. Division 06 Section "Rough Carpentry" for furring, blocking, and other carpentry work not exposed to view.
 - 2. Division 09 Section "Interior Painting" for priming and back priming of interior finish carpentry.

1.3 DEFINITIONS

- A. Lumber grading agencies, and the abbreviations used to reference them, include the following:
 - 1. NeLMA: Northeastern Lumber Manufacturers' Association.
 - 2. NHLA: National Hardwood Lumber Association.
 - 3. NLGA: National Lumber Grades Authority.
 - 4. SPIB: The Southern Pine Inspection Bureau.
 - 5. WCLIB: West Coast Lumber Inspection Bureau.
 - 6. WWPA: Western Wood Products Association.

1.4 SUBMITTALS

- A. Product Data: For each type of process and factory-fabricated product. Indicate component materials, dimensions, profiles, textures, and colors and include construction and application details.
- B. Samples for Initial Selection: For each type of running trim indicated.
- C. Samples for Verification:
 - 1. For each species and cut of lumber and panel products with non-factory-applied finish, with 1/2 of exposed surface finished, 50 sq. in. for lumber and 8 by 10 inches for panels.

2. For each finish system and color of lumber and panel products with factory-applied finish, 50 sq. in. for lumber and 8 by 10 inches for panels.
3. Corner Trim: Provide a 12" x 12" finished sample, loose with biscuit.
4. Transaction Window Countertop: Provide a 12" x 12" finished sample, 3/4" hardwood veneer plywood, w/ angled hardwood edge, biscuit or continuous rabbit joint w/ one mitered corner, clear and smooth finish, as indicated.
5. Wall Kick Panels: Provide a 12" x 12" finished sample 3/4" hardwood veneer plywood, w/ hardwood edge, biscuit or continuous rabbit joint w/ one mitered corner, as indicated.

1.5 DELIVERY, STORAGE, AND HANDLING

- A. Protect materials against weather and contact with damp or wet surfaces. Stack lumber, plywood, and other panels flat with spacers between each bundle to provide air circulation. Provide for air circulation within and around stacks and under temporary coverings.
- B. Deliver interior finish carpentry materials only when environmental conditions meet requirements specified for installation areas. If interior finish carpentry materials must be stored in other than installation areas, store only where environmental conditions meet requirements specified for installation areas.

1.6 PROJECT CONDITIONS

- A. Environmental Limitations: Do not deliver or install interior finish carpentry materials until building is enclosed and weatherproof, wet work in space is completed and nominally dry, and HVAC system is operating and maintaining temperature and relative humidity at occupancy levels during the remainder of the construction period.
- B. Do not install finish carpentry materials that are wet, moisture damaged, or mold damaged.
 1. Indications that materials are wet or moisture damaged include, but are not limited to, discoloration, sagging, or irregular shape.
 2. Indications that materials are mold damaged include, but are not limited to, fuzzy or splotchy surface contamination and discoloration.

PART 2 - PRODUCTS

2.1 MATERIALS, GENERAL

- A. Lumber: DOC PS 20 and applicable grading rules of inspection agencies certified by ALSC's Board of Review.
 1. Factory mark each piece of lumber with grade stamp of inspection agency indicating grade, species, moisture content at time of surfacing, and mill.
 2. For exposed lumber, mark grade stamp on end or back of each piece.

2.2 STANDING AND RUNNING TRIM

- A. Lumber Trim for Opaque Finish (Primed & Painted):
 - 1. Species and Grade: Poplar; B finish; NHLA.
 - 2. Maximum Moisture Content: 10 percent.
 - 3. Finger Jointing: Not allowed.
 - 4. Corners: Mitered w/ wood biscuits, glued.
 - 5. Face Surface: Surfaced (smooth).
 - 6. Edge Condition: Eased 1/8-inch quarter rounded edge, sanded smooth, matching at inside & outside corners.
 - 7. Cut rabbited notches, where surfaces of substrate materials differ in depth, allowing flush junctions.

2.3 MISCELLANEOUS MATERIALS

- A. Fasteners for Interior Finish Carpentry: Nails, screws, and other anchoring devices of type, size, material, and finish required for application indicated to provide secure attachment, concealed where possible.
 - 1. Where galvanized finish is indicated, provide fasteners and anchorages with hot-dip galvanized coating complying with ASTM A 153/A 153M.
- B. Glue: Aliphatic-resin, polyurethane, or resorcinol wood glue recommended by manufacturer for general carpentry use.
 - 1. Use wood glue that has a VOC content of 30 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).
- C. Wood Filler: 2 component, sanded smooth prior to primer coats, retreat as necessary.
- D. Multipurpose Construction Adhesive: Formulation complying with ASTM D 3498 that is recommended for indicated use by adhesive manufacturer.
 - 1. Use adhesive that has a VOC content of 70 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).

2.4 FABRICATION

- A. Ease edges of lumber less than 1 inch in nominal thickness to 1/16-inch radius and edges of lumber 1 inch or more in nominal thickness to 1/8-inch radius.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance.

- B. Examine finish carpentry materials before installation. Reject materials that are wet, moisture damaged, and mold damaged.
- C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

- A. Clean substrates of projections and substances detrimental to application.
- B. Before installing interior finish carpentry, condition materials to average prevailing humidity in installation areas for a minimum of 24 hours.

3.3 INSTALLATION, GENERAL

- A. Do not use materials that are unsound, warped, improperly treated or finished, inadequately seasoned, or too small to fabricate with proper jointing arrangements.
 - 1. Do not use manufactured units with defective surfaces, sizes, or patterns.
- B. Install interior finish carpentry level, plumb, true, and aligned with adjacent materials. Use concealed shims where necessary for alignment.
 - 1. Scribe and cut interior finish carpentry to fit adjoining work. Refinish and seal cuts as recommended by manufacturer.
 - 2. Countersink fasteners, fill surface flush, and sand where face fastening is unavoidable.
 - 3. Install to tolerance of 1/8 inch in 96 inches for level and plumb. Install adjoining interior finish carpentry with 1/32-inch maximum offset for flush installation and 1/16-inch maximum offset for reveal installation.
 - 4. Coordinate interior finish carpentry with materials and systems in or adjacent to it. Provide cutouts for mechanical and electrical items that penetrate interior finish carpentry.

3.4 STANDING AND RUNNING TRIM INSTALLATION

- A. Install with minimum number of joints practical, using full-length pieces from maximum lengths of lumber available. Cope at returns and miter at corners to produce tight-fitting joints with full-surface contact throughout length of joint. Plane backs of casings to provide uniform thickness across mitered joints where necessary for alignment.
 - 1. Install trim after plywood joint finishing operations are completed.
 - 2. Window Jambs, Sills and Header trim boards, regardless of installed direction, shall be continuous, without seams, or butt joints.
 - 3. Drill pilot holes in hardwood before fastening to prevent splitting. Fasten to prevent movement or warping.
 - 4. Countersink fastener heads on exposed carpentry work and fill all holes and dents.
 - 5. Caulk all gaps with paintable latex caulk, prior to painting.
 - 6. Sand after painted coats for smooth finish coats. If 1st finish coat of paint is not smooth, sand prior to 2nd finish coat of paint/varnish.

3.5 ADJUSTING

- A. Replace interior finish carpentry that is damaged or does not comply with requirements. Interior finish carpentry may be repaired or refinished if work complies with requirements and shows no evidence of repair or refinishing. Adjust joinery for uniform appearance.

3.6 CLEANING

- A. Clean interior finish carpentry on exposed and semi-exposed surfaces. Touch up factory-applied finishes to restore damaged or soiled areas.

3.7 PROTECTION

- A. Protect installed products from damage from weather and other causes during the remainder of the construction period.
- B. Protect all installed horizontal surfaces with Ram Board Temporary or equal, secured in place with 3" wide low tack masking tape, remove after substantial completion, taking care not to damage painted surfaces.
- C. Remove and replace finish carpentry materials that are wet, moisture damaged, and mold damaged.
 - 1. Indications that materials are wet or moisture damaged include, but are not limited to, discoloration, sagging, or irregular shape.
 - 2. Indications that materials are mold damaged include, but are not limited to, fuzzy or splotchy surface contamination and discoloration.

END OF SECTION

SECTION 07 31 13 - ASPHALT SHINGLES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including Sections 1, 2, 3, and Division 1 of Section 4 apply to this Section.

1.2 SUMMARY

- A. Section Includes:
 - 1. Removal of existing roofing system.
 - 2. Asphalt shingles.
 - 3. Underlayment.
- B. Related Sections:
 - 1. Division 06 Section "Rough Carpentry" for wood framing.
 - 2. Division 06 Section "Sheathing" for roof sheathing.
- C. Replace damaged or missing asphalt roof shingles with matching shingles in appearance, color, etc.

1.3 DEFINITION

- 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 SUBMITTALS

- A. Product Data: For each type of product indicated.
- B. Samples for Selection: For each type of asphalt shingle indicated.
- C. Product Test Reports: Based on evaluation of comprehensive tests performed by manufacturer and witnessed by a qualified testing agency, for asphalt shingles.
- D. Maintenance Data: For each type of asphalt shingle to include in maintenance manuals.
- E. Warranties: Sample of special warranties.

1.5 QUALITY ASSURANCE

- A. Fire-Resistance Characteristics: Where indicated, provide asphalt shingles and related roofing materials identical to those of assemblies tested for fire resistance per test method below by UL or another testing and inspecting agency acceptable to authorities having jurisdiction. Identify products with appropriate markings of applicable testing agency.
 - 1. Exterior Fire-Test Exposure: Class A; ASTM E 108 or UL 790, for application and roof slopes indicated.

1.6 DELIVERY, STORAGE, AND HANDLING

- A. Store roofing materials in a dry, well-ventilated, weathertight location according to asphalt shingle manufacturer's written instructions. Store underlayment rolls on end on pallets or other raised surfaces. Do not double stack rolls.
 - 1. Handle, store, and place roofing materials in a manner to avoid significant or permanent damage to roof deck or structural supporting members.
- B. Protect unused underlayment from weather, sunlight, and moisture when left overnight or when roofing work is not in progress.

1.7 PROJECT CONDITIONS

- A. Environmental Limitations: Do not deliver or install asphalt shingles until spaces are enclosed and weathertight, wet work in spaces is complete and dry, and temporary HVAC system is operating and maintaining ambient temperature and humidity conditions at occupancy levels during the remainder of the construction period.
 - 1. Install self-adhering sheet underlayment within the range of ambient and substrate temperatures recommended by manufacturer.

1.8 WARRANTY

- A. Special Warranty: Standard form in which manufacturer agrees to repair or replace asphalt shingles that fail in materials within specified warranty period.
 - 1. Failures include, but are not limited to, the following:
 - a. Manufacturing defects.
 - b. Structural failures including failure of asphalt shingles to self-seal after a reasonable time.
 - 2. Material Warranty Period: 25 years from date of Substantial Completion, prorated, with first three years nonprorated.
 - 3. Wind-Speed Warranty Period: Asphalt shingles will resist blow-off or damage caused by wind speeds up to 60 mph for five years from date of Substantial Completion.
 - 4. Algae-Discoloration Warranty Period: Asphalt shingles will not discolor five years from date of Substantial Completion.

5. Workmanship Warranty Period: 10 years from date of Substantial Completion.

1.9 EXTRA MATERIALS

- A. Furnish extra materials that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.
 1. Asphalt Shingles: 100 sq. ft of each type, in unbroken bundles.

PART 2 - PRODUCTS

2.1 GLASS-FIBER-REINFORCED ASPHALT SHINGLES

- A. Multitab-Strip Asphalt Shingles: ASTM D 3462, glass-fiber reinforced, mineral-granule surfaced, and self-sealing. Match existing shingles in appearance, color, etc.
 1. Manufacturers: Basis of Design: Owes Corning Duration, or proven equal, subject to compliance with requirements, provide products by one of the following:
 - a. CertainTeed Corporation.
 - b. GAF Materials Corporation.
 2. Tab Arrangement: Three tabs, regularly spaced.
 3. Cutout Shape: Square.
 4. Butt Edge: Straight cut.
 5. Nailing Strip Type & Size: Manufacturer's standard, web-reinforced for maximum pull-out strength.
 6. Algae Resistance: Granules treated to resist algae discoloration.
 7. Color and Blends: As selected by Architect from manufacturer's full range.
- B. Hip and Ridge Shingles: Site-fabricated units cut from asphalt shingle strips. Trim each side of lapped portion of unit to taper approximately 1 inch.

2.2 UNDERLAYMENT MATERIALS

- A. Felt: ASTM D 226 or ASTM D 4869, Type I, 15 lb. asphalt-saturated organic felts, nonperforated.
- B. Self-Adhering Sheet Underlayment, Polyethylene Faced: ASTM D 1970, minimum of 40-mil-thick, slip-resisting, polyethylene-film-reinforced top surface laminated to SBS-modified asphalt adhesive, with release paper backing; cold applied.
 1. Manufacturers: Subject to compliance with requirements, provide products by the following:
 - a. Grace, W. R. & Co. - Conn.
 - b. Certainteed.
 - c. Contractor's proposal, proven equal.

2.3 RIDGE VENTS

- A. Rigid Ridge Vent: Manufacturer's standard, rigid section high-density polypropylene or other UV-stabilized plastic ridge vent with nonwoven geotextile filter strips; for use under ridge shingles.
 - 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. Air Vent, Inc.; a Gibraltar Industries company.
 - b. Cor-A-Vent, Inc.
 - c. GAF Materials Corporation.
 - d. Obdyke, Benjamin Incorporated.
 - e. Owens Corning.

2.4 ACCESSORIES

- A. Asphalt Roofing Cement: ASTM D 4586, Type II, asbestos free.
- B. Roofing Nails: ASTM F 1667; aluminum, stainless-steel, copper, or hot-dip galvanized-steel wire shingle nails, minimum 0.120-inch- diameter, smooth shank, sharp-pointed, with a minimum 3/8-inch- diameter flat head and of sufficient length to penetrate 3/4 inch into solid wood decking or extend at least 1/8 inch through OSB or plywood sheathing.
 - 1. Where nails are in contact with metal flashing, use nails made from same metal as flashing.
- C. Felt Underlayment Nails: Aluminum, stainless-steel, or hot-dip galvanized-steel wire with low-profile capped heads or disc caps, 1-inch minimum diameter.
- D. Staples: Not allowed.

2.5 METAL FLASHING AND TRIM

- A. Fabricate sheet metal flashing and trim to comply with recommendations in SMACNA's "Architectural Sheet Metal Manual" that apply to design, dimensions, metal, and other characteristics of the item.
 - 1. Drip Edges: Fabricate in lengths not exceeding 10 feet with 2-inch roof-deck flange and 1-1/2-inch fascia flange with 3/8-inch drip at lower edge.
- B. Vent Pipe Flashing: Pipes penetrating shingled roofs shall be ARFCO self-sealing neoprene collar with copper flange.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of the Work.
 - 1. Remove existing roofing materials to wooden substrate. Remove existing fasteners completely top avoid telegraphing.
 - 2. Remove all existing roofing debris from project site immediately and clean ground area around the building of all roofing debris to Owner's satisfaction.
 - 3. Examine roof sheathing to verify that sheathing joints are supported by framing and blocking or metal clips and that installation is within flatness tolerances.
 - 4. Verify that substrate is sound, dry, smooth, clean, sloped for drainage, and completely anchored; and that provision has been made for flashings and penetrations through asphalt shingles.
- B. Prepare written report, endorsed by Installer, listing conditions detrimental to performance of the Work.
- C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 UNDERLAYMENT INSTALLATION

- A. General: Comply with underlayment manufacturer's written installation instructions applicable to products and applications indicated unless more stringent requirements apply.
- B. Single-Layer Felt Underlayment: Install on roof deck parallel with and starting at the eaves. Lap sides a minimum of 2 inches over underlying course. Lap ends a minimum of 4 inches. Stagger end laps between succeeding courses at least 72 inches. Fasten with felt underlayment nails.
 - 1. Install felt underlayment on roof deck not covered by self-adhering sheet underlayment. Lap sides of felt over self-adhering sheet underlayment not less than 3 inches in direction to shed water. Lap ends of felt not less than 6 inches over self-adhering sheet underlayment.
 - 2. Install fasteners at no more than 36 inch o.c.
- C. Self-Adhering Sheet Underlayment: Install, wrinkle free, on roof deck. Comply with low-temperature installation restrictions of underlayment manufacturer if applicable. Install at locations indicated below, lapped in direction to shed water. Lap sides not less than 3-1/2 inches. Lap ends not less than 6 inches staggered 24 inches between courses. Roll laps with roller. Cover underlayment within seven days.
 - 1. Eaves: Extend 70 inches from edges of eaves.
 - 2. Rakes: Extend 70 inches from edges of eaves.
 - 3. Ridge: Extend 70 inches from edges of eaves.
 - 4. Cupola Roof: Cover in its entirety.

5. Flashing: Tape off continuously with min. 3" wide Self-Adhering Sheet Underlayment rolls, overlap joints min. 6".
6. Roll all Self-Adhering Sheet Underlayment flat and secure with weighted rollers.

3.3 METAL FLASHING INSTALLATION

- A. Eave Drip Edges: Install eave drip edge flashings below underlayment and fasten to roof sheathing.
- B. Pipe Flashings: Form flashing around pipe penetrations and asphalt shingles. Fasten and seal to asphalt shingles as recommended by Manufacturer.

3.4 ASPHALT SHINGLE INSTALLATION

- A. General: Install asphalt shingles according to manufacturer's written instructions, recommendations in ARMA's "Residential Asphalt Roofing Manual," and asphalt shingle recommendations in NRCA's "The NRCA Roofing and Waterproofing Manual."
 1. Fasten asphalt shingles, by hand only, to roof sheathing with nails, staples are not permitted.
- B. Install starter strip along lowest roof edge, consisting of an asphalt shingle strip with tabs removed with self-sealing strip face up at roof edge.
 1. Install starter strip along rake edge.
- C. Install first and remaining courses of asphalt shingles stair-stepping diagonally across roof deck with manufacturer's recommended offset pattern at succeeding courses, maintaining uniform exposure.
- D. Install first and remaining courses of asphalt shingles stair-stepping diagonally across roof deck with manufacturer's recommended offset pattern at succeeding courses, maintaining uniform exposure.
- E. Fasten asphalt shingle strips with a minimum of six roofing nails per piece, located according to manufacturer's written instructions.
- F. Ridge Vents: Install continuous ridge vents over asphalt shingles according to manufacturer's written instructions. Fasten with roofing nails of sufficient length to penetrate sheathing.
- G. Ridge Cap Shingles: Maintain same exposure of cap shingles as roofing shingle exposure. Lap cap shingles at ridges to shed water away from direction of prevailing winds. Fasten with roofing nails of sufficient length to penetrate sheathing.
 1. Fasten ridge cap asphalt shingles to cover ridge vent without obstructing airflow.

END OF SECTION

SECTION 07 60 00 - METAL FLASHING

PART 1 GENERAL

1.1 Scope

- a. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 00 and 01 Specification Sections, apply to this Section.
- b. Furnish all flashing materials as shown on the drawings and/or specified.

1.2 Related Work Specified Elsewhere

- a. Roofing, Flashing and Accessories - Division 07
- b. Caulking - Division 07

1.3 Submittals

- a. 5 copies of manufacturer's product literature.

PART 2 PRODUCTS

2.1 Materials

- a. Aluminum Flashing: Minimum 24 gauge (0.024" thick) with baked enamel finish. Color to match adjoining surfaces.

PART 3 EXECUTION

3.1 General

- A. Form all metals on a bending brake. Insofar as practicable, do all shaping, trimming, and hand seaming on a bench with proper sheet metal working tools. Make the angles, bends, and folds for interlocking the metal with full regard for expansion and contraction to avoid buckling and/or fullness.
- B. Fasten all metal with mastic sealed seams and slip joints. Make and seal slip joints with Type I sealant. Form all corners. Exposed face nailing of metal not permitted. Run all metals straight and level: shim and build up as required. Set all metal in plastic cement and nail.
- C. Flash all window and door headers, whether indicated or not.

- c. All flashing to be installed so as to prevent the entry of storm water. Extra care shall be taken to prevent wind entering under any flashing.
- d. Flashing shall run up walls minimum 12" vertically from horizontal flashed surface, and minimum 10" under building wrap or siding.
- e. Exposed edges shall be hemmed min. $\frac{3}{4}$ ", with drip edges. No exposed single edge metal is permitted.

END OF SECTION 07 60 00

SECTION 07 71 23 - STEEL GUTTERS AND DOWNSPOUTS SYSTEM

PART 1 – GENERAL

1.01 WORK INCLUDED

- A. This section specifies the requirements necessary to furnish and install a complete system of steel roof gutters, downspouts, splash pans and all accessories as indicated in the construction documents.
- B. This work, pertaining to Sub-Project #1: Barn Renovations shall be priced under ALTERNATE #3.

1.02 RELATED WORK

- A. This section shall be used in conjunction with the contract documents to establish the total requirements for the steel gutter rain drainage system:
 - 1. Division 7 section included in the project specifications.
 - 2. The contract.
 - 3. Architectural drawings.
 - 4. Manufacturer's installation guide.

1.03 CONSTRUCTION STANDARDS

- A. All work and materials shall conform to the following in addition to all contract documents.
 - 1. Federal, State and local building codes
 - 2. International Construction Code ASTM A924 / A924M - 13 Standard Specification for General Requirements for Steel Sheet, Metallic-Coated by the Hot-Dip Process
 - 3. ASTM A370 Test Methods and Definitions for Mechanical Testing of Steel Products
 - 4. ASTM A568/A568M Specification for Steel, Sheet, Carbon, Structural, and High-Strength, Low-Alloy, Hot-Rolled and Cold-Rolled, General Requirements
 - 5. ASTM A635/A635M Specification for Steel, Sheet and Strip, Heavy-Thickness Coils, Hot-Rolled, Alloy, Carbon, Structural, High-Strength Low-Alloy, and High-Strength Low-Alloy with Improved Formability, General Requirements
 - 6. ASTM A941 Terminology Relating to Steel, Stainless Steel, Related Alloys, and Ferroalloys
 - 7. ASTM E18 Test Methods for Rockwell Hardness of Metallic Materials
 - 8. ES-1 Wind Test for Metal Products Qualification ANSI/SPRI
 - 9. SMACNA's "Architectural Sheet Metal Manual"

1.04 DELIVERY, STORAGE AND HANDLING

- A. All material shall be covered and protected during transit to protect all coated finishes.
- B. All material shall be delivered to the work site including shipping documents and packing list showing manufacturer.
- C. All material shall be stored on work site on elevated platform and protected from damage to coated finishes.

PART 2 – PRODUCTS

2.01 ACCEPTABLE MANUFACTURERS

- A. Basis of Design Product: Nordic Steel Gutters as manufactured by the Lindab group, for all rain drainage products including but not limited to gutters, downspouts, hangers, gutter connectors, end caps, downspout brackets, gutter supports and all other accessories not listed, or proven equal. Nordic Steel Gutters LLC, PO BOX 56227, 2509 George Mason Drive, Virginia Beach, VA 23456 Email: info@nordicsteelgutters.com | Web: www.nordicsteelgutters.com

2.02 MATERIALS

- A. All gutters shall have a half round profile.
- B. Steel gutters will have uniform sections of 10' or 18'.
- C. Downspouts shall be a maximum section of 10'.
- D. Downspouts shall be round and connect via 2" male-to-2" female friction.
- E. NOTE! Do not perforate downspout or connectors or elbow with screws, excluding ribbed elbow at foot of downspout.
- F. Aluminum gutter systems will not be accepted.

2.03 ACCESSORIES

- A. Basis of Design: Nordic Steel Gutters as manufactured by the Lindab group, for all accessories, hangers, brackets and snow supports to match color and finish required, or proven equal.

2.04 FABRICATION

- A. All steel gutter profiles & accessory dimensions & gauges shall be as per manufacturer's recommendation for the roof area being served.
- B. All steel gutters shall be minimum .6mm thickness for all 5" and 6" gutters and .7mm for 7.5" gutters.
 - C. The steel gutter shall have a rolled front bead of not less than .67 mm for 5" and 6" gutters and .87" for 7.5" gutters.
- D. All downspouts shall have a minimum thickness of .6mm.
- E. All steel hangers shall be 5mm in thickness and minimum 25mm wide for 5" and 6" and 5mm thick and 30mm wide for 7.5" gutters with a profile to match gutter.
- F. All steel gutters, downspouts and accessories shall be constructed from steel sheet containing a layer of G90 galvanization, a passivation layer, a primer coating and a top coating on both sides.
- G. Steel gutter connectors shall have a factory installed watertight EPDM seal allowing for thermal movement of the gutter.
- H. End caps for 5" and 6" steel gutters shall have a factory installed watertight EPDM seal and attach using friction.
- I. Inside and outside corner miters will be stamped out of a single piece of metal with finish and profile compatible with the gutter.

- J. Manufacturer's gutter hanger's type shall be as selected by the Architect. Spacing shall be as per the Manufacturer's recommendations according to the application, suitable for Maine's very cold weather climate.
- K. All downspouts and elbows shall be seamed.
- L. Provide pre-cast concrete gutter splash pans at each downspout outlet.

PART 3 – EXECUTION

3.01 EXAMINATION

- A. All areas of rain drainage system installation shall be examined for any conditions that may be detrimental to proper installation.
- B. Start of installation means acceptance of existing conditions.

3.02 INSTALLATION

- A. Refer to Manufacturer's Installation Guide for proper installation methods.
- B. Steel Gutters shall be installed in maximum lengths as possible.
- C. Steel Gutters shall have a slope to downspout of 1" per 32' of run.
- D. Downspouts shall be installed plum and in accordance to SMACNA's "Architectural Sheet Metal Manual".
- E. All steel gutters and downspouts shall be cut by either hacksaw or approved low frequency method.
- F. CAUTION! FLAME OR HIGH SPEED GRINDERS SHALL NOT BE PERMITTED OR USED TO CUT METAL.
- G. Connections and fittings shall be snug and water tight. Test entire steel gutter installation during significant rainfall event, or by water hose.

3.03 CLEANUP

- A. All packing material and debris shall be removed and / or recycled.
- B. Any damage to steel gutters or downspouts shall be repaired, including touch up paint to small scratches to finish coat.

3.04 PROTECTION

- A. The installer shall be responsible for protecting materials and work before and during the installation process.
- B. Upon completion of installation the general contractor shall be responsible for protecting the work from damage during the remaining construction.

END OF SECTION

SECTION 078413 - PENETRATION & JUNCTION FIRESTOPPING

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. Penetration and junctions in fire-resistance-rated walls.
 - 2. Penetration and junctions in smoke barriers.
 - 3. Junctions between floors and walls.
 - 4. Junctions between walls and exterior cladding.
 - 5. Construction penetrations and junctions, requiring fire-stopping, whether indicated or not.
- B. Related Sections include the following:
 - 1. Mechanical drawings indicating fire-suppression piping penetrations.
 - 2. Mechanical drawings indicating duct and piping penetrations.
 - 3. Electrical drawings indicating cable and conduit penetrations.

1.3 SUBMITTALS

- A. Product Data: For each type of product indicated.
- B. Product Schedule: Provide a complete product schedule for each penetration and junction firestopping system. Include location and design designation of qualified testing and inspecting agency.
 - 1. Where Project conditions require modification to a qualified testing and inspecting agency's illustration for a particular penetration and junction firestopping condition, submit illustration, with modifications marked, approved by penetration and junction firestopping manufacturer's fire-protection engineer as an engineering judgment or equivalent fire-resistance-rated assembly.
- C. Qualification Data: Provide for qualified Installer.
- D. Installer Certificates: From Installer indicating penetration and junction firestopping has been installed in compliance with requirements and manufacturer's written recommendations.
- E. Product Test Reports: Based on evaluation of comprehensive tests performed by a qualified testing agency, for penetration and junction firestopping.

1.4 QUALITY ASSURANCE

- A. Installer Qualifications: A firm experienced in installing penetration and junction firestopping similar in material, design, and extent to that indicated for this Project, whose work has resulted in construction with a record of successful performance. Qualifications include having the necessary experience, staff, and training to install manufacturer's products per specified requirements. Manufacturer's willingness to sell its penetration and junction firestopping products to Contractor or to Installer engaged by Contractor does not in itself confer qualification on buyer.
- B. Fire-Test-Response Characteristics: Penetration and junction firestopping shall comply with the following requirements:
 - 1. Penetration and junction firestopping tests are performed by a qualified testing agency acceptable to authorities having jurisdiction.
 - 2. Penetration and junction firestopping is identical to those tested per testing standard referenced in "Penetration and junction Firestopping" Article. Provide rated systems complying with the following requirements:
 - a. Penetration and junction firestopping products bear classification marking of qualified testing and inspecting agency.
 - b. Classification markings on penetration and junction firestopping correspond to designations listed by the following:
 - 1) UL in its "Fire Resistance Directory."
- C. Preinstallation Conference: Conduct a penetration and junction firestopping conference at Project site.
- D. Special Inspections: Allow for 1 of each type of penetration and junction firestopping system to be removed and inspected for conformance with approved submittals.
- E. Above Ceiling review: Prior to the installation of ceilings, a review of construction completion shall be conducted for penetration and junction firestopping and other items that will not be visible when the ceilings have been installed. All penetration and junction firestopping shall be inspected prior to the installation of ceilings.

1.5 PROJECT CONDITIONS

- A. Environmental Limitations: Do not install penetration and junction firestopping when ambient or substrate temperatures are outside limits permitted by penetration and junction firestopping manufacturers or when substrates are wet because of rain, frost, condensation, or other causes.
- B. Install and cure penetration and junction firestopping per manufacturer's written instructions using natural means of ventilations or, where this is inadequate, forced-air circulation.

1.6 COORDINATION

- A. Coordinate construction of openings and penetrating items to ensure that penetration and junction firestopping is installed according to specified requirements.
- B. Coordinate sizing of sleeves, openings, core-drilled holes, or cut openings to accommodate penetration and junction firestopping.
- C. Notify Owner's testing agency at least seven days in advance of penetration and junction firestopping installations; confirm dates and times on day preceding each series of installations.
- D. Firestop all existing and/or new floor & wall junctions and penetrations, whether indicated or not.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Available Products: Subject to compliance with requirements, through-penetration and junction 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.

2.2 PENETRATION AND JUNCTION FIRESTOPPING

- A. Provide penetration and junction firestopping, whether indicated or not, that is produced and installed to resist spread of fire according to requirements indicated, resist passage of smoke and other gases, and maintain original fire-resistance rating of construction penetrated. Penetration and junction firestopping systems shall be compatible with one another, with the substrates forming openings, and with penetrating items if any.
- B. Penetration and Junction Firestopping in Fire-Resistance-Rated Walls: Provide penetration and junction firestopping with ratings determined per ASTM E 814 or UL 1479, based on testing at a positive pressure differential of 0.01-inch wg.
 - 1. Fire-resistance-rated walls include fire walls and fire partitions.
 - 2. F-Rating: Not less than the fire-resistance rating of constructions penetrated.
- C. Penetration and Junctions Firestopping in Smoke Barriers: Provide penetration and junction firestopping with ratings determined per UL 1479.

1. L-Rating: Not exceeding 5.0 cfm/sq. ft. of penetration and junction opening at 0.30-inch wg at both ambient and elevated temperatures.
- D. Exposed Penetration and Junction Firestopping: Provide products with flame-spread and smoke-developed indexes of less than 25 and 450, respectively, as determined per ASTM E 84.
- E. VOC Content: Provide penetration and junction firestopping that complies with the following limits for VOC content when calculated according to 40 CFR 59, Subpart D (EPA Method 24):
 1. Architectural Sealants: 250 g/L.
 2. Sealant Primers for Nonporous Substrates: 250 g/L.
 3. Sealant Primers for Porous Substrates: 775 g/L.
- F. Accessories: Provide components for each penetration and junction firestopping system that are needed to install fill materials and to maintain ratings required. Use only those components specified by penetration and junction firestopping manufacturer and approved by qualified testing and inspecting agency for penetration and junction firestopping indicated.
 1. Permanent forming/damming/backing materials, including the following:
 - a. Slag-wool-fiber or rock-wool-fiber insulation.
 - b. Sealants used in combination with other forming/damming/backing materials to prevent leakage of fill materials in liquid state.
 - c. Fire-rated form board.
 - d. Fillers for sealants.
 2. Temporary forming materials.
 3. Substrate primers.
 4. Collars.
 5. Steel sleeves.

2.3 FILL MATERIALS

- A. Cast-in-Place Firestop Devices: Factory-assembled devices for use in cast-in-place concrete floors and consisting of an outer metallic sleeve lined with an intumescent strip, a radial extended flange attached to one end of the sleeve for fastening to concrete formwork, and a neoprene gasket.
- B. Firestopping Track Systems: Head-of-wall drywall track system consisting of a slip track designed to allow an inflatable bag to be filled with cementitious fireproofing material to seal the track to deck condition a top of wall.
- C. Latex Sealants: Single-component latex formulations that do not re-emulsify after cure during exposure to moisture.
- D. Elastomeric Spray: Single component, water-based elastomeric compound, 3M Fire MAX or equal w/ 50% elasticity.
- 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 Paint: If applicable, on all clean and exposed tube steel column sides as indicated, provide compatible alkyd primer, minimum 2.5 mil thick, and minimum 30 mil thick (measured when dry), for 60 minute rated coating using intumescent paint Forcefield FireGuard E-84 (FFG E-84), or equal, as provided by Shield Industries, 131 Smokehill Lane, Woodstock, Georgia 30188 or equal. Intumescent paint product shall meet the requirements of ASTM E-119-11A Structural Steel Section; NFPA 251, UL 263; ULC S-101-07.
- I. Intumescent Wrap Strips: Single-component intumescent elastomeric sheets with aluminum foil on one side.
- J. 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.
- K. Pillows/Bags: Reusable heat-expanding pillows/bags consisting of glass-fiber cloth cases filled with a combination of mineral-fiber, water-insoluble expansion agents, and fire-retardant additives. Where exposed, cover openings with steel-reinforcing wire mesh to protect pillows/bags from being easily removed.
- L. Silicone Foams: Multicomponent, silicone-based liquid elastomers that, when mixed, expand and cure in place to produce a flexible, nonshrinking foam.
- M. Silicone Sealants: Single-component, silicone-based, neutral-curing elastomeric sealants of grade indicated below:
 - 1. Grade: Pourable (self-leveling) formulation for openings in floors and other horizontal surfaces, and nonsag formulation for openings in vertical and sloped surfaces, unless indicated firestopping limits use of nonsag grade for both opening conditions.
- N. 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.

2.4 MIXING

- A. For those products requiring mixing before application, comply with penetration and junction firestopping manufacturer's written instructions for accurate proportioning of materials, water (if required), type of mixing equipment, selection of mixer speeds, mixing containers, mixing time, and other items or procedures needed to produce products of uniform quality with optimum performance characteristics for application indicated.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates and conditions, with Installer present, for compliance with requirements for opening configurations, penetrating items, substrates, and other conditions affecting performance of the Work.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

- A. Surface Cleaning: Clean out openings immediately before installing penetration and junction firestopping to comply with manufacturer's written instructions and with the following requirements:
 - 1. Remove from surfaces of opening substrates and from penetrating items foreign materials that could interfere with adhesion of penetration and junction firestopping.
 - 2. Clean opening substrates and penetrating items to produce clean, sound surfaces capable of developing optimum bond with penetration and junction firestopping. Remove loose particles remaining from cleaning operation.
 - 3. Remove laitance and form-release agents from concrete.
- B. Priming: Prime substrates where recommended in writing by manufacturer using that manufacturer's recommended products and methods. Confine primers to areas of bond; do not allow spillage and migration onto exposed surfaces.
- C. Masking Tape: Use masking tape to prevent penetration and junction firestopping from contacting adjoining surfaces that will remain exposed on completion of the Work and that would otherwise be permanently stained or damaged by such contact or by cleaning methods used to remove stains. Remove tape as soon as possible without disturbing penetration and junction firestopping's seal with substrates.

3.3 INSTALLATION

- A. General: Install penetration and junction firestopping to comply with manufacturer's written installation instructions and published drawings for products and applications indicated.

- B. Install forming materials and other accessories of types required to support fill materials during their application and in the position needed to produce cross-sectional shapes and depths required to achieve fire ratings indicated.
 - 1. After installing fill materials and allowing them to fully cure, remove combustible forming materials and other accessories not indicated as permanent components of penetration and junction firestopping.
- C. Install fill materials for penetration and junction firestopping by proven techniques to produce the following results:
 - 1. Fill voids and cavities formed by openings, forming materials, accessories, and penetrating items as required to achieve fire-resistance ratings indicated.
 - 2. Apply materials so they contact and adhere to substrates formed by openings and penetrating items.
 - 3. For fill materials that will remain exposed after completing the Work, finish to produce smooth, uniform surfaces that are flush with adjoining finishes.
- D. Install board insulation in exterior wall construction where indicated on Drawings.

3.4 IDENTIFICATION

- A. Identify penetration and junction firestopping with preprinted metal or plastic labels. Attach labels permanently to surfaces adjacent to and within 6 inches of penetration and junction firestopping edge so labels will be visible to anyone seeking to remove penetrating items or penetration and junction firestopping. Use mechanical fasteners or self-adhering-type labels with adhesives capable of permanently bonding labels to surfaces on which labels are placed. Include the following information on labels:
 - 1. The words "Warning - Penetration and Junction Firestopping - Do Not Disturb. Notify Building Management of Any Damage."
 - 2. Contractor's name, address, and phone number.
 - 3. Designation of applicable testing and inspecting agency.
 - 4. Date of installation.
 - 5. Manufacturer's name.
 - 6. Installer's name.

3.5 FIELD QUALITY CONTROL

- A. Owner will engage a qualified testing agency to perform tests and inspections.
- B. Where deficiencies are found or penetration and junction firestopping is damaged or removed because of testing, repair or replace penetration and junction firestopping to comply with requirements.
- C. Proceed with enclosing penetration and junction firestopping with other construction only after inspection reports are issued and installations comply with requirements.
- D. Reinstall penetration and junction firestopping materials that have been removed for inspection.

3.6 CLEANING AND PROTECTION

- A. Clean off excess fill materials adjacent to openings as the Work progresses by methods and with cleaning materials that are approved in writing by penetration and junction firestopping manufacturers and that do not damage materials in which openings occur.
- B. Provide final protection and maintain conditions during and after installation that ensure that penetration and junction firestopping is without damage or deterioration at time of Substantial Completion. If, despite such protection, damage or deterioration occurs, immediately cut out and remove damaged or deteriorated penetration and junction firestopping and install new materials to produce systems complying with specified requirements.

END OF SECTION

SECTION 079200 - JOINT SEALANTS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section Includes:
 - 1. Urethane joint sealants.
 - 2. Silicone joint sealants.
 - 3. Acoustic sealant.
 - 4. Construction joints contributing to weather tightness, whether indicated or not.
- B. Related Sections:
 - 1. Division 08 Section "Hollow Metal Doors & Frames" for joints between door frames & other construction.
 - 2. Division 08 Section "Fiberglass Windows" for joints between window frames & other construction.

1.3 SUBMITTALS

- A. Product Data: For each joint-sealant product indicated.
- B. Samples for Selection: Provide 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.

1.4 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. Source Limitations: Obtain each kind of joint sealant from single source from single manufacturer.
- C. 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.
 - 2. Test according to SWRI's Sealant Validation Program for compliance with requirements specified by reference to ASTM C 920 for adhesion and cohesion under cyclic movement, adhesion-in-peel, and indentation hardness.
- D. 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.
- E. Pre-installation Conference: Conduct conference at Project site.

1.5 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.

1.6 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: 5 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

2.1 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. Suitability for Contact with Food: Where sealants are indicated for joints that will come in repeated contact with food, provide products that comply with 21 CFR 177.2600.
- D. Colors of Exposed Joint Sealants: As selected by Architect from manufacturer's full range.

2.2 URETHANE JOINT SEALANTS

- A. Urethane 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.

2.3 SILICONE JOINT SEALANTS

- A. 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).
 - 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).

2.4 ACOUSTIC SEALANTS

- A. Basis of Design Product: Green Glue Noiseproofing Sealant, Single-Component, Nonsag, Joint Sealant; Sound Tests: ASTM E 90, Mold Resistance: ASTM D3273-00, VOC: CA Section 01350, Flame Spread: 0, Smoke Developed: 0, Color: White, Solid Content: 70% +/- 5%, Viscosity: Light Paste 1,370,000-1,450,000 cps (#RV-6 @ 10rpm), Odor: Mild, none after drying, Weight: 11.4 +/- 0.5 lbs./gal, Working Temperature: 40 degrees F to 90 degrees F, Drying Time: 48 Hours.
 - 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.
 - b. GE Advanced Materials.
 - c. Pecora Corporation.
 - d. Sika Corporation, Construction Products Division.
 - e. Tremco Incorporated.

2.5 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.

2.6 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

3.1 EXAMINATION

- A. Examine joints indicated to receive joint sealants, with Installer present, for compliance with requirements for joint configuration, installation tolerances, and other conditions affecting joint-sealant performance.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

- A. Surface Cleaning of Joints: Clean out joints immediately before installing joint sealants to comply with joint-sealant manufacturer's written instructions and the following requirements:
 - 1. Remove all foreign material from joint substrates that could interfere with adhesion of joint sealant, including dust, paints (except for permanent, protective coatings tested and approved for sealant adhesion and compatibility by sealant manufacturer), old joint sealants, oil, grease, waterproofing, water repellents, water, surface dirt, and frost.
 - 2. Clean porous joint substrate surfaces by brushing, grinding, mechanical abrading, or a combination of these methods to produce a clean, sound substrate capable of developing optimum bond with joint sealants. Remove loose particles remaining after cleaning operations above by vacuuming or blowing out joints with oil-free compressed air. Porous joint substrates include the following:
 - a. Concrete.
 - b. Aluminum.
 - c. Steel.
 - d. Masonry.
 - e. Gypsum.
 - f. Plywood.
 - 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.
- 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.

3.3 INSTALLATION OF JOINT SEALANTS

- A. General: Comply with joint-sealant manufacturer's written installation instructions for products and applications indicated, unless more stringent requirements apply.
- B. Install joint sealants, whether indicated or not in order to:
 1. Achieve weathertight construction.
 2. Provide construction without unsightly gaps.
 3. Hinder migration of moisture, and/or water to substrates.
 4. Otherwise hinder an incomplete finished appearance.
- C. Sealant Installation Standard: Comply with recommendations in ASTM C 1193 for use of joint sealants as applicable to materials, applications, and conditions indicated.
- D. 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.
- E. Install bond-breaker tape behind sealants where sealant backings are not used between sealants and backs of joints.
- F. 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.
- G. 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.

3.4 CLEANING

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

3.5 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.

3.6 JOINT-SEALANT SCHEDULE

- A. Perimeter Joints between Interior & Exterior Surfaces and Frames of Doors & Windows.
1. Urethane Joint Sealant.
 2. Joint-Sealant Color: As selected by Architect from manufacturer's full range of colors.
- B. Joints between Plumbing Fixtures and Walls and Floors.
1. Silicone Joint Sealant.
 2. Joint-Sealant Color: As selected by Architect from manufacturer's full range of colors.
- C. Interior Acoustic Joints between base of Gypsum Wallboard and Plywood Sheathing as indicated.
1. Acoustic Joint Sealant.
 2. Joint-Sealant Color: White.

D. Interior Joints for Which No Other Sealant is Indicated.

1. Silicone Joint Sealant.
2. Joint-Sealant Color: As selected by Architect from manufacturer's full range of colors.

END OF SECTION

SECTION 081113 - HOLLOW METAL DOORS, WINDOWS AND FRAMES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section Includes:
 - 1. Standard hollow metal doors and frames.
 - 2. Hollow metal frames for interior windows.
 - 3. Fire rated frames where required.
- B. Related Sections:
 - 1. Division 08 Section "Door Hardware" for door hardware for hollow metal doors.
 - 2. Division 09 Section "Interior & Exterior Painting" for field painting hollow metal doors and frames.
- C. All materials and labor shall be furnished by a single contractor who shall assume complete and sole responsibility for furnishing, installing, detailing, coordinating, performance and warranty of work. This shall be the same contractor who supplies wood doors under Division 08 Section "Flush Wood Doors" and door hardware under Division 08 Section "Door Hardware."

1.3 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.

1.4 SUBMITTALS

- A. Product Data: For each type of product indicated. Include construction details, material descriptions, core descriptions, fire-resistance rating, and finishes.
- B. Shop Drawings: Include the following:
 - 1. Elevations of each door design.
 - 2. Details of doors & interior windows, including vertical and horizontal edge details and metal thicknesses.
 - 3. Frame details for each frame type, including dimensioned profiles and metal thicknesses.

4. Locations of reinforcement and preparations for hardware.
5. Details of each different wall opening condition.
6. Details of anchorages, joints, field splices, and connections.
7. Details of accessories.
8. Details of moldings, removable stops, and glazing.

C. Samples for Verification:

1. For each type of exposed finish required, prepared on Samples of not less than 3 by 5 inches.

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. Oversize Construction Certification: For assemblies required to be fire rated and exceeding limitations of labeled assemblies.

F. 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.

1.5 QUALITY ASSURANCE

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

B. Fire-Rated Door Assemblies: If applicable, assemblies complying with NFPA 80 that are listed and labeled by a qualified testing agency, for fire-protection ratings indicated, based on testing at as close to neutral pressure as possible according to UL 10B.

1. Oversize Fire-Rated Door Assemblies: For units exceeding sizes of tested assemblies, provide certification by a qualified testing agency that doors comply with standard construction requirements for tested and labeled fire-rated door assemblies except for size.

C. Fire-Rated, Borrowed-Light Frame Assemblies: If applicable, 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. 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.

1.6 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. Provide minimum 1/4-inch space between each stacked door to permit air circulation.

1.7 PROJECT CONDITIONS

- A. Field Measurements: Verify actual dimensions of openings by field measurements before fabrication.

1.8 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

2.1 MANUFACTURERS

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - 1. Standard Steel Doors and Frames:
 - a. Ceco Door Products; a United Dominion Company.
 - b. Curries Company.
 - c. Steelcraft; a division of Ingersoll-Rand.

2.2 MATERIALS

- A. Cold-Rolled Steel Sheet: ASTM A 1008/A 1008M, Commercial Steel (CS), Type B; suitable for exposed applications.
- B. Hot-Rolled Steel Sheet: ASTM A 1011/A 1011M, Commercial Steel (CS), Type B; free of scale, pitting, or surface defects; pickled and oiled.

- C. Metallic-Coated Steel Sheet: ASTM A 653/A 653M, Commercial Steel (CS), Type B; with minimum G60 or A60 metallic coating.
- D. 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.
- E. Inserts, Bolts, and Fasteners: Hot-dip galvanized according to ASTM A 153/A 153M.
- F. 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.
- G. Grout: ASTM C 476, except with a maximum slump of 4 inches, as measured according to ASTM C 143/C 143M.
- H. 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.

2.3 STANDARD HOLLOW METAL DOORS

- A. General: Provide doors of design indicated, not less than thickness indicated; fabricated with smooth surfaces, without visible joints or seams on exposed faces unless otherwise indicated. Comply with ANSI/SDI A250.8.
 - 1. Design: Flush panel.
 - 2. Core Construction: Manufacturer's standard kraft-paper honeycomb, polystyrene, polyurethane, polyisocyanurate, mineral-board, or vertical steel-stiffener core.
 - a. Fire Door Core: As required to provide fire-protection ratings indicated.
 - b. Thermal-Rated (Insulated) Doors: Where indicated, provide doors fabricated with thermal-resistance value (R-value) of not less than 10.0 deg F x h x sq. ft./Btu when tested according to ASTM C 1363.
 - 1) Locations: As indicated.
 - 2) Rating: 2-Hours.
 - 3. Vertical Edges for Single-Acting Doors: Beveled edge.
 - a. Beveled Edge: 1/8 inch in 2 inches.
 - 4. Vertical Edges for Double-Acting Doors: Round vertical edges with 2-1/8-inch radius.
 - 5. Top and Bottom Edges: Closed with flush or inverted 0.042-inch- thick, end closures or channels of same material as face sheets.
 - 6. Tolerances: Comply with SDI 117, "Manufacturing Tolerances for Standard Steel Doors and Frames."

- B. Interior Doors: Face sheets fabricated from cold-rolled steel sheet unless metallic-coated sheet is indicated. Provide doors complying with requirements indicated below by referencing ANSI/SDI A250.8 for level and model and ANSI/SDI A250.4 for physical performance level:
 - 1. Level 2 (18 ga faces) and Physical Performance Level B (Heavy Duty), Model 2 (Seamless).
- C. Hardware Reinforcement: Fabricate according to ANSI/SDI A250.6 with reinforcing plates from same material as door face sheets.
- D. Fabricate concealed stiffeners and hardware reinforcement from either cold- or hot-rolled steel sheet.

2.4 STANDARD HOLLOW METAL FRAMES

- A. General: Comply with ANSI/SDI A250.8 and with details indicated for type and profile.
- B. Exterior Frames: if applicable, fabricated from metallic-coated steel sheet.
 - 1. Fabricate frames with mitered or coped corners.
 - 2. Fabricate frames as full profile welded unless existing construction prohibits.
 - 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 face welded unless otherwise indicated.
 - 3. Fabricate knocked-down, slip-on frames for in-place existing exterior door openings in walls where installing fully welded door frames would be inhibited.
 - 4. Frames for Level 2 Steel Doors: 0.053-inch- thick steel sheet.
 - 5. Frames for Wood Doors: 0.053-inch- thick steel sheet, if applicable.
 - 6. Frames for Borrowed Lights: 0.053-inch- thick steel sheet, if applicable.
- D. Hardware Reinforcement: Fabricate according to ANSI/SDI A250.6 with reinforcement plates from same material as frames.

2.5 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. Compression Type for Drywall Slip-on Frames: Adjustable compression anchors.

4. Post installed 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.

2.6 STOPS AND MOLDINGS

- A. Fixed Frame Moldings: Formed integral with hollow metal frames, a minimum of 5/8 inch high unless otherwise indicated.

2.7 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. Gasketing: Install new gasketing at Door 108D.

2.8 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 Doors:
1. Full hinge cut-outs for non-handed doors will not be acceptable.
- D. 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. Knock-Down Frames: Ensure that all set screws are fully seated after installation.
 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. Stud-Wall Type: Locate anchors not more than 18 inches from top and bottom of frame. Space anchors not more than 32 inches o.c. and as follows:
 - 1) Three anchors per jamb up to 60 inches high.
 - 2) Four anchors per jamb from 60 to 90 inches high.
 - 3) Five anchors per jamb from 90 to 96 inches high.
 - 4) Five anchors per jamb plus 1 additional anchor per jamb for each 24 inches or fraction thereof above 96 inches high.
 - 5) Two anchors per head for frames above 42 inches wide and mounted in metal-stud partitions.
 - b. 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.
- E. Fabricate concealed stiffeners, edge channels, and hardware reinforcement from either cold- or hot-rolled steel sheet.
- F. 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 doors and frames to receive non-templated, 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.

2.9 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

3.1 EXAMINATION

- A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of the Work.

- B. Examine roughing-in for embedded and built-in anchors to verify actual locations before frame installation.
- C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

- A. Remove welded-in shipping spreaders installed at factory. Restore exposed finish by grinding, filling, and dressing, as required to make repaired area smooth, flush, and invisible on exposed faces.
- B. 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 (1.5 mm). Provide digital photography as evidence as a submittal.

3.3 INSTALLATION

- A. General: Install hollow metal work plumb, rigid, properly aligned, and securely fastened in place; comply with Drawings and manufacturer's written instructions.
- B. Hollow Metal Frames: Install hollow metal frames of size, type 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 necessary for installation 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.
 - g. Field apply bituminous coating to backs of frames that are filled with grout containing antifreezing agents.
 2. Floor Anchors: Provide floor anchors for each jamb and mullion that extends to floor, and secure with postinstalled expansion anchors.
 - a. Floor anchors may be set with powder-actuated fasteners instead of postinstalled expansion anchors if so indicated and approved on Shop Drawings.
 3. 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.
 4. 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.
 5. Installation Tolerances: Adjust hollow metal door frames for squareness, alignment, twist, and plumb to the following tolerances:
 - a. Squareness: Plus or minus 1/16 inch, measured at door rabbet on a line 90 degrees from jamb perpendicular to frame head.
 - b. Alignment: Plus or minus 1/16 inch, measured at jambs on a horizontal line parallel to plane of wall.
 - c. Twist: Plus or minus 1/16 inch, measured at opposite face corners of jambs on parallel lines, and perpendicular to plane of wall.
 - d. Plumbness: Plus or minus 1/16 inch, measured at jambs at floor.
- C. Hollow Metal Doors: Provide & fit hollow metal doors accurately in frames, within clearances specified below. Shim as necessary.
 1. Non-Fire-Rated Standard Steel Doors:
 - a. Jambs and Head: 1/8 inch plus or minus 1/16 inch.
 - b. Between Edges of Pairs of Doors: 1/8 inch plus or minus 1/16 inch.
 - c. Between Bottom of Door and Top of Threshold: Maximum 3/8 inch.
 - d. Between Bottom of Door and Top of Finish Floor (No Threshold): Maximum 3/4 inch.
 2. Fire-Rated Doors: Install doors with clearances according to NFPA 80.
 3. Smoke-Control Doors: Install doors according to NFPA 105.
- D. Hollow Metal Interior Windows: Provide & fit tempered, insulated glazing accurately in frames, for an airtight & noise tight seal, within clearances specified below. Shim as necessary.
 1. Non-Fire-Rated Standard Interior Windows:
 - a. Jambs, Head & Sill: 1/8 inch plus or minus 1/16 inch.
 - b. Rubber gaskets.

3.4 ADJUSTING AND CLEANING

- A. Final Adjustments: Check and readjust operating hardware items immediately before final inspection. Leave work in complete and proper operating condition. Remove and replace defective work, including hollow metal work that is warped, bowed, or otherwise unacceptable.
- B. Remove grout and other bonding material from hollow metal work immediately after installation.
- C. Prime-Coat Touchup: Immediately after installation, 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.
- E. Remove temporary labels & clean glazing on both sides immediately prior to Substantial Completion.

END OF SECTION

SECTION 081416 - FLUSH WOOD DOORS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section Includes:
 - 1. Solid-core doors with wood-veneer faces.
 - 2. Factory finishing flush wood doors.
 - 3. Factory fitting flush wood doors & frames
 - 4. Factory machining for hardware.

1.3 SUBMITTALS

- A. Product Data: For each type of door indicated. Include details of core and edge construction and trim for openings. Include factory-finishing specifications.
- B. Shop Drawings: Indicate location, size, and hand of each door; elevation of each kind of door; construction details not covered in Product Data; location and extent of hardware blocking; and other pertinent data.
 - 1. Indicate dimensions of raw openings (verified in field by the Sub-Contractor)
 - 2. Indicate wood species of all parts of door assembly.
 - 3. Indicate dimensions of wood door panels.
 - 4. Indicate dimensions and locations of mortises and holes for hardware.
 - 5. Indicate dimensions and locations of cutouts.
 - 6. Indicate dimensions, form and locations of wood beads.
 - 7. Indicate requirements for veneer matching.
 - 8. Indicate doors to be factory finished and finish requirements.
 - 9. Indicate fire-protection ratings for fire-rated doors.
- C. Samples for Verification:
 - 1. Factory finishes applied to actual door face materials, approximately 8 by 10 inches, for each material and finish.
- D. Warranty: Sample of special warranty.

1.4 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 as close to neutral pressure as possible according to UL 10B.
- D. Pre-installation Conference: Conduct conference at Project site w/ the Architect.
 - 1. Inspect and discuss condition of substrate and other preparatory work performed by other trades.

1.5 DELIVERY, STORAGE, AND HANDLING

- A. Comply with requirements of referenced standard and manufacturer's written instructions.
- B. Package doors individually in plastic bags or cardboard cartons.
- C. Mark each door on bottom rail with opening number used on Shop Drawings.

1.6 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.

1.7 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 shall also include installation and finishing that may be required due to repair or replacement of defective doors.
 - 3. Warranty Period for Solid-Core Interior Doors: Life of installation.

PART 2 - PRODUCTS

2.1 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.

2.2 DOOR CONSTRUCTION, GENERAL

- A. WDMA I.S.1-A Performance Grade: Extra Heavy Duty.
- B. 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.
- C. 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. Provide UL fire-rating on metal engraved/punched tag.

2.3 VENEERED-FACED DOORS FOR TRANSPARENT FINISH

- A. Interior Solid-Core Doors:
 1. Grade: Premium, with Grade A faces.
 2. Species: Select Maple, or Birch
 3. Cut: Rotary cut.
 4. Match between Veneer Leaves: Book match.
 5. Pair and Set Match: Provide for doors hung in same opening.
 6. Exposed Vertical Edges: Same species as faces.
 7. Core: Structural composite lumber is required.
 8. Construction: Five plies. Stiles and rails are bonded to core, then entire unit abrasive planed before veneering.
 9. WDMA I.S.1-A Performance Grade: Extra Heavy Duty.

2.4 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. Coordinate factory machined doors to fit cylinder hardware provided by the Owner.
 - 1. Prepare hardware templates to allow for factory machining required to match door panel mortise work with specified hardware.
 - 2. Comply with door schedules, prepare door frame Shop Drawings.
 - 3. Coordinate with hardware mortises in wood frames to verify dimensions and alignment before factory machining.

2.5 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, hidden edges of cutouts, and mortises.
 - 2. Provide factory made standing & running trim to match species, grade & finish of wood door assemblies.
- 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

3.1 EXAMINATION

- A. Examine existing and modified door openings. Ensure raw opening is ready for door assembly installation.
- B. Do not install door assembly in unfinished raw openings.
- C. Examine door frames before hanging doors panels.
 - 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 & frames with defects.
- D. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

- A. Locking Hardware: Owner supplied, coordination by the Sub-Contractor.
- B. Hinges: Heavy-Duty, 5 knuckle, tamper resistant locking pin, brushed stainless steel, with 6 coarse thread stainless steel screws per hinge, min. ¼-inch diameter x 2-inches long.
- C. 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.
- D. Factory-Fitted Doors: Align in frames for uniform clearance at each edge.
- E. Factory-Finished Doors: Restore finish before installation if fitting or machining is required at Project site.
- F. Doors w/ Glazing in Fire-Rated Walls: P
 1. Provide Fire-Lite Glazing, or Fire-Rated Film on 3/8" tempered glass complying with the Fire-Rating requirements of the Wall and Door assembly.

3.3 PROTECTION

- A. Protect flush wood door panels from damage w/ Ramboard on both sides fastened with no-residue masking tape. Remove at Substantial Completion.

3.4 ADJUSTING, CLEANING & PROTECTION:

- A. Operation: Rehang or replace doors that do not swing or operate freely. Confirm that doors are hung level and plumb without tendency to close due to gravity.
- B. Clean doors when fully installed and protect both sides of door panels and glazing from damage with Ramboard or equal securely taped in place. Remove protection at Substantial Completion, including any tape residue without damaging the door panel or glazing finish.
- C. Finished Doors: Replace doors that are damaged or that do not comply with requirements. Doors be repaired or refinished if work complies with requirements and shows no evidence of repair or refinishing.

END OF SECTION

SECTION 08 54 13 - FIBERGLASS WINDOWS

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 Fiberglass or other architectural approved equal single hung window complete with hardware, glazing, weather strip, insect half screen, grilles-between-the glass, jamb extension, sheet rock return, j-channel, and standard or specified anchors, trim and attachments. Types include:
 - 1. Single Hung
 - 2. Picture Window
 - 3. Gliding
 - 4. Awning

1.3 Related Sections:

- 1. Division 1 Section "Sustainable Design Requirements"

1.3 DEFINITIONS

- A. Performance class designations according to AAMA/WDMA 101/I.S.2/NAFS:
 - 1. AW: Architectural.
 - 2. HC: Heavy Commercial.
 - 3. C: Commercial.
 - 4. LC: Light Commercial.
 - 5. R: Residential.
- B. Performance grade number according to AAMA/WDMA 101/I.S.2/NAFS:
 - 1. Design pressure number in pounds force per square foot (pascals) used to determine the structural test pressure and water test pressure.
- C. Structural Test Pressure: For uniform load structural test, is equivalent to 150 percent of the design pressure.
- D. Minimum Test Size: Smallest size permitted for performance class (gateway test size). Products must be tested at minimum test size or at a size larger than minimum test size to comply with requirements for performance class.

1.4 PERFORMANCE REQUIREMENTS

- A. General: Provide windows capable of complying with performance requirements indicated, based on testing manufacturer's windows that are representative of those specified, and that are of test size indicated below:
 - 1. Size indicated on Drawings.
- B. Structural Performance: Provide windows capable of withstanding the effects of the following loads, based on testing units representative of those indicated for Project that pass AAMA/WDMA 101/I.S.2/NAFS, Uniform Load Structural Test:
 - 1. Design Wind Loads: Determine design wind loads applicable to Project from basic wind speed indicated in miles per hour (meters per second) at 33 feet (10 m) above grade, according to ASCE 7, Section 6.5, "Method 2-Analytical Procedure," based on mean roof heights above grade indicated on Drawings.
 - a. Basic Wind Speed: see drawings.

1.5 SUBMITTALS

- A. Product Data: Include construction details, material descriptions, fabrication methods, dimensions of individual components and profiles, hardware, finishes, and operating instructions for each type of window indicated.
- B. Shop Drawings: Include plans, elevations, sections, details, hardware, attachments to other work, operational clearances, installation details, and the following:
 - 1. Mullion details, including reinforcement and stiffeners.
 - 2. Joinery details.
 - 3. Expansion provisions.
 - 4. Flashing and drainage details.
 - 5. Weather-stripping details.
 - 6. Glazing details.
 - 7. Window cleaning provisions.
 - 8. For installed products indicated to comply with design loads, include structural analysis data prepared by or under the supervision of a qualified professional engineer detailing fabrication and assembly of windows, and used to determine structural test pressures and design pressures from basic wind speeds indicated.
- C. Samples for Initial Selection: For units with factory-applied color finishes.
 - 1. Include similar Samples of hardware and accessories involving color selection.
- D. Samples for Verification: For windows and components required, prepared on Samples of size indicated below.
 - 1. Main Framing Member: 12-inch- (300-mm-) long, full-size sections of window frame with factory-applied color finish.

2. Window Corner Fabrication: 12-by-12-inch- (300-by-300-mm-) long, full-size window corner including full-size sections of window frame with factory-applied color finish, weather stripping, and glazing.
 3. Operable Window: Full-size unit with factory-applied finish.
 4. Hardware: Full-size units with factory-applied finish.
- E. Product Schedule: For windows. Use same designations indicated on Drawings.
- F. Qualification Data: For Installer manufacturer and testing agency.
- G. Product Test Reports: Based on evaluation of comprehensive tests performed within the last four years by a qualified testing agency for each type, class, grade, and size of window. Test results based on use of downsized test units will not be accepted.
- H. Maintenance Data: For windows and finishes to include in maintenance manuals.
- I. Warranty: Special warranty specified in this Section.

1.6 QUALITY ASSURANCE

- A. Installer Qualifications: An installer acceptable to window manufacturer for installation of units required for this Project.
1. Installer's responsibilities include providing professional engineering services needed to assume engineering responsibility.
 2. Engineering Responsibility: Preparation of data for windows, including Shop Drawings, based on testing and engineering analysis of manufacturer's standard units in assemblies similar to those indicated for this Project.
- B. Manufacturer Qualifications: A manufacturer capable of fabricating windows that meet or exceed performance requirements indicated and of documenting this performance by inclusion in lists and by labels, test reports, and calculations.
- C. Source Limitations: Obtain windows through one source from a single manufacturer.
- D. Product Options: Information on Drawings and in Specifications establishes requirements for windows' 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.
- E. Product Options: Drawings indicate size, profiles, and dimensional requirements of windows and are based on the specific system indicated. Refer to Division 01 Section "Product Requirements." Do not modify size and dimensional 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.

- F. Fenestration Standard: Comply with AAMA/WDMA 101/I.S.2/NAFS, "North American Fenestration Standard Voluntary Performance Specification for Windows, Skylights and Glass Doors," for definitions and minimum standards of performance, materials, components, accessories, and fabrication unless more stringent requirements are indicated.
- G. Glazing Publications: Comply with published recommendations of glass manufacturers and with GANA's "Glazing Manual" unless more stringent requirements are indicated.
- H. Preinstallation Conference: Conduct conference at Project site to comply with requirements in Division 01 Section "Project Management and Coordination."
- I. Preinstallation Conference: Conduct conference at Project site to comply with requirements in Division 01 Section "Project Management and Coordination." Review methods and procedures related to windows including, but not limited to, the following:
 - 1. Review and finalize construction schedule and verify availability of materials, Installer's personnel, equipment, and facilities needed to make progress and avoid delays.
 - 2. Review, discuss, and coordinate the interrelationship of windows with other exterior wall components. Include provisions for structural anchorage, glazing, flashing, weeping, sealants, and protection of finishes.
 - 3. Review and discuss the sequence of work required to construct a watertight and weathertight exterior building envelope.
 - 4. Inspect and discuss the condition of substrate and other preparatory work performed by other trades.
- K. Regulatory Requirements: Emergency Egress or Rescue: Comply with requirements for sleeping units of IBC International Building Code.

1.7 DELIVERY

- A. Comply with provisions of Section 01 65 00.
- B. Deliver in original packaging and protect from weather.

1.8 PROJECT CONDITIONS

- A. Field Measurements: Verify window openings 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 opening dimensions and proceed with fabricating windows without field measurements. Coordinate wall construction to ensure that actual opening dimensions correspond to established dimensions.

1.9 WARRANTY

- A. Windows shall be warranted to be free from defects in manufacturing, materials, and workmanship for a period of ten (10) years from purchase date.

- B. Window glass shall be warranted to be free from defects in manufacturing, materials and workmanship for a period of twenty (20) years from the purchase date.

1.10 REFERENCES

- A. American Society for Testing and Materials (ASTM):
 - 1. E 283: Standard Test Method for Rate of Air Leakage Through Exterior Windows, Curtain Walls, and Doors.
 - 2. E 330: Standard Test Method for Structural Performance of Exterior Windows, Curtains Walls, and Doors by Uniform Static Air Pressure Difference.
 - 3. E 547: Standard Test Method for Water Penetration of Exterior Windows, Curtain Walls, and Doors by Cyclic Static Air Pressure Differential.
 - 4. E 774: Specification for Sealed Insulated Glass Units.
 - 5. C 1036: Standard Specification for Flat Glass.
- B. Sealed Insulating Glass Manufacturers Association / Insulating Glass Certification Council (SIGMA / IGCC).
- C. American Architectural Manufacturers Association / Window and Door Manufacturers Association (AAMA / WDMA):
 - 1. ANSI/AAMA/NWDA 101 / I.S.2-97: Voluntary Specifications for Aluminum, (PVC) and Wood Windows and Glass Doors.
 - 2. 101/I.S. 2/NAFS-02: Voluntary Performance Specification for Windows, Skylights and Glass Doors/
- D. Window and Door Manufacturers Association (WDMA): Hallmark Certification Program.
- E. American Architectural Manufacturers Association (AAMA): 613: Voluntary Performance Requirements and Test Procedures for Organic Coatings on Plastic Profiles.
- F. National Fenestration Rating Council (NFRC): 101: Procedure for Determining Fenestration Product Thermal Properties.

1.11 SYSTEM DESCRIPTION

- A. Design and Performance Requirements:
 - 1. Window units shall be designed to comply with ANSI / AAMA / NWDA 101 / I.S.2-97 and 101 / I.S. 2/ NAFS-02
 - a. Single Hung: (H-LC50) (H-LC30)
 - b. Transom: (TR-C50)
 - c. Picture: (F-C50)
 - 2. Air leakage shall not exceed the following when tested at 1.57 according to ASTM E 283: .03 cfm per square foot of frame.
 - 3. No water penetration shall occur when units are tested at the following pressure according to ASTM E 547:
 - a. : (H-LC50 – 7.5 psf) (H-LC30 – 4.5 psf)
 - b. Glider: (H-LC40 - 6 psf)
 - c. Single Hung Awning: (H-LC40 - 6 psf)
 - d. Picture: (F-C50-7.5 psf)

4. Units shall be designed to comply with ASTM E330 for structural performance when tested at the following pressures:
 - a. Single Hung: (H-LC50 – 7.5 psf) (H-LC30 – 4.5 psf)
 - b. Glider: (H-LC40 - 6 psf)
 - c. Awning: (H-LC40 - 6 psf)
 - d. Picture: (F-C50-7.5 psf)

PART 2 – PRODUCTS

2.1 MANUFACTURERS

- A. Manufacturers:
 1. All Ultrex Impervia as manufactured by Marvin Windows and Doors, Fargo, North Dakota.
 2. All Ultrex Essential as manufactured by Marvin Windows and Doors, Fargo, North Dakota.
 3. Fibrex Andersen A-Series Fiberglass Windows, Bayport, Minnesota.
 2. Or architectural approved equal.

2.2 MATERIALS

2.3 FRAME DESCRIPTION

- A. Interior: Reinforced fiberglass minimum 0.065 – 0.070 inch (2 mm) thick.
- B. Frame width: Manufacturers' standard.

2.4 SASH DESCRIPTION

- A. Manufactures' standard.

2.5 GLAZING

- A. Select quality complying with ASTM C 1036. Insulating glass SIGMA/IGCC certified to performance level CBA when tested in accordance with ASTM E 774.
- B. Glazing method: 3/4 inch (19 mm) Insulated glass.
- C. Glass type: Low E II - Argon gas.
- D. Glazing seal: Silicone bedding at exterior and interior.

2.6 FINISH

- A. Color: Architect to choose from Manufacturers standard.

2.7 HARDWARE

- A. Single Hung:
 1. Balance System: Coil spring block and tackle with nylon cord and glass filled nylon shoe and steel locking shoe.
 2. Jamb Track: Pultrusion.
 3. Lock: High pressure zinc die-cast cam lock and keeper.
 4. Finish: Phosphate coated and electrostatically painted. Color: White.

B. Awning:

1. Lock: Multipoint locking mechanism is actuated from a single point of operation. The lock mechanism is concealed with only the actuator handle and escutcheon being visible to the interior.
2. Hinges: Concealed stainless steel track and injection molded shoe.
3. Handle: Die cast detachable folding handle.
4. Roto-gear Operator: E-Gard™ coated hinge arm and housing mechanism.
5. Snubber: Pulls the sash tight to the frame and provides engagement to keep the sash in place under structural loads.
6. Color: Applies to handle and locking hardware:
7. Finish: Phosphate coated and electrostatically painted. Color: White.

2.2 WEATHER STRIP

A. Single Hung:

1. Sill weather strip is foam filled bulb. The bottom sash is sealed to the jambs using rigid with flexible seals. The top stationary sash seal is foam tape. The checkrails are sealed using rigid with flexible seals.

B. Awning:

1. Primary weather strip is a one-piece, continuous, extruded "Ultra Cell" Micro Cellular Foam Bulb attached to all four sides of the frame by a kerf and provides seal between sash and frame.
2. Secondary weather strip is an extruded TPE hollow bulb that attaches to a kerf in the sash and provides seal between sash and frame.

2.3 INSECT HALF SCREEN

- A. General: Design windows and hardware to accommodate screens in a tight-fitting, removable arrangement, with a minimum of exposed fasteners and latches. Fabricate insect screens to fully integrate with window frame. Locate screens on outside of window and provide for each operable exterior sash or ventilator.
- B. Provide Manufacturers standard screen
- C. Factory installed half screen. Screen mesh, 18 by 16: Charcoal fiberglass.
- D. Frame finish: match windows.

2.4 GRILLES-BETWEEN-THE-GLASS (GBG)

A. Manufactures' standard

1. Profile: Simple raised flat reveal, not simple rectangular profile.
2. Colors: match windows.

2.5 ACCESSORIES AND TRIM

A. Installation Accessories:

1. Factory installed nailing fin at head, sill and side jambs.
2. Installation brackets: Brackets for 4-9/16 inch jambs.

2.6 FABRICATION

- B. Fabricate windows in sizes indicated. Include a complete system for assembling components and anchoring windows.
- C. Weather Stripping: Provide full-perimeter weather stripping for each operable sash and ventilator, unless otherwise indicated.
 1. Single hung and Gliding Windows: Provide weather stripping only at horizontal rails of operable sash.
- D. Subframes: Provide subframes with anchors for window units as shown, of profile and dimensions indicated but not less than 0.062-inch- (1.6-mm-) thick extruded aluminum. Miter or cope corners, and weld and dress smooth with concealed mechanical joint fasteners. Provide manufacturer's standard finish to match window units. Provide subframes capable of withstanding design loads of window units.
- E. Factory-Glazed Fabrication: Except for light sizes in excess of 100 united inches (2500 mm width plus length), glaze windows in the factory where practical and possible for applications indicated. Comply with requirements in Division 08 Section "Glazing" and with AAMA/WDMA 101/I.S.2/NAFS.
- F. Glazing Stops: Provide nailed or snap-on glazing stops coordinated with Division 08 Section "Glazing" and glazing system indicated. Provide glazing stops to match sash and ventilator frames.
- G. Hardware: Mount hardware through double walls of extrusions or provide corrosion-resistant steel reinforcement complying with requirements for reinforcing members, or do both.
- H. Complete fabrication, assembly, finishing, hardware application, and other work in the factory to greatest extent possible. Disassemble components only as necessary for shipment and installation. Allow for scribing, trimming, and fitting at Project site.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine openings, substrates, structural support, anchorage, and conditions, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of work. Verify rough opening dimensions, levelness of sill plate, and operational clearances. Examine wall flashings, vapor retarders, water and weather barriers, and other built-in components to ensure a coordinated, weathertight window installation.
 1. Masonry Surfaces: Visibly dry and free of excess mortar, sand, and other construction debris.
 2. Wood Frame Walls: Dry, clean, sound, well nailed, free of voids, and without offsets at

joints. Ensure that nail heads are driven flush with surfaces in opening and within 3 inches (76 mm) of opening.

3. Metal Surfaces: Dry; clean; free of grease, oil, dirt, rust, corrosion, and welding slag; without sharp edges or offsets at joints.
4. Proceed with installation only after unsatisfactory conditions have been corrected.

3.1 EXAMINATION

- A. Verification of Conditions: Before Installation, verify openings are plumb, square, and of proper dimension as required in Section 01 71 00. Report frame defects or unsuitable conditions to the General Contractor before proceeding.
- B. Acceptance of Conditions: Beginning of installation confirms acceptance of existing conditions.

3.2 INSTALLATION

- A. Comply with Section 01 "Execution".
- B. Assemble and install window unit according to manufacturer's instructions and reviewed shop drawings.
- C. Install sealant and related backing materials at perimeter of unit or assembly in accordance with Section 07 "Joint Sealants". Do not use expansive foam sealant.
- D. Install accessory items as required.
- E. Use finish nails to apply wood trim and mouldings.
- F. Install interior & exterior wood trim as per SECTIONs 06 "Interior Finish Carpentry", 09 "Interior & Exterior Painting".

3.3 CLEANING

- A. Remove visible labels and adhesive residue according to manufacturer's instructions.
- B. Leave windows and glass in a clean condition. Final cleaning as required in Section 01 74 00.

3.4 PROTECTING INSTALLED CONSTRUCTION

- A. Comply with Section 01 "Execution".
- B. Protect windows from damage by chemicals, solvents, paint, or other construction operations that may cause damage.

3.2 INSTALLATION

- A. Comply with Drawings, Shop Drawings, and manufacturer's written instructions for installing windows, hardware, accessories, and other components.
- B. Install windows level, plumb, square, true to line, without distortion or impeding thermal movement, anchored securely in place to structural support, and in proper relation to wall flashing and other adjacent construction.

- C. Install, prep and finish wood window jamb & header extensions as required.
- D. Set sill members in bed of sealant or with gaskets, as indicated, for weathertight construction.
- E. Separate aluminum and other corrodible surfaces from sources of corrosion or electrolytic action at points of contact with other materials.

3.3 ADJUSTING, CLEANING, AND PROTECTION

- A. Adjust operating sashes and ventilators, screens, hardware, and accessories for a tight fit at contact points and weather stripping for smooth operation and weathertight closure. Lubricate hardware and moving parts.
- B. Clean exposed surfaces immediately after installing windows. Avoid damaging protective coatings and finishes. Remove excess sealants, glazing materials, dirt, and other substances.
- C. Clean factory-glazed glass immediately after installing windows. Comply with manufacturer's written recommendations for final cleaning and maintenance. Remove nonpermanent labels, and clean surfaces.
- D. Remove and replace glass that has been broken, chipped, cracked, abraded, or damaged during construction period.
- E. Protect window surfaces from contact with contaminating substances resulting from construction operations. In addition, monitor window surfaces adjacent to and below exterior concrete and masonry surfaces during construction for presence of dirt, scum, alkaline deposits, stains, or other contaminants. If contaminating substances do contact window surfaces, remove contaminants immediately according to manufacturer's written recommendations.

END OF SECTION

SECTION 087100 - DOOR HARDWARE

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. All of the Contract Documents, including General and Supplementary Conditions and Division 1 General Requirements, apply to the work of this section.

1.2 DESCRIPTION OF THE WORK

- A. The work of this section includes the furnishing of door hardware as shown on the Drawings and as herein specified for the proper operation of wood and hollow metal doors which, without limiting the generality thereof includes:
 - 1. Furnishing all required templates and schedules.
 - 2. Delivery of door hardware under this Section to the Sub-Contractor for installation.
 - 3. Coordinate work with related trades.

1.3 RELATED WORK

- A. Examine Contract Documents for requirements that affect work of this Section. Other Specification Sections that relate directly to work of this Section include, but are not limited to:
 - 1. Division 8 - FINISH CARPENTRY
 - 2. Division 8 - METAL DOORS, WINDOWS AND FRAMES

1.4 REFERENCES

- A. Comply with applicable requirements of the following standards. Where these standards conflict with other specified requirements, the most restrictive requirements shall govern.
 - 1. Americans with Disabilities Act (ADA):
Providing Accessibility and Usability for Physically Handicapped People.
 - 2. Door and Hardware Institute (DHI):
Ref. 1 Recommended Locations for Builders Hardware.

1.5 SUBMITTALS:

- A. Hardware Schedules: Prepare and submit to the Architect for approval a complete Hardware Schedule in digital format. The Schedule shall be in vertical format and shall include the manufacturers' numbers, types, sizes, and installation location of all hardware required to complete the job. The Hardware Schedule shall list the Specification Hardware Set Number next to the Schedule Heading Number and shall include a numerical Door Index listing the Schedule Heading Numbers and a condensed list of products, manufacturer's numbers and quantities scheduled therein.
- B. Catalogue Cuts: Include with the Schedule a set of catalogue cuts, together with product data sheets, of all hardware items. Catalog Cuts to be attached to Hardware Schedule as a complete Submission

- C. Templates: All required templates shall be furnished in accordance with the schedule. Furnish templates to the door and frame manufacturer sufficiently in advance so as not to delay progress of the work. However, no templates shall be issued or materials ordered until the schedule has been approved.
- D. Samples: A sample of each item of hardware the successful bidder proposes to furnish shall be submitted for approval not later than ten (10) days after being requested. After review, samples shall be returned to the Supplier.

1.6 PACKING AND MARKING

- A. All hardware shall be delivered to the site in packages which are legibly marked with labels indicating the manufacturers' numbers, types and sizes, and with the Hardware Schedule reference number.
- B. Each hardware item shall be wrapped together with all screws, bolts, and fastenings necessary for its proper installation.

1.7 DELIVERY AND STORAGE

- A. The GC shall receive, check against invoices, and store all hardware at the job.
- B. Delivery of hardware to the job shall be made in accordance with the GC's instructions.
- C. The GC shall furnish the supplier of the hardware with receipts for all hardware received.
- D. The GC shall provide adequate locked storage space with shelving, and shall be responsible for all items of hardware after receipt from the supplier. He shall replace all lost or damaged hardware at his own expense.

1.8 KEYING

- A. All Permanent Cores shall be furnished and installed by the GC. GC shall coordinate with Owner regarding format type in advance of placing order for door hardware.

1.9 SPECIAL REQUIREMENTS

- A. Hardware Supplier shall determine conditions and materials of all doors and frames for proper application of hardware.
- B. Hardware Supplier shall be responsible for the accuracy of the quantities, sizes, finish and proper hardware to be furnished, whether specifically listed or not, and shall be responsible for determining all details, such as and of doors, bevel of locks, etc.
- C. All lever or knob trim for door locks to hazardous areas such as Mechanical, Electrical, Elevator Machine Rooms, etc., shall have a tactile surface to comply with requirements of the Authority Having Jurisdiction.
- D. Tools for Maintenance: All special tools packed with hardware items shall be saved and turned over to the Owner upon completion of the Work.

- E. Lock fronts, flush bolt faces, and strikes shall be beveled in accordance with manufacturer's standards.
- F. Furnish strikes and electric strikes as required by the Door Schedule. Electric strikes shall be compatible with HID Mini-Proxy 5365EGP00 (refer to Electrical). GC shall coordinate electric strike and proximity card reader compatibility.
- G. Handing of doors shall be verified by the supplier.
- H. Refer to Hollow Metal Section regarding adequate blocking and reinforcing for surface applied hardware.
- J. Hardware not specifically listed for a particular opening shall be the same as hardware scheduled for similar openings.

PART 2 - PRODUCTS

2.1 QUALITY ASSURANCE

- A. All hardware shall be entirely free from imperfection in manufacture and finish. It is the responsibility of the Hardware Supplier to follow the manufacturers' catalogue requirements for the proper size and weight of hardware and fastenings, and the proper function of hardware in each case. All door sizes are to be noted on the Door Schedule and all hardware shall be in strict accordance with requirements of height, width, and thickness.
- B. The numbers used below to set a standard of quality for the major products for this project are taken from the catalogs of those manufacturers whose names appear in parentheses. Equivalent products of the other manufacturers listed are acceptable provided said products are equal to the items specified in quality, weight, design and function, and approved by the The Construction Manager/Specifier. Where only one manufacturer is listed, no substitution shall be permitted.

<u>ITEM</u>	<u>MANUFACTURERS</u>
Butts	(McKinney) BAHCO, Hager
Keying	(By Owner)
Locksets	Sargent
Exit Devices	Sargent
Closers	LCN
Pulls	(Rockwood) Hager, Trimco
Protection Plates	(Rockwood) Hager, Trimco
Stops	(Rockwood) Hager, Trimco
Thresholds/Gasketing	(National Guard Products) Hager, Pemko
Astragal	(Rockwood) Hager, Trimco

2.2 HINGES AND PIVOTS

- A. Number of hinges or pivots per door: Two hinges or pivots are to be provided for doors up to and including five feet in height, and an additional hinge for each two-and-one-half feet (2-1/2'), or fraction thereof, of the height of the door.
- B. Hinges for interior doors shall be steel, McKinney "TA" Series, sized as follows:

<u>Door Thickness</u>	<u>Door Width</u>	<u>Hinge Weight</u>	<u>Hinge Height</u>
1-3/4"	Under 39"	Regular Weight	4-1/2"
1-3/4"	39" and over	Heavy Weight.	5"

Width of hinges shall be determined by trim conditions.

- C. Hinges are to be of Three knuckle concealed bearing design, equipped with full radial thrust and lateral bearing assemblies. The bearing assemblies are to be permanently lubricated and sealed. All hinges are to have positive non-rising pins and a hole in the bottom tip for easy pin removal. Pins shall be through hardened.
- D. Hinges at all interior out swinging lockable doors shall have non-removable pins (NRP).

2.3 EXIT DEVICES

- A. Exit Devices shall be Sargent 8900 Mortise Lock Exit Device, in functions as noted in the HW Sets below. Furnish Narrow Stile Devices where stiles dictate.
- B. Latch Bolt: Brass Nickel plated, 3/4" (19mm) throw, anti-friction.
- C. Device Centerline: 41" (1041 mm) above FFL.
- D. Furnish cylinder dogging ("16" prefix) for all non-fire rated devices. Furnish Fire Rated Devices, as required.
- E. All Exit Devices shall be furnished sans Lexan insert ("19" prefix) and Flush End Cap ("43" Prefix).
- F. Finish: Satin Stainless Steel (BHMA 630).
- G. Furnish strikes with extended lips at deep reveals and where required to protect trim from being marred by latchbolt.
- H. Outside Trim: No pull side hardware required.

2.4 CLOSERS

- A. Overhead Surface Closers shall be LCN 4040XP, in the following applications,

Interior Doors: Series. Furnish arm functions where noted in the HW Sets.

Cylinder: Cast iron.
Piston: 3/4" dia.
Fluid: All-weather Liquid X fluid.
Spring Force: LCN patented Green Dial spring force indicator, adjustable spring sizes 1-6.
Installation: Non-handed.
ADA: Meets ADA requirements.
Tests & Certifications: ANSI/BHMA A156.4 Grade 1.
Mounting: Top-side.
Cover: Handed metal.
Finish: Plated finish on metal cover, arm and fasteners.

- B. Unless specified otherwise, closers shall be mounted on that side of the opening least objectionable to the public view. Provide parallel arm type at reverse bevel conditions.
- C. Template and install all door closers for the maximum degree of opening as indicated on the drawings (except where built in stops are specified).

2.5 PROTECTION PLATES

- A. Kick Plates shall be Rockwood K1062, 8" high, unless noted otherwise. Plates shall be 2" less width of the door on single doors and 1" less width of the door on pairs of doors. Armor Plates shall be 34" high.

2.6 STOPS

- A. Overhead Stop, Dorma 900 Series.
- B. Kick Door Stop – Stanley N273-557, 5" satin chrome.

2.7 GASKETING/ DOOR BOTTOMS/THRESHOLDS

- A. Gasketing shall be NGP 5020C, applied at head and jambs (refer to Door Schedule). Provide Gasketing at Doors 101, 102, 103, 104 & 105.
- B. Overlapping Astragals shall be NGP 139SP x full height of opening (if not By Door Manufacturer). Refer to Lockset Paragraph 2.3-C regarding Strike Lip. Astragals shall not be notched.
- C. Sets of Astragals shall be NGP 600A (2-pieces).
- D. Thresholds for exterior outswing doors shall be NGP 950S, unless otherwise detailed.
- E. Sweeps shall be NGP 200SA.
- F. Furnish NGP 17 Drip Strips for all exterior doors.
- G. All Thresholds shall be cut-in around mullions, frame members, stops, mullions (not butted up against) and shall provide a continuous surface across the full width of the opening from

jamb to jamb. Strikes for Exit Device Bottom rods shall be installed in field. All Thresholds shall be properly sealed, grouted and/or caulked and set in a full bed of mastic.

2.8 MISCELLANEOUS

- A. Furnish Door Silencers for all interior hollow metal and wood frames and shall be equal to Rockwood 608/609.

2.9 FINISHES - Unless otherwise noted, finish shall be as follows:

- A. Butts shall be satin chrome finish (US26D/626/652).
- B. Overhead Closers shall be Powder Coated Aluminum, 689 finish.

PART 3 - EXECUTION

3.1 MOUNTING POSITIONS

- A. Mounting heights given are centerline heights from finished floor.
- B. Hinges: Position top hinge five inches below head, bottom hinge ten inches above finished floor and intermediate hinge equally spaced between top and bottom hinges.
- C. Locksets and Latchsets: Unless shown otherwise, locate center of levers 40 inches above finished floor; deadlocks and deadlatches – 46" AFF (or per manufacturers standard locations).
- D. Overhead Closers:
 - 1. Verify each head condition prior to furnishing door closers.
 - 2. Surface-mounted on Door: Surface shoe application for standard operation and soffit plate application for parallel arms. Provide special shoe plates and brackets where specified or where required by job conditions.
 - 3. Set hardware plumb, level and in exact alignment and location. Conceal and countersink fasteners wherever possible.

3.2 ADJUSTING, CLEANING AND PROTECTION

- A. Adjust hardware items to work smoothly, easily and correctly.
- B. Clean exposed surfaces using non-abrasive materials and methods recommended by the manufacturer of the hardware being cleaned. Remove and replace work, which cannot be successfully cleaned, as judged solely by the The Construction Manager.
- C. Provide temporary protection to ensure work being done without damage or deterioration at time of Final Acceptance. Levers shall be kept covered with heavy cloth, and other hardware shall be protected against damage until Substantial Completion of the Project. Remove protections and re-clean as necessary immediately prior to Final Acceptance.

3.3 COMPLETION AND CONTINUED MAINTENANCE

- A. Before completion of work of this Section, inspect work and adjust and correct work to leave operating parts in perfect operating condition, jointing to adjacent material tight, surfaces without blemishes or stains, work properly executed and complete, and defects and damaged work replaced or corrected.

3.4 DOOR HARDWARE

- A. Door Hardware is listed on:
 - a. A-102 Barn
 - b. A-201DMR Officeand represents the complete hardware requirements for each opening. Furnish the quantities required of each set for the work.
- B. The numbers used opposite Locksets and Exit Devices to identify the function are Sargent numbers. Where "HW" is noted, furnish butts Heavy Weight.
- C. Pole Barn Door Clasp-Latches & Pad Locks:
 - a. Provide heavy duty galvanized steel clasp-latches
 - b. Provide outdoor padlocks for each door set:
 - i. Base Bid: One (1) sliding door set, Two (2) personnel doors.
 - ii. Alternate #4: Add four (4) sliding door sets.
 - iii. Provide Two (2) matching spare Outdoor Padlocks, hand over to Owner.
 - c. Outdoor Padlocks Basis of Design: Master Lock Outdoor Padlocks as provided by ULINE, Website: https://www.uline.com/BL_732/Master-Lock-Outdoor-Padlocks , Model No.: H-7800, Keyed alike, 2-1/2" Hardened steel shackle, Width: 7/8", Impact & weather resistant, Heavy Duty Steel Body.

END OF SECTION

SECTION 088000 - GLAZING

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 glazing for the following products and applications, including those specified in other Sections where glazing requirements are specified by reference to this Section:
 - 1. Exterior Doors.
 - 2. Transaction Window.
- B. Related Sections:
 - 1. Division 08 Section "Hollow Metal Doors & Windows" for steel doors to be factory glazed and Interior Windows to be factory and field glazed.

1.3 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.
- D. Tempered: as required by applicable codes and as indicated.

1.4 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.
- B. Delegated Design: Design glass, including comprehensive engineering analysis according to ICC's 2003 International Building Code by a qualified professional engineer, using the following design criteria:

1. Design Wind Pressures: Determine design wind pressures applicable to Project according to ASCE/SEI 7, based on heights above grade as indicated on Drawings.
 2. Vertical Glazing: For glass surfaces sloped 15 degrees or less from vertical, design glass to resist design wind pressure based on glass type factors for short-duration load.
 3. Maximum Lateral Deflection: For glass supported on all four edges, limit center-of-glass deflection at design wind pressure to not more than 1/50 times the short-side length or 1 inch, whichever is less.
 4. Differential Shading: Design glass to resist thermal stresses induced by differential shading within individual glass lites.
- C. Thermal Movements: Allow for thermal movements from ambient and surface temperature changes acting on glass framing members and glazing components.
1. Temperature Change: 120 deg F, ambient; 180 deg F, material surfaces.

1.5 SUBMITTALS

- A. Product Data: For each glass product and glazing material indicated.
- B. Glass Samples: For each type of the following products; 12 inches square.
 1. Insulating glass.
- C. Glazing Schedule: List glass types and thicknesses for each size opening and location. Use same designations indicated on Drawings.
- D. 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.
- E. Product Certificates: For glass and glazing products, from manufacturer.
- F. Product Test Reports: Based on evaluation of comprehensive tests performed by a qualified testing agency, for insulating glass.
- G. Warranties: Sample of special warranties.

1.6 QUALITY ASSURANCE

- A. Manufacturer Qualifications for Insulating-Glass Units with Sputter-Coated, Low-E Coatings: A qualified insulating-glass manufacturer who is approved by coated-glass manufacturer.
- B. Glass Testing Agency Qualifications: A qualified independent testing agency accredited according to the NFRC CAP 1 Certification Agency Program.
- C. Sealant Testing Agency Qualifications: An independent testing agency qualified according to ASTM C 1021 to conduct the testing indicated.

- D. Source Limitations for Glass: Obtain insulating glass from single source from single manufacturer for each glass type.
- E. Source Limitations for Glazing Accessories: Obtain from single source from single manufacturer for each product and installation method.
- F. 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. IGMA Publication for Insulating Glass: SIGMA TM-3000, "North American Glazing Guidelines for Sealed Insulating Glass Units for Commercial and Residential Use."
- G. 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.
- H. Fire-Protection-Rated Glazing Labeling: If applicable, 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.

1.7 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.

1.8 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.

1.9 WARRANTY

- A. Manufacturer's Special Warranty on Insulating Glass: Manufacturer's standard form in which insulating-glass manufacturer agrees to replace insulating-glass units that deteriorate within specified warranty period. Deterioration of insulating glass is defined as failure of hermetic seal under normal use that is not attributed to glass breakage or to maintaining and cleaning

insulating glass contrary to manufacturer's written instructions. Evidence of failure is the obstruction of vision by dust, moisture, or film on interior surfaces of glass.

1. Warranty Period: 10 years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 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.
- C. Thermal and Optical Performance Properties: Provide glass with performance properties specified, as indicated in manufacturer's published test data, based on procedures indicated below:
 1. For monolithic-glass lites, properties are based on units with lites 6.0 mm thick.
 2. For insulating-glass units, properties are based on units of thickness indicated for overall unit and for each lite.
 3. U-Factors: Center-of-glazing values, according to NFRC 100 and based on LBL's WINDOW 5.2 computer program, expressed as Btu/sq. ft. x h x deg F.
 4. Solar Heat-Gain Coefficient and Visible Transmittance: Center-of-glazing values, according to NFRC 200 and based on LBL's WINDOW 5.2 computer program.
 5. Visible Reflectance: Center-of-glazing values, according to NFRC 300.

2.2 GLASS PRODUCTS

- A. Float Glass: ASTM C 1036, Type I, Quality-Q3, Class I (clear) unless otherwise indicated.
- B. 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.
 3. For coated vision glass, comply with requirements for Condition C (other coated glass).
 4. Required at all exterior doors where glazing is indicated, regardless of height.

2.3 INSULATING GLASS

- A. Insulating-Glass Units: Factory-assembled units consisting of sealed lites of glass separated by a dehydrated interspace, qualified according to ASTM E 2190, and complying with other requirements specified.
 - 1. Sealing System: Dual seal, with silicone primary seal and butyl secondary seal.
 - 2. Spacer: Manufacturer's standard spacer material and construction.
 - 3. Desiccant: Molecular sieve or silica gel, or blend of both.
- B. Glass: Comply with applicable requirements in "Glass Products" Article as indicated by designations in "Insulating-Glass Types" Article.

2.4 GLAZING GASKETS

- A. Dense Compression Gaskets: Molded or extruded gaskets of profile and hardness required to maintain watertight and airtight (noise) seal, made from one of the following:
 - 1. Neoprene complying with ASTM C 864.
 - 2. EPDM complying with ASTM C 864.
 - 3. Silicone complying with ASTM C 1115.
 - 4. Thermoplastic polyolefin rubber complying with ASTM C 1115.
- B. Soft Compression Gaskets: Extruded or molded, closed-cell, integral-skinned neoprene 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.

2.5 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 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.

2.6 GLAZING TAPES

A. Back-Bedding Mastic Glazing Tapes: Preformed, butyl-based, 100 percent solids elastomeric tape; nonstaining and nonmigrating in contact with nonporous surfaces; with or without spacer rod as recommended in writing by tape and glass manufacturers for application indicated; and complying with ASTM C 1281 and AAMA 800 for products indicated below:

1. AAMA 804.3 tape, where indicated.
2. AAMA 806.3 tape, for glazing applications in which tape is subject to continuous pressure.
3. AAMA 807.3 tape, for glazing applications in which tape is not subject to continuous pressure.

B. 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.

2.7 MISCELLANEOUS GLAZING MATERIALS

A. General: Provide products of material, size, and shape complying with referenced glazing standard, requirements of manufacturers of glass and other glazing materials for application indicated, and with a proven record of compatibility with surfaces contacted in installation.

B. Cleaners, Primers, and Sealers: Types recommended by sealant or gasket manufacturer.

C. Setting Blocks: 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: If applicable, 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.

2.8 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.
- B. Clean-cut or flat-grind vertical edges of butt-glazed monolithic lites to produce square edges with slight chamfers at junctions of edges and faces.
- C. Provide circular cut-outs for penetrations through transaction glazing units for Alpha TTU-1A-X talk-thru communication devices, as indicated.

PART 3 - EXECUTION

3.1 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.

3.2 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.

3.3 GLAZING, GENERAL

- A. Comply with combined written instructions of manufacturers of glass, sealants, gaskets, and other glazing materials, unless more stringent requirements are indicated, including those in referenced glazing publications.
- B. 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.
- K. Where wedge-shaped gaskets are driven into one side of channel to pressurize sealant or gasket on opposite side, provide adequate anchorage so gasket cannot walk out when installation is subjected to movement.
- L. Square cut wedge-shaped gaskets at corners and install gaskets in a manner recommended by gasket manufacturer to prevent corners from pulling away; seal corner joints and butt joints with sealant recommended by gasket manufacturer.

3.4 TAPE GLAZING

- A. Position tapes on fixed stops so that, when compressed by glass, their exposed edges are flush with or protrude slightly above sightline of stops.
- B. Install tapes continuously, but not necessarily in one continuous length. Do not stretch tapes to make them fit opening.
- C. 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.

3.5 GASKET GLAZING (DRY)

- A. Cut compression gaskets to lengths recommended by gasket manufacturer to fit openings exactly, with allowance for stretch during installation.
- B. Insert soft compression gasket between glass and frame or fixed stop so it is securely in place with joints miter cut and bonded together at corners.
- C. Installation with Pressure-Glazing Stops: Center glass lites in openings on setting blocks and press firmly against soft compression gasket. Install dense compression gaskets and pressure-glazing stops, applying pressure uniformly to compression gaskets. Compress gaskets to produce a weathertight seal without developing bending stresses in glass. Seal gasket joints with sealant recommended by gasket manufacturer.
- D. Install gaskets so they protrude past face of glazing stops.

3.6 SEALANT GLAZING (WET)

- A. Install continuous spacers, or spacers combined with cylindrical sealant backing, between glass lites and glazing stops to maintain glass face clearances and to prevent sealant from extruding into glass channel and blocking weep systems until sealants cure. Secure spacers or spacers and backings in place and in position to control depth of installed sealant relative to edge clearance for optimum sealant performance.
- B. Force sealants into glazing channels to eliminate voids and to ensure complete wetting or bond of sealant to glass and channel surfaces.

- C. Tool exposed surfaces of sealants to provide a substantial wash away from glass.

3.7 STRUCTURAL SILICONE JOINTS

- A. Inspect insulating units, verifying proper placement and support of setting blocks. Clean edge of insulating unit to assure full adhesion of sealant.
- B. Verify silicone has been checked for compatibility with the seals of insulating glass units and glazing channel substrates and gaskets.
- C. Stabilize glass, fully retained to prevent movement during curing of the joint sealant.
- D. Install backer rod to permit proper depth of joint sealant.
- E. Schedule sealant operations during periods of minimal wind to prevent pick up of airborne dust. Gun silicone into joint under pressure without displacing backer rod, fully wetting surfaces for full adhesion, providing weather tight seal. Gun or tool silicone, providing smooth uniform joint without excess material on glass. Remove smears from glass, using methods that do not damage glass or sealant.

3.8 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.

END OF SECTION

SECTION 092216 - NON-STRUCTURAL METAL FRAMING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. This Section includes non-load-bearing steel framing members for the following applications:
 - 1. Interior framing systems (e.g., supports for partition walls, framed soffits, furring, etc.).
 - 2. Interior suspension systems (e.g., supports for ceilings, suspended soffits, etc.), if applicable.
- B. Related Sections include the following:
 - 1. Division 07 Section "Batt Insulation" for insulation installations indicated.
 - 2. Division 06 Section "Rough Carpentry" for installations indicated.
 - 3. Division 10 Section "Specialties" for items indicated.

1.3 SUBMITTALS

- A. Product Data: For each type of product indicated.
- B. Product Data: For each type of cold-formed metal framing product and accessory indicated.
- C. Shop Drawings: Show layout, spacings, sizes, thicknesses, and types of cold-formed metal framing; fabrication; and fastening and anchorage details, including mechanical fasteners. Show reinforcing channels, opening framing, supplemental framing, strapping, bracing, bridging, splices, accessories, connection details, and attachment to adjoining work.
 - 1. If applicable to application, include structural analysis calculations signed and sealed by the qualified professional engineer responsible for their preparation.
 - a. Review of structural analysis calculations is for general conformance with requirements and completeness. The responsibility for correctness rests solely with the professional engineer. The Architect reserves the authority to require resubmittal for observed deficiencies, or incompleteness.
 - 2. Include complete details for all member connections at openings and other discontinuities of the wall system.
 - 3. Specify connections to supports at top and bottom of wall including spacings at jambs of openings.

1.4 QUALITY ASSURANCE

- A. Fire-Test-Response Characteristics: For fire-resistance-rated assemblies that incorporate non-load-bearing steel framing, provide materials and construction identical to those tested in assembly indicated according to ASTM E 119 by an independent testing agency.
- B. STC-Rated Assemblies: For STC-rated assemblies, provide materials and construction identical to those tested in assembly indicated according to ASTM E 90 and classified according to ASTM E 413 by an independent testing agency.

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. Steel Framing and Furring:
 - a. Dietrich Industries, Inc., UltraSteel™ Framing.
 - b. MarinoWare; Division of Ware Ind.
 - c. National Gypsum Company.
 - d. The Steel Network, Inc.
 - e. Unimast, Inc.

2.2 NON-LOAD-BEARING STEEL FRAMING, GENERAL

- A. Framing Members, General: Comply with ASTM C 754 for conditions indicated.
 - 1. Steel Sheet Components: Comply with ASTM C 645 requirements for metal, unless otherwise indicated.
 - 2. Protective Coating: ASTM A 653/A 653M, G40, hot-dip galvanized or equivalent per ASTM A1003.
- B. Furring Channels (Furring Members):
 - 1. Cold-Rolled Channels: 0.0538-inch bare-steel thickness, with minimum 1/2-inch- wide flanges, typically 3/4-inch deep.
 - 2. Steel Studs: ASTM C 645.
 - a. Minimum Base-Metal Thickness: 0.0179 inch.
 - b. Depth: 3/4"-inch.
 - c. Heights: As indicated, use heavier gauge carrying channels for heights above 10'0".
 - 3. Hat-Shaped, Rigid Furring Channels: ASTM C 645, typically 7/8-inch deep.
 - a. Minimum Base Metal Thickness: 0.0179 inch.
 - b. Depth: 7/8-inch.

- c. Heights: As indicated, use heavier gauge carrying channels for heights above 10'0".
- 4. Resilient Furring Channels: If applicable, 1/2-inch- deep members designed to reduce sound transmission.
 - a. Configuration: Asymmetrical.

2.3 STEEL FRAMING FOR FRAMED ASSEMBLIES

- A. Steel Studs and Runners: ASTM C 645.
 - 1. Minimum Base-Metal Thickness: 16 Gauge.
 - 2. Depth: 11-5/8".
- B. Slip-Type Head Joints: Where indicated, provide one of the following:
 - 1. Single Long-Leg Runner System: ASTM C 645 top runner with 2-inch- deep flanges in thickness not less than indicated for studs, installed with studs friction fit into top runner and with continuous bridging located within 12 inches of the top of studs to provide lateral bracing.
 - 2. Double-Runner System: ASTM C 645 top runners, inside runner with 2-inch- deep flanges in thickness not less than indicated for studs and fastened to studs, and outer runner sized to friction fit inside runner.
 - a. Available Products: Subject to compliance with requirements, products that may be incorporated into the Work include, but are not limited to, the following:
 - 1) Steel Network Inc. (The); VertiClip SLD or VertiTrack VTD Series.
 - 2) Superior Metal Trim; Superior Flex Track System (SFT).
- C. Firestop Tracks: If applicable, top runner manufactured to allow partition heads to expand and contract with movement of the structure while maintaining continuity of fire-resistance-rated assembly indicated; in thickness not less than indicated for studs and in width to accommodate depth of studs.
 - 1. Available Products: Subject to compliance with requirements, products that may be incorporated into the Work include, but are not limited to, the following:
 - 2. Products: Subject to compliance with requirements, provide one of the following:
 - a. Fire Trak Corp.; Fire Trak.
 - b. Metal-Lite, Inc.; The System.
 - c. The Steel Network, Inc.; VertiClip SLD or VertiTrack VTD.
 - d. Dietrich: SLP-TRK Slotted Track.
- D. Flexible Track: If applicable, Flexible Steel track for curved walls consisting of ASTM A 653, 20 gage galvanized steel channel sections with slotted sides and slide-able straps.
 - 1. Available Product: Subject to compliance with requirements, products that may be incorporated into the Work include, but are not limited to, the following:

- a. Flex-C Trac as manufactured by Flex-ability Concepts, P.O. Box 7145 Edmond, OK 73083, Tel 405-715-1799, www.flexc.com.
- E. Cold-Rolled Channel Bridging: 0.0538-inch bare-steel thickness, with minimum 1/2-inch- wide flanges.
 - 1. Depth: 1-1/2 inches.
 - 2. Clip Angle: 1-1/2 by 1-1/2 inch, 0.068-inch- thick, galvanized steel or BridgeClip by The Steel Network, Inc.
- F. Hat-Shaped, Rigid Furring Channels: ASTM C 645.
 - 1. Minimum Base Metal Thickness: 0.0179 inch.
 - 2. Depth: As indicated on Drawings.
- G. Resilient Furring Channels: 1/2-inch- deep, steel sheet members designed to reduce sound transmission.
 - 1. Configuration: Asymmetrical.
- H. Cold-Rolled Furring Channels: 0.0538-inch bare-steel thickness, with minimum 1/2-inch- wide flanges.
 - 1. Depth: 3/4 inch.
 - 2. Furring Brackets: Adjustable, corrugated-edge type of steel sheet with minimum bare-steel thickness of 0.0312 inch.
 - 3. Tie Wire: ASTM A 641/A 641M, Class 1 zinc coating, soft temper, 0.0625-inch- diameter wire, or double strand of 0.0475-inch- diameter wire.
- I. Z-Shaped Furring: If applicable, with slotted or nonslotted web, face flange of 1-1/4 inches, wall attachment flange of 7/8 inch, minimum bare-metal thickness of 0.0179 inch, and depth required to fit insulation thickness indicated.
- J. Maximum allowable deflection (either horizontal or vertical): 1/600 (exterior) and 1/360 (interior) of span measured from point of structural attachment, including effect of studs only, not sheathing board or facing material.
- K. Steel framing materials shall comply with ASTM A 446, A 570, or A 611, as applicable. Fabricate 16-gauge and heavier components from structural quality steel sheet, minimum yield point 40,000 psi; lighter units from commercial-quality steel sheet, minimum yield point of 33,000 psi. Minimum stud thickness as per table below. Maximum 24" on center or less as shown on drawings. These gauges are minimums only. Thicker gauges may be required as noted on Drawings or in manufacturer's span tables.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine areas and substrates, with Installer present, and including welded hollow-metal frames, cast-in anchors, and structural framing, for compliance with requirements and other conditions affecting performance.

- 1. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

- A. Suspended Assemblies: If applicable, coordinate installation of suspension systems with installation of overhead structure to ensure that inserts and other provisions for anchorages to building structure have been installed to receive hangers at spacing required to support the Work and that hangers will develop their full strength.

- 1. Furnish concrete inserts and other devices indicated to other trades for installation in advance of time needed for coordination and construction.

3.3 INSTALLATION, GENERAL

- A. Installation Standard: ASTM C 754, except comply with framing sizes and spacing indicated.

- 1. Gypsum Board Assemblies: Also comply with requirements in ASTM C 840 that apply to framing installation.

- B. Install bracing at terminations in assemblies.

- C. Do not bridge building control and expansion joints with non-load-bearing steel framing members. Frame both sides of joints independently.

3.4 INSTALLING SUSPENSION SYSTEMS

- A. If applicable, install suspension system components in sizes and spacings indicated on Drawings, but not less than those required by referenced installation standards for assembly types and other assembly components indicated.

- B. Isolate suspension systems from building structure where they abut or are penetrated by building structure to prevent transfer of loading imposed by structural movement.

- C. Suspend hangers from building structure as follows:

- 1. Install hangers plumb and free from contact with insulation or other objects within ceiling plenum that are not part of supporting structural or suspension system.

- a. Splay hangers only where required to miss obstructions and offset resulting horizontal forces by bracing, counter splaying, or other equally effective means.
- 2. Where width of ducts and other construction within ceiling plenum produces hanger spacings that interfere with locations of hangers required to support standard suspension system members, install supplemental suspension members and hangers in the form of trapezes or equivalent devices.
 - a. Size supplemental suspension members and hangers to support ceiling loads within performance limits established by referenced installation standards.
- 3. Wire Hangers: Secure by looping and wire tying, either directly to structures or to inserts, eye screws, or other devices and fasteners that are secure and appropriate for substrate, and in a manner that will not cause hangers to deteriorate or otherwise fail.
- 4. Flat Hangers: Secure to structure, including intermediate framing members, by attaching to inserts, eye screws, or other devices and fasteners that are secure and appropriate for structure and hanger, and in a manner that will not cause hangers to deteriorate or otherwise fail.
- 5. Do not attach hangers to roof decks.
- 6. Do not attach hangers to permanent metal forms. Furnish cast-in-place hanger inserts that extend through forms.
- 7. Do not attach hangers to rolled-in hanger tabs of composite steel floor deck.
- 8. Do not connect or suspend steel framing from ducts, pipes, or conduit.
- D. Fire-Resistance-Rated Assemblies: Wire tie furring channels to supports.
- E. Seismic Bracing: Sway-brace suspension systems with hangers used for support.
- F. Grid Suspension Systems: Attach perimeter wall track or angle where grid suspension systems meet vertical surfaces. Mechanically join main beam and cross-furring members to each other and butt-cut to fit into wall track.
- G. Installation Tolerances: Install suspension systems that are level to within 1/8 inch in 12 feet measured lengthwise on each member that will receive finishes and transversely between parallel members that will receive finishes.

3.5 INSTALLING FRAMED ASSEMBLIES

- A. Where studs are installed directly against exterior masonry walls or dissimilar metals at exterior walls, install isolation strip between studs and exterior wall.
- B. Install studs so flanges within framing system point in same direction.
 - 1. Space studs as follows:
 - a. Single-Layer Construction: 24 inches o.c., unless otherwise indicated.
 - b. Multilayer Construction: 24 inches o.c., unless otherwise indicated.
 - c. Tile backing panels: Studs required in ceramic wall tile areas shown shall be 20 gauge, 16" on center, minimum stud depth 3-5/8", if applicable.

- C. Install tracks (runners) at floors, upstand walls, existing metal framing and overhead supports. Extend framing full height to structural supports or substrates in walls, or above suspended ceilings, except where partitions are indicated to terminate at suspended ceilings. Continue framing around ducts penetrating partitions above ceiling.
1. Slip-Type Head Joints: Where framing extends to overhead structural supports, install to produce joints at tops of framing systems that prevent axial loading of finished assemblies.
 2. Door Openings: Screw vertical studs at jambs to jamb anchor clips on door frames; install runner track section (for cripple studs) at head and secure to jamb studs.
 - a. Install two 0.312 inch (0.79 mm) (20 gage) studs at each jamb, unless otherwise indicated.
 - b. Install cripple studs at head adjacent to each jamb stud, with a minimum 1/2-inch clearance from jamb stud to allow for installation of control joint in finished assembly.
 - c. Extend jamb studs through suspended ceilings and attach to underside of overhead structure.
 3. Other Framed Openings: Frame openings other than door openings the same as required for door openings, unless otherwise indicated. Install framing below sills of openings to match framing required above door heads.
 4. In-Fill Openings: Frame exterior wall in-fill openings other than door openings the same as required for door openings, unless otherwise indicated. Install framing below sills of openings to match framing required above door heads. Provide engineering calculations, prepared by and stamped by a licensed engineer in Maine, that determine the final framing requirements for:
 - a. 14'x14' Infill Opening at North Wall (former Overhead Door).
 - b. 6'x7' Exterior Wall Infill Opening at East Wall (former Double Door).
 5. Fire-Resistance-Rated Partitions: Install framing to comply with fire-resistance-rated assembly indicated and support closures and to make partitions continuous from floor to underside of solid structure.
 - a. Firestop Track: Where indicated, install to maintain continuity of fire-resistance-rated assembly indicated.
 6. Sound-Rated Partitions: If applicable, install framing to comply with sound-rated assembly indicated.
 7. Curved Partitions: If applicable
 - a. Bend track to uniform curve and locate straight lengths so they are tangent to arcs.
 - b. Begin and end each arc with a stud, and space intermediate studs equally along arcs. On straight lengths of not less than 2 studs at ends of arcs, place studs 6 inches o.c.
- D. Direct Furring:
1. Screw to wood framing.
 2. Attach to concrete or masonry with stub nails, screws designed for masonry attachment, or powder-driven fasteners spaced 24 inches o.c.

E. Z-Furring Members:

1. Erect insulation (specified in Division 07 Section "Thermal Insulation") vertically and hold in place with Z-furring members spaced 24 inches o.c.
2. Except at exterior corners, securely attach narrow flanges of furring members to wall with concrete stub nails, screws designed for masonry attachment, or powder-driven fasteners spaced 24 inches o.c.
3. At exterior corners, attach wide flange of furring members to wall with short flange extending beyond corner; on adjacent wall surface, screw-attach short flange of furring channel to web of attached channel. At interior corners, space second member no more than 12 inches from corner and cut insulation to fit.

F. Installation Tolerance: Install each framing member so fastening surfaces vary not more than 1/8 inch from the plane formed by faces of adjacent framing.

END OF SECTION

SECTION 092900 - GYPSUM BOARD

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. Interior gypsum board.
- B. Related Sections include the following:
 - 1. Division 09 Section "Non-Structural Metal Framing" for non-structural framing and suspension systems that support gypsum board.
 - 2. Division 09 Section "Gypsum Board" for components of gypsum wall assemblies.

1.3 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.
 - 2. Proof of Country of Origin.

1.4 QUALITY ASSURANCE

- 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.

1.5 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.

1.6 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

2.1 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.

2.2 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. American Gypsum Co.
 - b. BPB America Inc.
 - c. G-P Gypsum.
 - d. Lafarge North America Inc.
 - e. National Gypsum Company.
 - f. PABCO Gypsum.
 - g. Temple.
 - h. USG Corporation.
- B. Moisture- and Mold-Resistant Type: With moisture- and mold-resistant core and surfaces.
 - 1. Core: 5/8 inch, Type X, typical at all walls.
 - 2. Long Edges: Tapered.
 - 3. Provide only mold resistant gypsum board.
 - 4. 1-Hour Rated Walls: Provide 1 layer of 5/8-inch on each side, Type X, sag resistant gypsum board, as indicated. If gypsum board can only be applied on one surface, two (2) provide 2 layers, whether indicated or not.

5. 1- Hour Rated Ceilings & Soffits (Multi-Layered): Provide 2 layers of 1/2", Type X, sag resistant gypsum board, as indicated.
6. If applicable, 2-Hour Rated Walls (Multi-Layered): Provide 2 layers of 5/8-inch on each side, Type X, sag resistant gypsum board, as indicated.

2.3 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. Tear-Away vinyl bead (provide at all butt joints with other materials)

2.4 JOINT TREATMENT MATERIALS

A. General: Comply with ASTM C 475/C 475M.

B. Joint Tape:

1. Interior Gypsum Wallboard: Paper or self-adhering net.
2. Glass-Mat Gypsum Sheathing Board: 10-by-10 glass mesh.
3. Tile Backing Panels: As recommended by panel manufacturer.

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, unless surface undulations are present after Finish Coat.

2.5 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. Batt Insulation: As specified in Section 07 "Batt Insulation".
- 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. Basis of Design Product: Green Glue (Refer to Section 07 92 00).
 - b. Pecora Corporation; AC-20 FTR or AIS-919.
 - c. 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. Firestopping: As specified in Division 07 Section "Penetration Firestopping."

PART 3 - EXECUTION

3.1 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 cold formed framing for plumbness & flatness. Correct any work that would cause undulations in gypsum board installation.
- C. Examine blocking to ensure all required locations are present.
- D. Examine panels before installation. Reject panels that are wet, moisture damaged, and mold damaged.
- E. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 APPLYING AND FINISHING PANELS, GENERAL

- A. Comply with ASTM C 840.
- B. Install all gypsum walls from floor to existing gypsum ceilings, allow 3/8" for acoustic sealant at floor (shim gypsum board), and top.

- C. Install existing ceiling repair panels in a manner that provides a tight fit for required fire protection matching existing gypsum ceiling assembly. Fill all joints completely with sag resistant compound.
- D. Install soffit panels across soffit 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.
- E. Tape & apply compound to all inside corner junctions with existing and new gypsum walls (vertical & horizontal)
- F. 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.
- G. 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.
- H. Form control and expansion joints with space between edges of adjoining gypsum panels.
- I. 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 neatly 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.
- J. 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.
- K. Attachment to Steel Framing: Attach panels so leading edge or end of each panel is attached to open (unsupported) edges of stud flanges first.
- L. 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.
- M. Install sound attenuation blankets before installing gypsum panels, unless blankets are readily installed after panels have been installed on one side.
- N. Prior to closing wall, examine blanket insulation to ensure no gaps are present at edges, behind blocking, and/or between batts.

3.3 APPLYING INTERIOR GYPSUM BOARD

A. Single-Layer Application:

1. On ceilings, apply gypsum panels before wall/partition board application to greatest extent possible and at right angles to framing, unless otherwise indicated.
2. On partitions/walls, apply gypsum panels vertically (parallel to framing), unless otherwise indicated or required by fire-resistance-rated assembly, and minimize end joints.
 - a. Stagger abutting end joints not less than one framing member in alternate courses of panels.
 - b. At stairwells and other high walls, install panels horizontally, unless otherwise indicated or required by fire-resistance-rated assembly.
3. 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.

B. Multilayer Application:

1. On ceilings, apply gypsum board indicated for base layers before applying face 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.

3.4 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. Acoustic Sealant Gap: Provide continuous min. 3/8" gap at base of gypsum wallboard for proper installation of Acoustic Sealant, whether indicated or not.
- C. Interior Trim: Install in the following locations:
 1. Install continuous corner beads along all outside corners of chases and soffits.
 2. Install continuous tear-away vinyl beads at all edges butting against other materials.

3.5 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: If applicable, required in ceiling plenum areas, concealed areas, and where indicated.
 - 2. Level 2: If applicable, where RFP is indicated on Drawings.
 - 3. Level 3: Not required.
 - 4. Level 4: At all panel surfaces that will be exposed to view, unless otherwise indicated. This is the intended finish level.
 - 5. Level 5: Not required, unless surface undulations are present after Finish Coat.

3.6 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.

END OF SECTION

SECTION 096513 - RESILIENT BASE & ACCESSORIES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section Includes:
 - 1. Resilient base.
- B. Related Sections:
 - 1. Division 09 Section "Resilient Tile Flooring" for resilient floor tile.
 - 2. Division 09 Section "Carpet Tile" for textile floor coverings.

1.3 SUBMITTALS

- A. Product Data: For each type of product indicated.
- B. Samples for Selection: For each type of product indicated, in manufacturer's standard-size Samples but not less than 12 inches long, of each resilient product color, texture, and pattern required.
- C. Product Schedule: For resilient products. Use same designations indicated on Drawings.

1.4 QUALITY ASSURANCE

- A. Fire-Test-Response Characteristics: As determined by testing identical products according to ASTM E 648 or NFPA 253 by a qualified testing agency.
 - 1. Critical Radiant Flux Classification: Class I, not less than 0.45 W/sq. cm.

1.5 DELIVERY, STORAGE, AND HANDLING

- A. Store resilient products and installation materials in dry spaces protected from the weather, with ambient temperatures maintained within range recommended by manufacturer, but not less than 50 deg F or more than 90 deg F.

1.6 PROJECT CONDITIONS

- A. Maintain ambient temperatures within range recommended by manufacturer, but not less than 70 deg F or more than 95 deg F, in spaces to receive resilient products during the following time periods:
 - 1. 48 hours before installation.
 - 2. During installation.
 - 3. 48 hours after installation.
- B. Until Substantial Completion, maintain ambient temperatures within range recommended by manufacturer, but not less than 55 deg F or more than 95 deg F.
- C. Install resilient products after other finishing operations, including painting, have been completed.

1.7 EXTRA MATERIALS

- A. Furnish extra materials that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.
 - 1. Furnish not less than 10 linear feet for every 500 linear feet or fraction thereof, of each type, color, pattern, and size of resilient product installed.

PART 2 - PRODUCTS

2.1 RESILIENT BASE

- A. Resilient Base:
 - 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. Armstrong World Industries, Inc.
 - b. Burke Mercer Flooring Products; Division of Burke Industries, Inc.
 - c. Endura Rubber Flooring; Division of Burke Industries, Inc.
 - d. Flexco, Inc.
 - e. Johnsonite.
 - f. Musson, R. C. Rubber Co.
 - g. Nora Rubber Flooring; Freudenberg Building Systems, Inc.
 - h. Roppe Corporation, USA.
- B. Resilient Base Standard: ASTM F 1861.
 - 1. Material Requirement: Type TP (rubber, thermoplastic).
 - 2. Manufacturing Method: Group I (solid, homogeneous).
 - 3. Style: Cove (base with toe) and straight (flat or toeless).
- C. Minimum Thickness: 0.125 inch.

- D. Height: 4 inches.
- E. Lengths: Coils in manufacturer's standard length.
- F. Outside Corners: Preformed, required field forming is NOT acceptable.
- G. Inside Corners: Job formed.
- H. Finish: Satin.
- I. Colors and Patterns: As selected by Architect from full range of industry colors.

2.2 RESILIENT MOLDING ACCESSORY

- A. Resilient Molding Accessory: Provide whether indicated or not between differing flooring materials.
 - 1. Manufacturers: Subject to compliance with requirements, provide products by the following:
 - a. Johnsonite.
- B. Material: Vinyl.
- C. Profile and Dimensions:
 - 1. Transition Strip between VCT and Carpet/Ceramic Tile: CE-XX-A by Johnsonite or approved substitute.
 - 2. Transition Strip between Sheet Flooring and VCT: CD-XX-C by Johnsonite or approved substitute.
 - 3. Reducer Strip between Concrete and VCT: RRS-XX-C by Johnsonite or approved substitute.
 - 4. Reducer Strip between Concrete and Carpet: EG-XX-L by Johnsonite or approved substitute.
 - 5. Cove Cap for Sheet Flooring: SCC-XX-B by Johnsonite or approved substitute.
- D. Colors and Patterns: As selected by Architect from full range of industry colors.

2.3 INSTALLATION MATERIALS

- A. Trowelable Leveling and Patching Compounds: Latex-modified, portland cement based or blended hydraulic-cement-based formulation provided or approved by 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. Cove Base Adhesives: Not more than 50 g/L.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates, with Installer present, for compliance with requirements for maximum moisture content and other conditions affecting performance of the Work.
- B. Verify that finishes of substrates comply with tolerances and other requirements specified in other Sections and that substrates are free of cracks, ridges, depressions, scale, and foreign deposits that might interfere with adhesion of resilient products.
- C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

- A. Prepare substrates according to manufacturer's written instructions to ensure adhesion of resilient products.
- B. Concrete Substrates for Resilient Accessories: Prepare according to ASTM F 710.
 - 1. Verify that substrates are dry and free of curing compounds, sealers, and hardeners.
 - 2. Remove substrate coatings and other substances that are incompatible with adhesives and that contain soap, wax, oil, or silicone, using mechanical methods recommended by manufacturer. Do not use solvents.
 - 3. Alkalinity and Adhesion Testing: Verify that tests have been performed and pass the recommendations by manufacturer. Proceed with installation only after substrates pass testing.
 - 4. Moisture Testing: Verify that tests have been performed pass the recommendations by manufacturer. Proceed with installation only after substrates pass testing.
- C. Fill cracks, holes, and depressions in substrates with trowelable leveling and patching compound and remove bumps and ridges to produce a uniform and smooth substrate.
- D. Do not install resilient products until they are same temperature as the space where they are to be installed.
 - 1. Move resilient products and installation materials into spaces where they will be installed at least 48 hours in advance of installation.
- E. Sweep and vacuum clean substrates to be covered by resilient products immediately before installation.

3.3 RESILIENT BASE INSTALLATION

- A. Comply with manufacturer's written instructions for installing resilient base.
- B. Apply resilient base to walls, columns, pilasters, casework and cabinets in toe spaces, and other permanent fixtures in rooms and areas where base is required.

- C. Install resilient base in lengths as long as practicable without gaps at seams and with tops of adjacent pieces aligned.
- D. Tightly adhere resilient base to substrate throughout length of each piece, with base in continuous contact with horizontal and vertical substrates.
- E. Do not stretch resilient base during installation.
- F. On masonry surfaces or other similar irregular substrates, fill voids along top edge of resilient base with manufacturer's recommended adhesive filler material.
- G. Preformed Corners: Install preformed corners before installing straight pieces.
- H. Job-Formed Corners:
 - 1. Inside Corners: Use straight pieces of maximum lengths possible.

3.4 RESILIENT ACCESSORY INSTALLATION

- A. Comply with manufacturer's written instructions for installing resilient accessories.
- B. Resilient Molding Accessories: Butt to adjacent materials and tightly adhere to substrates throughout length of each piece, install transition strips between differing flooring materials whether indicated or not. Install reducer strips at edges of resilient floor covering that would otherwise be exposed.

3.5 CLEANING AND PROTECTION

- A. Comply with manufacturer's written instructions for cleaning and protection of resilient products.
- B. Perform the following operations immediately after completing resilient product installation:
 - 1. Remove adhesive and other blemishes from exposed surfaces.
 - 2. Sweep and vacuum surfaces thoroughly.
 - 3. Damp-mop surfaces to remove marks and soil.
- C. Protect resilient products from mars, marks, indentations, and other damage from construction operations and placement of equipment and fixtures during remainder of construction period.
- D. Floor Polish: Remove soil, visible adhesive, and surface blemishes from resilient stair treads before applying liquid floor polish.
 - 1. Apply one coat.
- E. Cover resilient products until Substantial Completion.

END OF SECTION

SECTION 096516 - RESILIENT SHEET FLOORING

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. Multi-purpose, slip-resistant, resilient sheet floor covering in DMR Office Bathroom.

1.3 SUBMITTALS

- A. Product Data: For each type of product indicated.
- B. Samples for Selection: In manufacturer's standard size sections of each different color and pattern of floor covering required.
- C. Seam Samples: For each welded seamless-installation technique indicated and for each floor covering product, color, and pattern required; with seam running lengthwise and in center of 12 by 12 inch mock-up applied to a rigid backing and prepared by Installer for this Project, including horizontal termination pieces indicated.
 - 1. Flat Seams.
 - 2. Inside Corner Seams.
 - 3. Outside Corner Seams.
 - 4. Integral Cove Base.
- D. Product Schedule: For floor coverings. Use same designations indicated on Drawings.
- E. Maintenance Data: For each type of floor covering to include in maintenance manuals.

1.4 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.
- B. Thickness: .08-inch (2.0 mm)
- C. Roll Length: 66' (20m).
- D. Roll width: 6-feet 7-inches (2m).

- E. Seam Orientation: As indicated in drawings.
- F. Slip Resistance: ASTM D2047, D.78 / W.80.
- G. Critical Radiant Flux: ASTM E648, pass Class 1.
- H. Smoke Generation: ASTM E662.
- I. Static Load Limit: ASTM F970.
- J. Composition: Aluminum oxide throughout thickness, colored quartz in surface layer.
- K. Backing: Non-woven polyester/cellulose, glass fiber reinforcement.
- L. VOC Emissions: Low VOC Emitting, complying with CA 01350 Standard.
- M. Recycled Content: 10% post-consumer recycled content and 10% pre-consumer recycled content.
- N. Warranty: Manufacturer's 10-Year limited product warranty.
- O. Field Mockups: Based on approved submittal samples, build mockup of seam to demonstrate aesthetic effects and set quality standards for materials and execution prepared by Installer for this Project, including horizontal termination pieces indicated.
 - 1. Flat Seams.
 - 2. Inside Corner Seams.
 - 3. Outside Corner Seams.
 - 4. Integral Cove Base.
 - 5. Size: Minimum 10 linear feet.
 - 6. Mockups may remain as part of completed work.

1.5 DELIVERY, STORAGE, AND HANDLING

- A. Store floor coverings and installation materials in dry spaces protected from the weather, with ambient temperatures maintained within range recommended by manufacturer, but not less than 50 deg F or more than 90 deg F. Store rolls upright.

1.6 PROJECT CONDITIONS

- A. Maintain ambient temperatures within range recommended by manufacturer, but not less than 70 deg F or more than 85 deg F, in spaces to receive floor coverings during the following time periods:
 - 1. 48 hours before installation.
 - 2. During installation.
 - 3. 48 hours after installation.
- B. Until Substantial Completion, maintain ambient temperatures within range recommended by manufacturer, but not less than 55 deg F or more than 95 deg F.

- C. Close spaces to traffic during floor covering installation.
- D. Close spaces to traffic for 48 hours after floor covering installation.
- E. Install floor coverings after other finishing operations, including painting, have been completed.

1.7 EXTRA MATERIALS

- A. Furnish extra materials that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.
 - 1. Floor Covering: Furnish quantity not less than 10 linear feet for every 500 linear feet or fraction thereof, in roll form and in full roll width for each color, pattern, and type of floor covering installed.

PART 2 - PRODUCTS

2.1 MULTI-PURPOSE, SLIP-RESISTANT RESILIENT FLOOR COVERINGS

- A. Basis of Design Product: Altro Walkway Plus 20 as provided by Altro Floor Coverings, 80 Industrial Way, Wilmington, Massachusetts, 01887, Telephone: (800) 377-5597, Fax (610) 746-4325, Email: info@altrofloors.com, or proven equal:
 - 1. Basis of Design Product: Altro Walkway Plus 20.
 - 2. Welding Rod: match flooring color.
 - 3. Mastic Adhesive: AM79.
 - 4. Light Reflectance Value: LRV 45.
 - 5. Seaming Method: Flush welded in field with manufacturer's standard material.
 - 6. Cove Base Type I: 4-inch integral, as indicated.
 - 7. Cove Base Insert: Altro Cove Stick CF 20R, .75-inch radius, installed continuously.
 - 8. Capping Seal Type I: Altro Capping Seal C7, at junction between 4-inch integral cove base and painted gypsum walls, color design intent to match or compliment flooring product, as selected by Architect from manufacturer's full range of colors and patterns produced, complying with requirements indicated.
 - 9. Product Line Colors: As selected by Architect from manufacturer's full range of colors and patterns produced, complying with requirements indicated.

2.2 INSTALLATION MATERIALS

- A. Trowelable Leveling and Patching Compounds: Provide latex-modified, Portland cement based or blended hydraulic-cement-based formulation provided or approved by manufacturer for applications indicated.
- B. Adhesives: Water-resistant type recommended by manufacturer to suit floor covering and substrate conditions indicated.

1. Use adhesives that have a VOC content of not more than 50 g/L when calculated according to 40 CFR 59, Subpart D (EPA Method 24).
- C. Seamless-Installation Accessories:
 1. Provide Manufacturer's standard welding product for all bonding seams.
- D. Temporary Protection: Ram Board Temporary Floor Protection, as provided by Ram Board, 716 S. Flower Street, Burbank, California 91502, Telephone (818) 848-0400, Fax: (818) 848-0099, Email: info@ramboard.com, Website: www.ramboard.com.
- E. Floor Polish: If applicable, provide protective liquid floor polish products as recommended by manufacturer.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates, with Installer present, for compliance with requirements for maximum moisture content and other conditions affecting performance of the Work.
- B. Verify that finishes of substrates comply with tolerances and other requirements specified in other Sections and that substrates are free of cracks, ridges, depressions, scale, and foreign deposits that might interfere with adhesion of floor coverings.
- C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

- A. Prepare substrates according to manufacturer's written instructions to ensure adhesion of floor coverings.
- B. Wood Substrates:
 1. Verify that substrates are dry and free of debris, unevenness, burrs, or anything that could telegraph through flooring membrane.
 2. Remove substrate coatings and other substances that are incompatible with adhesives and that contain soap, wax, oil, or silicone, using mechanical methods recommended by manufacturer. Do not use solvents.
 3. Alkalinity and Adhesion Testing: Verify that applicable tests have been performed and pass the recommendations by manufacturer. Proceed with installation only after substrates pass testing.
 4. Moisture Testing: Verify that applicable tests have been performed and pass the recommendations by manufacturer. Proceed with installation only after substrates pass testing.
 5. Seal wood substrates to avoid moisture migration using a wood sealer product recommended by the flooring Manufacturer. Confirm compatibility between sealer and flooring adhesive and membrane. Apply two (2) coats and ensure substrate is smooth and clean prior to installing flooring membrane.

- C. Fill cracks, holes, and depressions in substrates with trawable leveling and patching compound and remove bumps and ridges to produce a uniform and smooth substrate.
- D. Do not install floor coverings until they are same temperature as space where they are to be installed.
 - 1. Move floor coverings and installation materials into spaces where they will be installed at least 48 hours in advance of installation.
- E. Sweep and vacuum clean substrates to be covered by floor coverings immediately before flooring installation.

3.3 FLOOR COVERING INSTALLATION

- A. Comply with manufacturer's written instructions for installing floor coverings.
- B. Unroll floor coverings and allow them to stabilize before cutting and fitting.
- C. Lay out floor coverings as follows:
 - 1. Maintain uniformity of floor covering direction.
 - 2. Minimize number of seams; place seams in inconspicuous and low-traffic areas, at least 6 inches away from parallel joints in floor covering substrates.
 - 3. Match edges of floor coverings for color shading at seams.
 - 4. Avoid cross seams.
- D. Scribe and cut floor coverings to butt neatly and tightly to vertical surfaces, permanent fixtures, and built-in furniture including cabinets, pipes, outlets, floor drain (clamping type), and door frames.
- E. Extend floor coverings into toe spaces, door reveals, closets, and similar openings.
- F. Maintain reference markers, holes, or openings that are in place or marked for future cutting by repeating on floor coverings as marked on substrates. Use chalk or other nonpermanent marking device.
- G. Install floor coverings on covers for telephone and electrical ducts and similar items in installation areas. Maintain overall continuity of color and pattern between pieces of floor coverings installed on covers and adjoining floor covering. Tightly adhere floor covering edges to substrates that abut covers and to cover perimeters.
- H. Adhere floor coverings to substrates using a full spread of adhesive applied to substrate to produce a completed installation without open cracks, voids, raising and puckering at joints, telegraphing of adhesive spreader marks, and other surface imperfections.
- I. Seamless Installation:
 - 1. Welded Seams: Bond seams with manufacturer's standard welding materials and methods to permanently fuse sections into a seamless floor covering. Prepare seams and produce tightly-fitted seams without gaps, overlays, or excess welding materials on floor covering surfaces.

3.4 CLEANING AND PROTECTION

- A. Comply with manufacturer's written instructions for cleaning and protection of floor coverings.
- B. Perform the following operations immediately after completing floor covering installation:
 - 1. Remove adhesive and other blemishes from floor covering surfaces.
 - 2. Sweep and vacuum floor coverings thoroughly.
 - 3. Damp-mop floor coverings to remove marks and soil.
- C. Protect floor coverings with Ram Board Temporary Floor Protection, taped down with manufacturer's recommended tape or 3-inch duct tape, in order to protect newly laid sheet flooring from foot traffic, marks, scratches, gouges, marks, indentations, and other damage from construction operations and placement of equipment and fixtures during remainder of construction period. Layout Ram Board protection in a manner that allows installation of Food Service Equipment to be installed without having to remove it from traffic areas.
- D. Floor Polish: Remove soil, visible adhesive, and surface blemishes from floor covering before applying liquid floor polish.
 - 1. Apply one coat.
- E. Cover floor coverings until Substantial Completion.
- F. Repair/Replace damaged areas.

END OF SECTION

SECTION 096519 - RESILIENT TILE FLOORING

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. Vinyl composition floor tile.
- B. Related Sections:
 - 1. Division 09 Section "Resilient Base and Accessories" for resilient base, reducer strips, and other accessories installed with resilient floor coverings.
 - 2. Division 09 Section "Resilient Sheet Flooring" for resilient sheet floor coverings.

1.3 SUBMITTALS

- A. Product Data: For each type of product indicated.
- B. Shop Drawings: For each type of floor tile. Include floor tile layouts, edges, columns, doorways, enclosing partitions, built-in furniture, cabinets, and cutouts.
 - 1. Show details of special patterns.
- C. Samples for Selection: For each type of floor tile indicated.
- D. Product Schedule: For floor tile. Use same designations indicated on Drawings.
- E. Maintenance Data: For each type of floor tile to include in maintenance manuals.

1.4 QUALITY ASSURANCE

- A. Installer Qualifications: A qualified installer who employs workers for this Project who are competent in techniques required by the manufacturer for floor tile installation indicated.
- B. Fire-Test-Response Characteristics: As determined by testing identical products according to ASTM E 648 or NFPA 253 by a qualified testing agency.
 - 1. Critical Radiant Flux Classification: Class I, not less than 0.45 W/sq. cm.

1.5 DELIVERY, STORAGE, AND HANDLING

- A. Store floor tile and installation materials in dry spaces protected from the weather, with ambient temperatures maintained within range recommended by manufacturer, but not less than 50 deg F or more than 90 deg F. Store floor tiles on flat surfaces.

1.6 PROJECT CONDITIONS

- A. Maintain ambient temperatures within range recommended by manufacturer, but not less than 70 deg F or more than 95 deg F, in spaces to receive floor tile during the following time periods:
 - 1. 48 hours before installation.
 - 2. During installation.
 - 3. 48 hours after installation.
- B. Until Substantial Completion, maintain ambient temperatures within range recommended by manufacturer, but not less than 55 deg F or more than 95 deg F.
- C. Close spaces to traffic during floor tile installation.
- D. Close spaces to traffic for 48 hours after floor tile installation.
- E. Install floor tile after other finishing operations, including painting, have been completed.

1.7 EXTRA MATERIALS

- A. Furnish extra materials that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.
 - 1. Floor Tile: Furnish 1 box for every 50 boxes or fraction thereof, of each type, color, and pattern of floor tile installed.

PART 2 - PRODUCTS

2.1 VINYL COMPOSITION FLOOR TILE

- A. Products: Subject to compliance with requirements, provide one of the following:
 - 1. Armstrong World Industries, Inc.; Imperial Texture Standard Excelon.
 - 2. Mannington Mills, Inc.; Essentials.
 - 3. Tarkett, Inc.; Expressions.
- B. Tile Standard: ASTM F 1066, Class 2, through-pattern tile.
- C. Wearing Surface: Smooth.
- D. Thickness: 0.125 inch.

- E. Size: 12 by 12 inches.
- F. Colors: Two (2) colors, as selected by Architect from Manufacturer's full range of colors. i.e. Armstrong Excelon Imperial Texture, Stonetex, or Companian Square.
- G. Patterns: Bordered 2'x2' checkerboard as indicated.

2.2 INSTALLATION MATERIALS

- A. Trowelable Leveling and Patching Compounds: Latex-modified, portland cement based or blended hydraulic-cement-based formulation provided or approved by manufacturer for applications indicated.
- B. Adhesives: Water-resistant type recommended by manufacturer to suit floor tile 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 and Asphalt Tile Adhesives: Not more than 50 g/L.
- C. Floor Polish: Provide protective liquid floor polish products as recommended by manufacturer.
- D. Temporary Protection: Ram Board Temporary Floor Protection, as provided by Ram Board, 716 S. Flower Street, Burbank, California 91502, Telephone (818) 848-0400, Fax: (818) 848-0099, Email: info@ramboard.com, Website: www.ramboard.com.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates, with Installer present, for compliance with requirements for maximum moisture content and other conditions affecting performance of the Work.
- B. Verify that finishes of substrates comply with tolerances and other requirements specified in other Sections and that substrates are free of cracks, ridges, depressions, scale, and foreign deposits that might interfere with adhesion of floor tile.
- C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

- A. Prepare substrates according to manufacturer's written instructions to ensure adhesion of resilient products.
- B. Concrete Substrates: Prepare according to ASTM F 710.
 - 1. Verify that substrates are dry and free of curing compounds, sealers, and hardeners.

2. Remove substrate coatings and other substances that are incompatible with adhesives and that contain soap, wax, oil, or silicone, using mechanical methods recommended by manufacturer. Do not use solvents.
 3. Alkalinity and Adhesion Testing: Verify that tests have been performed under Division 07 Section "Below-Grade Vapor Retarders" and pass the recommendations by manufacturer. Proceed with installation only after substrates pass testing.
 4. Moisture Testing: Verify that tests have been performed under Division 07 Section "Below-Grade Vapor Retarders" and pass the recommendations by manufacturer. Proceed with installation only after substrates pass testing.
- C. Fill cracks, holes, and depressions in substrates with trowelable leveling and patching compound and remove bumps and ridges to produce a uniform and smooth substrate.
 - D. Do not install floor tiles until they are same temperature as space where they are to be installed.
 1. Move resilient products and installation materials into spaces where they will be installed at least 48 hours in advance of installation.
 - E. Sweep and vacuum clean substrates to be covered by resilient products immediately before installation.

3.3 FLOOR TILE INSTALLATION

- A. Comply with manufacturer's written instructions for installing floor tile.
- B. Lay out floor 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 tile at perimeter.
 1. Lay tiles square with room axis or in pattern indicated.
- C. Match floor tiles for color and pattern by selecting tiles from cartons in the same sequence as manufactured and packaged, if so numbered. Discard broken, cracked, chipped, or deformed tiles.
 1. Lay tiles with grain direction alternating in adjacent tiles (basket-weave pattern).
- D. Scribe, cut, and fit floor tiles to butt neatly and tightly to vertical surfaces and permanent fixtures including built-in furniture, cabinets, pipes, outlets, and door frames.
- E. Extend floor tiles into toe spaces, door reveals, closets, and similar openings. Extend floor tiles to center of door openings.
- F. Maintain reference markers, holes, and openings that are in place or marked for future cutting by repeating on floor tiles as marked on substrates. Use chalk or other nonpermanent, nonstaining marking device.
- G. Install floor tiles on covers for telephone and electrical ducts, building expansion-joint covers, and similar items in finished floor areas. Maintain overall continuity of color and pattern

between pieces of tile installed on covers and adjoining tiles. Tightly adhere tile edges to substrates that abut covers and to cover perimeters.

- H. Adhere floor tiles to flooring substrates using a full spread of adhesive applied to substrate to produce a completed installation without open cracks, voids, raising and puckering at joints, telegraphing of adhesive spreader marks, and other surface imperfections.

3.4 CLEANING AND PROTECTION

- A. Comply with manufacturer's written instructions for cleaning of floor tile.
- B. Perform the following operations immediately after completing floor tile installation:
 - 1. Remove adhesive and other blemishes from exposed surfaces.
 - 2. Sweep and vacuum surfaces thoroughly.
 - 3. Damp-mop surfaces to remove marks and soil.
- C. Protect entire floor tile products with Ramboard or equal from mars, marks, indentations, and other damage from construction operations and placement of equipment and fixtures during remainder of construction period.
- D. Floor Polish: Remove soil, visible adhesive, and surface blemishes from floor tile surfaces before applying liquid floor polish.
 - 1. Apply one coat.
- E. Cover entire floor resilient tile area with Ramboard or equal until Substantial Completion.
- F. Replace damaged tiles.

END OF SECTION

SECTION 096813 - TILE CARPETING

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. Modular carpet tile (OS/CI), for repair areas, as indicated.
- B. Related Requirements:
 - 1. Section 01 "Alternates" for alternate floor coverings.

1.3 PREINSTALLATION MEETINGS

- A. Preinstallation Conference: Conduct conference at Project site.
 - 1. Review methods and procedures related to carpet tile installation including, but not limited to, the following:
 - a. Review delivery, storage, and handling procedures.
 - b. Review ambient conditions and ventilation procedures.
 - c. Review subfloor preparation procedures.
 - d. Review tile carpeting layout pattern and direction.
 - e. Review special installation considerations to avoid small tile carpeting pieces.

1.4 ACTION SUBMITTALS

- A. Product Data: For each type of product.
 - 1. Include manufacturer's written data on physical characteristics, durability, and fade resistance.
 - 2. Include manufacturer's written installation recommendations for each type of substrate.
- B. Product Schedule: For carpet tile. Use same designations indicated on Drawings.

1.5 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For Installer.

- B. Product Test Reports: For carpet tile, for tests performed by a qualified testing agency.
- C. Sample Warranty: For special warranty.

1.6 CLOSEOUT SUBMITTALS

- A. Maintenance Data: For carpet tiles to include in maintenance manuals. Include the following:
 - 1. Methods for maintaining carpet tile, including cleaning and stain-removal products and procedures and manufacturer's recommended maintenance schedule.
 - 2. Precautions for cleaning materials and methods that could be detrimental to carpet tile.

1.7 QUALITY ASSURANCE

- A. Installer Qualifications: An experienced installer who is certified by the International Certified Floorcovering Installers Association at the Commercial II certification level.
- B. Mockups: Build mockups to verify selections made under Sample submittals, to demonstrate aesthetic effects, and to set quality standards for fabrication and installation.
 - 1. Build mockups at locations and in sizes shown on Drawings.
 - 2. Demonstrate methods of layout specified that avoid small tile carpeting pieces and respect the tile carpeting pattern and direction.
 - 3. Subject to compliance with requirements, approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

1.8 DELIVERY, STORAGE, AND HANDLING

- A. Comply with the Carpet and Rug Institute's CRI 104.

1.9 FIELD CONDITIONS

- A. Comply with the Carpet and Rug Institute's CRI 104 for temperature, humidity, and ventilation limitations.
- B. Environmental Limitations: Do not deliver or install carpet tiles until spaces are enclosed and weathertight, wet-work in spaces is complete and dry, and ambient temperature and humidity conditions are maintained at levels planned for building occupants during the remainder of the construction period.
- C. Do not install carpet tiles over concrete slabs until slab repairs have cured and are sufficiently dry to bond with adhesive and concrete slabs have pH range recommended by carpet tile manufacturer.
- D. Where demountable partitions or other items are indicated for installation on top of carpet tiles, install carpet tiles before installing these items.

1.10 WARRANTY

1. Warranty Period: 1 year from date of Substantial Completion for installation of OS/CI carpet tiles.

PART 2 - PRODUCTS

2.1 CARPET TILE

- A. Manufacturer: Shaw.
- B. Collection: Shaw Contract, manufacturer's full range.
- C. Performance Characteristics:
 1. Appearance Retention Rating: Heavy traffic, 3.0 minimum according to ASTM D7330.

2.2 INSTALLATION ACCESSORIES

- A. Trowelable Leveling and Patching Compounds: Latex-modified, hydraulic-cement-based formulation provided or recommended by carpet tile manufacturer.
- B. Adhesives: Water-resistant, mildew-resistant, nonstaining, pressure-sensitive type to suit products and subfloor conditions indicated, that comply with flammability requirements for installed carpet tile, and are recommended by carpet tile manufacturer for releasable installation.
- C. Cove Base: OS/CI product, Fully adhere to walls at all carpet tile to wall junctions, 4" high.
- D. Rubber Carpet Transition Strip at Door #1: Mannington Carpet to Resilient Transition 710 or equal, fully adhered at all exposed edges of carpet tile and transitions to other finished flooring materials, whether indicated or not.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements for maximum moisture content, alkalinity range, installation tolerances, and other conditions affecting carpet tile performance.
- B. Examine carpet tile for type, color, pattern, and potential defects.
- C. Concrete Slabs: Verify that finishes comply with requirements specified in Section 033000 "Cast-in-Place Concrete" and that surfaces are free of cracks, ridges, depressions, scale, and foreign deposits.

1. Moisture Testing: Perform tests so that each test area does not exceed 200 sq. ft. (18.6 sq. m), and perform no fewer than three tests in each installation area and with test areas evenly spaced in installation areas.
 - a. Anhydrous Calcium Chloride Test: ASTM F1869. Proceed with installation only after substrates have maximum moisture-vapor-emission rate of 3 lb of water/1000 sq. ft. (1.36 kg of water/92.9 sq. m) in 24 hours.
 - b. Relative Humidity Test: Using in situ probes, ASTM F2170. Proceed with installation only after substrates have a maximum 75 percent relative humidity level measurement.
 - c. Perform additional moisture tests recommended in writing by adhesive and carpet tile manufacturers. Proceed with installation only after substrates pass testing.

D. Wood Subfloors: Verify the following:

1. Underlayment over subfloor complies with requirements specified in Section 061600 "Sheathing."
2. Underlayment surface is free of irregularities and substances that may interfere with adhesive bond or show through surface.
3. Apply flooring compound for a flat substrate, allow to dry completely according to Manufacturer's instructions prior to installing carpet tile.

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

3.2 PREPARATION

- A. General: Comply with the Carpet and Rug Institute's CRI 104 and with carpet tile manufacturer's written installation instructions for preparing substrates indicated to receive carpet tile.
- B. Use trowelable leveling and patching compounds, according to manufacturer's written instructions, to fill cracks, holes, depressions, and protrusions in substrates. Fill or level cracks, holes and depressions 1/8 inch (3 mm) wide or wider, and protrusions more than 1/32 inch (0.8 mm) unless more stringent requirements are required by manufacturer's written instructions.
- C. Concrete Substrates: Remove coatings, including curing compounds, and other substances that are incompatible with adhesives and that contain soap, wax, oil, or silicone, without using solvents. Use mechanical methods recommended in writing by adhesive and carpet tile manufacturers.
- D. Broom and vacuum clean substrates to be covered immediately before installing carpet tile.

3.3 INSTALLATION

- A. General: Comply with the Carpet and Rug Institute's CRI 104, Section 10, "Carpet Tile," and with carpet tile manufacturer's written installation instructions.
- B. Installation Method: Fully adhered glue down; install every tile with full-spread, releasable, pressure-sensitive adhesive. Peel & Stick type adhesives are prohibited.

- C. Maintain dye-lot integrity. Do not mix dye lots in same area.
- D. Maintain pile-direction patterns, confirm pattern and direction with Owner and Architect prior to installation. Mockups required minimum 6'x6' area.
- E. Cut and fit carpet tile to butt tightly to vertical surfaces, permanent fixtures, and built-in furniture including cabinets, pipes, outlets, edgings, thresholds, and nosings. Bind or seal cut edges as recommended by carpet tile manufacturer.
- F. Extend carpet tile into cove base reglets, toe spaces, door reveals, closets, open-bottomed obstructions, removable flanges, alcoves, and similar openings.
- G. All exposed carpet tile edges and transitions shall be concealed w/ screw-fastened anodized aluminum transition strips, color: as selected by Architect from Manufacturer's full range.
- H. Maintain reference markers, holes, and openings that are in place or marked for future cutting by repeating on carpet tile as marked on subfloor. Use nonpermanent, non-staining marking device.

3.4 CLEANING AND PROTECTION

- A. Perform the following operations immediately after installing carpet tile:
 - 1. Remove excess adhesive and other surface blemishes using cleaner recommended by carpet tile manufacturer.
 - 2. Remove yarns that protrude from carpet tile surface.
 - 3. Vacuum carpet tile using commercial machine with face-beater element.
- B. Protect installed carpet tile to comply with the Carpet and Rug Institute's CRI 104, Section 13.7.
- C. Protect carpet tile against damage from construction operations and placement of equipment and fixtures during the remainder of construction period. Use wall to wall Ramboard protection taped together with Ramboard tape or masking tape. Remove protection only after installation of fixed tables (by others) and immediately prior to Substantial Completion.
- D. Replace any damaged carpet tiles.

END OF SECTION

SECTION 098116 - BATT INSULATION

1.0 GENERAL

1.01 SUMMARY OF WORK

- A. This Section specifies stone fiber sound attenuation batt and blanket acoustical insulation.

1.02 RELATED REQUIREMENTS

- A. Section 07 "Firestopping".
- B. Section 07 "Acoustical Joint Sealants".
- C. Section 08 "Hollow Metal Doors & Frames".
- D. Section 06 "Rough Carpentry".
- E. Section 09 "Non-Structural Metal Framing".
- F. Section 09 "Gypsum Board".

1.03 REFERENCE STANDARDS

ASTM International (ASTM).

1. ASTM C165 - 2012, Standard Test Method for Measuring Compressive Properties of Thermal Insulations.
2. ASTM C167 - 2009, Standard Test Method for Thickness and Density of Blanket or Batt Thermal Insulations.
3. ASTM C553 - 2011, Standard Specification for Mineral Fiber Blanket Thermal Insulation for Commercial and Industrial Applications.
4. ASTM C612 - 2010, Standard Specification for Mineral Fiber Block and Board Thermal Insulation.
5. ASTM C665 - 2011, Standard Specification for Mineral-Fiber Blanket Thermal Insulation for Light Frame Construction and Manufactured Housing.
6. ASTM C1104/C1104M - 2006, Standard Test Method for Determining the Water Vapor Sorption of Unfaced Mineral Fiber Insulation.
7. ASTM E84 - 2012, Standard Test Method for Surface Burning Characteristics of Building Materials.

B. Underwriters' Laboratories (UL).

1. UL 181 - 2005, Factory-Made Air Ducts and Connectors.

1.04 ADMINISTRATIVE REQUIREMENTS

- A. Co-ordination: Co-ordinate work of this Section with exterior walls-, opening infill-, roofing- or deck-work and with work of other trades for proper time and sequence to avoid construction delays.
- B. Pre-installation Meeting: Convene pre-installation meeting after Award of Contract and at least one week before starting work of this Section to verify project requirements, substrate conditions and coordination with other building sub-trades, and to review manufacturer's written installation instructions.
 1. Comply with Section 01 Project Meetings and co-ordinate with other similar pre-installation meetings.
 2. Notify Owner & Architect at least 2 weeks prior to meeting.
 3. Ensure meeting agenda includes review of methods and procedures related to insulation installation including co-ordination with related work.
 4. Record meeting proceedings including corrective measures and other actions required to ensure successful completion of work and distribute to each attendee within 1 week of meeting.

1.05 SUBMITTALS

- A. Make submittals in accordance with Contract Conditions and Section 01 "Submittal Procedures".

SECTION 098116 - BATT INSULATION

- B. Product Data: Submit product data including manufacturer's literature for insulation materials and accessories, indicating compliance with specified requirements and material characteristics.
 - 1. Submit list on insulation manufacturer's letterhead of materials and accessories to be incorporated into Work.
 - 2. MSDS report.
 - 3. Include product name.
 - 4. Include preparation instructions and recommendations, installation methods, and storage and handling requirements.
 - 5. Include contact information for manufacturer and their representative for this Project.
- C. Samples:
 - 1. Submit sealed samples 5.5 x 7.5 inches minimum of insulation in thickness used on Project.
- D. Test Reports:
 - 1. Submit evaluation service reports or other independent testing agency reports showing compliance with specified performance characteristics and physical properties.
- E. Field Reports: Submit manufacturer's field reports within 3 days of each manufacturer representative's site visit and inspection.
- F. Insulation Installer Qualifications:
 - 1. Submit letter verifying insulation installer's experience with work similar to work of this Section.

1.06 CLOSEOUT SUBMITTALS

- A. Operation and Maintenance Data: Supply maintenance data for insulation materials for incorporation into manual specified in Section 01 "Closeout Submittals".

1.07 QUALITY ASSURANCE

- A. Batt and Blanket Insulation Installer Quality Assurance: Work experience of 5 years minimum with work similar to work of this Section.

1.08 DELIVERY STORAGE AND HANDLING

- A. Delivery and Acceptance Requirements:
 - 1. Deliver material in accordance with Section 01 "Product Requirements".
 - 2. Deliver materials and accessories in insulation manufacture's original packaging with identification labels intact and in sizes to suit project.
 - 3. Ensure insulation materials are not exposed to moisture during delivery.
 - 4. Replace wet or damaged insulation materials.
- B. Storage and Handling Requirements: Store materials off ground in dry location and protected from exposure to harmful weather conditions and at temperature conditions recommended by manufacturer.
 - 1. Store in original packaging until installed.
- C. Packaging Waste Management:
 - 1. Separate and recycle waste packaging materials in accordance with Section 01 "Construction Waste Management and Disposal".
 - 2. Remove waste packaging materials from site and dispose of packaging materials at appropriate recycling facilities.
 - 3. Collect and separate for disposal paper and plastic material in appropriate on-site storage containers for recycling in accordance with Waste Management Plan.

SECTION 098116 - BATT INSULATION

1.09 WARRANTY

- A. Project Warranty: Refer to Contract Conditions for project warranty provisions.
- B. Manufacturer's warranty: Submit, for Owner's acceptance, manufacturer's standard warranty document executed by authorized company official. Manufacturer's warranty is in addition to and not intended to limit other rights Owner may have under Contract Conditions.
- C. Warranty period: 5 years commencing on Date of Substantial Performance of Work.

2 PRODUCTS

2.01 MANUFACTURER

- 1. Basis of Design Product Manufacturer: ROXUL INC., 420 Bronte Street South, Suite 105, Milton, Ontario, L9T 0H9, Phone: 905-878-8474, Toll Free: 1-800-265-6878, e-mail: contactus@roxul.com, URL: www.rspect.com.

2.02 DESCRIPTION

- A. Non-combustible, lightweight, semi-rigid stone wool batt insulation to ASTM C665 Type 1, that provides fire resistance to ASTM E136.

2.03 PERFORMANCE CRITERIA

- A. Fire batt insulation for floors, walls, ceilings & soffits to ASTM C665, Type 1.
 - 1. Fire performance:
 - a. Non-combustibility: To ASTM E136.
 - b. Surface Burning Characteristics: To ASTM E84.
 - 1) Flame spread: 0.
 - 2) Smoke developed: 0.
 - 3. Air erosion velocity: 1,000 ft/m maximum to UL 181.
 - 4. Thermal resistance: To ASTM C518.
 - 5. Corrosive resistance: To ASTM C665, Corrosive to steel - Pass.
 - 6. Stainless steel stress corrosion: To ASTM C795.
 - 7. Density: To ASTM C612, 2.8 lbs/ft³.
 - 8. Recycled content: 16 % minimum.

2.04 MATERIALS

- A. Non-combustible, lightweight, semi-rigid stone sound attenuation mineral wool batt insulation that provides fire resistance to ASTM E136.
 - 1. Size: 24-inches x 48-inches.
 - 2. Thickness: As required to fill wall cavities completely, as indicated.
 - 4. Basis of Design Material in Floor, Wall, Ceilings & Soffit Locations: ROXUL INC. / COMFORTBATT thermal batt insulation, filling cavities completely.

2.05 ACCESSORIES

- A. Mechanical fasteners in accordance with insulation manufacturer's written recommendations.
- B. Acoustical sealant in accordance with Section 07 "Acoustical Joint Sealants".
- C. Firestopping materials in accordance with Section 07 "Firestopping".

SECTION 098116 - BATT INSULATION

2.06 SOURCE QUALITY CONTROL

- A. Ensure insulation components and accessories are supplied or approved in writing by single manufacturer.

2.07 PRODUCT SUBSTITUTIONS

- A. Substitutions: Subject to the product requirements specified herein, in accordance with Section 01 "Product Substitution Procedures".

3 EXECUTION

3.01 INSTALLERS

- A. Use only installers with 5 years minimum experience with work similar to work of this Section.

3.02 EXAMINATION

- A. Verification of Conditions: Verify that conditions of substrate previously installed under other Sections or Contracts are acceptable for insulation installation in accordance with manufacturer's written recommendations.
 - 1. Visually inspect substrate in presence of Consultant.
 - 2. Ensure surfaces are free of snow, ice, frost, grease and other deleterious materials.
 - 3. Proceed with installation only after unacceptable conditions have been remedied and after receipt of written approval to proceed from Consultant.
- B. Start of insulation installation indicates installer's acceptance of substrate installation conditions.

3.02 INSTALLATION

- A. Install batt insulation in accordance with manufacturer's written recommendations, and as indicated.
- B. Install batt insulation to maintain continuity of thermal protection to building elements and spaces.
- C. Do not over compress insulation to fit into spaces.
- D. Ensure that exterior walls near areas of plumbing are well insulated without gaps.
- E. Ensure snug fitting sound attenuation batt insulation installation without gaps at edges of batts, metal studs or blocking.
- F. Co-ordinate installation of firestopping insulation with Section 07 84 13 Firestopping.
- G. Fit batt insulation closely around electrical boxes, pipes, ducts, frames and other objects in or passing through insulation.
- H. Keep batt insulation minimum 3 inches from heat emitting devices such as recessed light fixtures, and minimum 2 inches from sidewalls of chimneys and vents.
- I. Do not enclose batt insulation until before inspection and receipt of Architect's written approval.

3.04 FIELD QUALITY CONTROL

- A. Field Inspection: Coordinate field inspection in accordance with Section 01 "Quality Control".

3.05 CLEANING

- A. Progress Cleaning: Perform cleanup as work progresses.
 - 1. Leave work area clean at end of each day.

- B. Waste Management:

SECTION 098116 - BATT INSULATION

1. Co-ordinate recycling of waste materials with 01 "Construction Waste Management and Disposal".
2. Collect recyclable waste and dispose of or recycle field generated construction waste created during construction or final cleaning related to work of this Section.
3. Remove recycling containers and bins from site and dispose of materials at appropriate facility.

3.06 PROTECTION

- A. Protect installed products and accessories from damage during construction by other trades.
- B. Repair damage to sound attenuation batt insulation as required.
- C. Repair damage to adjacent materials caused by insulation installation.

END OF SECTION

SECTION 099123 - INTERIOR & EXTERIOR PAINTING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.
- B. Division 03 "Concrete" and Structural Drawings, for sealers required on interior & exterior exposed concrete.

1.2 SUMMARY

- A. This Section includes surface preparation and the application of paint systems on the following interior & exterior substrates:
 - 1. Steel.
 - 2. Metal.
 - 3. Wood.
 - 4. Gypsum Board.
 - 5. Concrete.

1.3 SUBMITTALS

- A. Product Data: For each type of product indicated.
- B. Samples for Selection: For each type of topcoat product indicated.
- C. Product List: For each product indicated, include the following:
 - 1. Cross-reference to paint system and locations of application areas. Use same designations indicated on Drawings and in schedules.

1.4 QUALITY ASSURANCE

- A. Mockups: Apply benchmark samples of each paint system indicated and each color and finish selected to verify preliminary selections made under sample submittals and to demonstrate aesthetic effects and set quality standards for materials and execution.
 - 1. Architect will select one surface to represent surfaces and conditions for application of each paint system specified in Part 3.
 - a. Architect will designate items or areas required.

2. Apply benchmark samples after permanent lighting and other environmental services have been activated, or provide equal temporary lighting conditions.
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.

1.5 DELIVERY, STORAGE, AND HANDLING

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

1.6 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.

1.7 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, unopened.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 1. The Sherwin-Williams Company (Basis of Design Standard Paint Products).
 2. Benjamin Moore & Co.
 3. ICI Paints.
 4. Shield Industries, Inc. (Basis of Design for Intumescent Paint Products).
 5. Kilz.

2.2 PAINT, GENERAL

A. Material Compatibility:

1. Provide materials for use within each paint system that are compatible with one another and substrates indicated, under conditions of service and application as demonstrated by manufacturer, based on testing and field experience.
2. For each coat in a paint system, provide products recommended in writing by manufacturers of topcoat for use in paint system and on substrate indicated.

B. VOC Content of Field-Applied Interior Paints and Coatings: Provide products that comply with the following limits for VOC content, exclusive of colorants added to a tint base, when calculated according to 40 CFR 59, Subpart D (EPA Method 24); 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. Flat Topcoat Paints: VOC content of not more than 50 g/L.
6. Nonflat Topcoat Paints: VOC content of not more than 150 g/L.
7. Anti-Corrosive and Anti-Rust Paints Applied to Ferrous Metals: VOC not more than 250 g/L.
8. Primers, Sealers, and Undercoaters: VOC content of not more than 200 g/L.
9. Dry-Fog Coatings: VOC content of not more than 400 g/L.
10. Zinc-Rich Industrial Maintenance Primers: VOC content of not more than 340 g/L.
11. 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: As selected by Architect from manufacturer's full range, or as indicated.

E. Paints in subsequent articles are specified by reference to MPI paint categories. Retaining requirements for VOC content or Environmental Performance Rating (EPR) further limits product selection; coordinate selections with products of manufacturers retained in "Manufacturers" Article.

2.3 METAL PRIMERS

A. Interior / Exterior Ferrous-Metal Primer: Factory-formulated quick-drying rust-inhibitive acrylic-based metal primer.

1. Basis of Design Product for Standard Paints: Sherwin-Williams; Pro-Cryl Universal Primer B66W310, or proven equal, applied at a dry film thickness of not less than 2.0 mils.

2.4 WOOD & GYPSUM PRIMERS

A. Interior Wood Primer for Acrylic-Enamel Finishes: Factory-formulated acrylic-latex-based interior wood primer.

1. Basis of Design Product : Sherwin-Williams; Multi-Purpose Latex Primer B51W450, or proven equal, applied at a dry film thickness of not less than 2.0 mils. Application, clean-up & Disposal as per manufacturer's recommendations.
- 2.

B. Exterior Wood Latex Primer Finishes: Factory-formulated latex-based exterior wood primer for wood siding & trim without knots.

1. Basis of Design Product:
 - a. Real Wood Clapboard Prep: Kilz Premium3; Heavy-Duty High Hide Sealer & Stain Blocker Primer 1300, or proven equal, applied at a dry film thickness of not less than 2.0 mils. Application, clean-up & Disposal as per manufacturer's safety recommendations.

- C. METAL EPOXY Interior Wood Primer for Acrylic-Enamel Finishes: Factory-formulated acrylic-latex-based interior wood primer.

- 1. Basis of Design Product: Sherwin-Williams; Multi-Purpose Latex Primer B51W450, or proven equal, applied at a dry film thickness of not less than 2.0 mils. Application, clean-up & Disposal as per manufacturer's recommendations.

2.5 PAINTS

- A. Basis of Design Product: Sherwin-Williams; Pro Industrial DTM Coating B66W01251 or proven equal, applied at a dry film thickness of not less than 3.0 mils. Minimum two (2) finish coats over a primer to full coverage. Finish: Gloss. Color: SW 7045 Intellectual Gray on hollow metal Window Frames, hollow metal Door Frames & steel Door Panels. Application, clean-up & Disposal as per manufacturer's recommendations.

2.6 GYPSUM WALL PAINTS

- A. Gypsum Walls: Basis of Design Product: Sherwin-Williams; ProClassic Interior Waterbased Acrylic-Alkyd Enamel Paint B33W00851 or proven equal, applied at a dry film thickness of not less than 3.0 mils. Minimum two (2) finish coats over a primer to full coverage. Finish: Satin, Color: as selected by Architect from Manufacturer's full range. Application, clean-up & Disposal as per manufacturer's recommendations.

2.7 TRANSPARENT FINISHES

- A. Hardwood: If applicable, Basis of Design Product: Cabot Spar Varnish, Clear Interior/Exterior Spar Varnish #8042 Alkyd Resins, or proven equal, for refinishing existing door panels on all 6 surfaces after sanding & minor repairs. Finish: Satin, unthinned, applied at a dry film thickness of not less than 3.0 mils, minimum two (2) finish coats, sanded prior to application and in between finish coats to full coverage. Application, clean-up & Disposal as per manufacturer's recommendations.

2.8 WOOD WATER BASED EPOXY PAINTS

- A. Basis of Design Product: Sherwin-Williams; Pro Industrial Pre-Catalyzed Water Based Epoxy K45W151, or proven equal, applied at a dry film thickness of not less than 3.0 mils, minimum two (2) finish coats over a primer to full coverage. Finish: Semi-Gloss. Color: as selected by Architect from Manufacturer's full range. Application, clean-up & Disposal as per manufacturer's recommendations, or

2.9 WOOD WATER BASED ALKYD ENAMEL PAINTS

- A. Basis of Design Product: Sherwin-Williams; ProClassic Alkyd Interior Enamel B33W00221, or proven equal, applied at a dry film thickness of not less than 3.0 mils, minimum two (2) finish coats over a primer to full coverage. Finish: Semi-Gloss. Color: as selected by Architect from Manufacturer's full range. Application, clean-up & Disposal as per manufacturer's recommendations.

2.10 WOOD EXTERIOR ACRYLIC LATEX PAINTS

- B. Basis of Design Product: Sherwin-Williams; Duration Exterior Acrylic Latex K33W00200, or proven equal, applied at a dry film thickness of not less than 3.0 mils, minimum two (2) finish coats over an exterior primer to full coverage. Finish: Satin. Color: as selected by Architect from Manufacturer's full range. Application, clean-up & Disposal as per manufacturer's recommendations. Initial exterior primer coat is required by Architect.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates and conditions, with Applicator present, for compliance with requirements for maximum moisture content and other conditions affecting performance of work.
- B. Maximum Moisture Content of Substrates: When measured with an electronic moisture meter as follows:
 - 1. Wood: 15 percent.
- C. Verify suitability of substrates, including surface conditions and compatibility with existing finishes and primers.
- D. Begin coating application only after unsatisfactory conditions have been corrected and surfaces are dry.
 - 1. Beginning coating application constitutes Contractor's acceptance of substrates and conditions.

3.2 PREPARATION

- A. Comply with manufacturer's written instructions and recommendations in "MPI Architectural Painting Specification Manual" applicable to substrates indicated.
- B. Remove plates, machined surfaces, and similar items already in place that are not to be painted. If removal is impractical or impossible because of size or weight of item, provide surface-applied protection before surface preparation and painting.
 - 1. After completing painting operations, use workers skilled in the trades involved to reinstall items that were removed. Remove surface-applied protection if any.
 - 2. Do not paint over labels of independent testing agencies or equipment name, identification, performance rating, or nomenclature plates.
- C. Patch, repair all damage to existing gypsum board and plywood, fill all holes larger than 1/8" prime as needed.

- D. 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.
- E. Steel Substrates: Remove rust and loose mill scale. Clean using methods recommended in writing by paint manufacturer.
- F. 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.
- G. 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.

3.3 APPLICATION

- A. Apply paints according to manufacturer's written instructions.
 - 1. Use applicators and techniques suited for paint and substrate indicated.
 - 2. Paint surfaces behind movable equipment and furniture same as similar exposed surfaces. Before final installation, paint surfaces behind permanently fixed equipment or furniture with prime coat only.
 - 3. Paint front and backsides of access panels, removable or hinged covers, and similar hinged items to match exposed surfaces.
- B. New integral cove base and vinyl cove base if installed prior to finish coats shall be neatly taped with Frog Tape or proven equal prior to painting works.
- C. Tint each undercoat a lighter shade to facilitate identification of each coat if multiple coats of same material are to be applied. Tint undercoats to match color of topcoat, but provide sufficient difference in shade of undercoats to distinguish each separate coat.
- D. If undercoats or other conditions show through topcoat, apply additional coats until cured film has a uniform paint finish, color, and appearance.
- E. 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.
- F. Ceilings: Clean ceiling, prime and provide minimum of two (2) finish coats to full coverage.

- G. Painting Mechanical and Electrical Work: Clean existing exposed ducts (all sides), conduit, junction boxes, piping, including priming if required. Paint exposed items in equipment rooms and occupied spaces according to the following list of required & not required painting works:

1. Mechanical Work:

- a. Uninsulated gas & oil metal piping, to prevent corrosion, required.
- b. Uninsulated plastic piping, not required.
- c. Pipe hangers and supports, not required.
- d. Visible portions of internal surfaces of existing & new metal ducts, without liner, behind air inlets and outlets, required.
- e. Duct, equipment, and pipe insulation having cotton or canvas insulation covering or other paintable jacket material, not required.
- f. Mechanical equipment that is indicated to have a factory-primed finish for field painting.

2. Electrical Work:

- a. Plywood Backer Boards, required.
- b. Switchgear, not required.
- c. Panelboards, not required.
- d. Electrical equipment w/ factory finish, not required.
- e. Electrical equipment that is indicated to have a factory-primed finish for field painting, required.
- f. Conduits, Hangers and other related Electrical in exposed areas, required.
- g. Electrical cover plates, not required.

3.4 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.

3.5 TOUCH-UP WORK

- A. Touch-up any paint works deemed by the Architect to be, damaged, uneven in finish quality, not properly prepped, or incomplete.
- B. Hand-Over extra paint materials (1 new / un-opened gallon per specified product), to Owner.

END OF SECTION

SECTION 099300 - TRANSPARENT FINISHING

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Transparent finishes.
- B. Related Requirements:
 - 1. Section 06 "Interior Finish Carpentry" for wood trim on window & door openings.
 - 2. Section 08 "Flush Wood Doors" for wood door panels.

1.2 ACTION SUBMITTALS

- A. Product Data:
 - 1. For each type of product.
 - 2. Include preparation requirements and application instructions.
 - 3. Indicate VOC content.
- B. Samples for Initial Selection: Manufacturer's standard color sheets, showing full range of available colors for each type of exposed finish.
- C. Samples for Verification: Sample for each type of finish system and in each color and gloss of finish required on representative samples of actual wood substrates.
 - 1. Size: 8 inches (200 mm) long.
 - 2. Apply coats on Samples in steps to show each coat required for system.
 - 3. Label each coat of each Sample.
 - 4. Label each Sample for location and application area.
- D. Product List: Cross-reference to finish system and locations of application areas. Use same designations indicated on Drawings and in schedules. Include color designations.

1.3 MAINTENANCE MATERIAL SUBMITTALS

- A. Extra Stock Material: Furnish extra materials, from the same product run, that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.
 - 1. Stains and Transparent Finishes: 5 percent, but not less than 1 gal. (3.8 L), unopened, of each material and color applied.

1.4 MOCKUPS

- A. Apply mockups of each finish system indicated and each color selected to verify preliminary selections made under Sample submittals and to demonstrate aesthetic effects, and to set quality standards for materials and execution.
 - 1. The Architect will select one surface to represent surfaces and conditions for application of each type of finish system and substrate.
 - a. Vertical and Horizontal Surfaces: Provide samples of at least 100 sq. ft. (9 sq. m).
 - b. Other Items: The Architect will designate items or areas required.
 - 2. Final approval of stain color selections will be based on mockups.
 - a. If preliminary stain color selections are not approved, apply additional mockups of additional stain colors selected by The Architect at no added cost to Owner.
 - 3. Subject to compliance with requirements, approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

1.5 DELIVERY, STORAGE, AND HANDLING

- A. Store materials not in use in tightly covered containers in well-ventilated areas with ambient temperatures continuously maintained at not less than 45 deg F (7 deg C).
 - 1. Maintain containers in clean condition, free of foreign materials and residue.
 - 2. Remove rags and waste from storage areas daily.

1.6 FIELD CONDITIONS

- A. Apply finishes only when temperature of surfaces to be finished and ambient air temperatures are between 50 and 95 deg F (10 and 35 deg C).
- B. Do not apply finishes when relative humidity exceeds 85 percent, at temperatures of less than 5 deg F (3 deg C) above the dew point, or to damp or wet surfaces.
- C. Do not apply exterior finishes in snow, rain, fog, or mist.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. MinWax or equal.

2.2 SOURCE LIMITATIONS

- A. Source Limitations: Obtain each coating product from single source from single manufacturer.

2.3 MATERIALS, GENERAL

A. Material Compatibility:

1. Provide materials for use within each coating 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.

2.4 TRANSPARENT FINISHES

- A. Varnish, Interior Polyurethane, Moisture Cured, Gloss: Solvent-based, moisture-curing polyurethane clear-coating with a matt finish for interior wood surfaces,
1. Gloss Level: Manufacturer's standard gloss finish.
 2. Minwax Polycrylic or equal, water based, crystal clear, matt finish.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates and conditions, with Applicator present, for compliance with requirements for maximum moisture content and other conditions affecting performance of the Work.
- B. Maximum Moisture Content of Exterior Wood Substrates: 15 percent, when measured with an electronic moisture meter.
- C. Maximum Moisture Content of Interior Wood Substrates: 9 percent, when measured with an electronic moisture meter.
- D. Verify suitability of substrates, including surface conditions and compatibility with existing finishes and primers.
- E. Proceed with finish application only after unsatisfactory conditions have been corrected.
1. Beginning finish application constitutes Sub-Contractor's acceptance of substrates and conditions.

3.2 PREPARATION

- A. Remove hardware, covers, plates, and similar items already in place that are removable. If removal is impractical or impossible because of size or weight of item, provide surface-applied protection before surface preparation and finishing.
1. After completing finishing operations, use workers skilled in the trades involved to reinstall items that were removed. Remove surface-applied protection if any.
- B. Clean and prepare surfaces to be finished according to manufacturer's written instructions for each substrate condition and as specified.

C. Interior Wood Substrates:

1. Scrape and clean knots, and apply coat of knot sealer before applying primer.
2. Apply wood filler paste to open-grain woods to produce smooth, glasslike finish.
3. Sand surfaces exposed to view and dust off.
4. After priming, fill holes and imperfections in the finish surfaces with putty or plastic wood filler. Sand smooth when dry.

3.3 APPLICATION

A. Apply finishes according to manufacturer's written instructions.

1. Use applicators and techniques suited for finish and substrate indicated.
2. Finish surfaces behind movable equipment and furniture same as similar exposed surfaces.
3. Do not apply finishes over labels of independent testing agencies or equipment name, identification, performance rating, or nomenclature plates.

B. Apply finishes to produce surface films without cloudiness, holidays, lap marks, brush marks, runs, ropiness, or other surface imperfections.

3.4 CLEANING AND PROTECTION

A. At end of each workday, remove rubbish, empty cans, rags, and other discarded materials from Project site.

B. After completing finish application, clean spattered surfaces. Remove spattered materials by washing, scraping, or other methods. Do not scratch or damage adjacent finished surfaces.

C. Protect work of other trades against damage from finish application. Correct damage by cleaning, repairing, replacing, and refinishing, as approved by The Architect, and leave in an undamaged condition.

D. At completion of construction activities of other trades, touch up and restore damaged or defaced finished wood surfaces.

3.5 INTERIOR WOOD-FINISH-SYSTEM SCHEDULE

A. Wood Substrates, Wood Trim and Wood Board Paneling: Coordinate finish types w/ the Architect.

1. Option I / Water-Based Varnish System:

- a. Prime Coat: Water-based varnish matching topcoat.
- b. Intermediate Coat: Water-based varnish matching topcoat.
- c. Topcoat: Varnish, water based, clear, satin on woodwall panels, semigloss on wood trim.

2. Option II / Polyurethane Varnish System:

- a. Prime Coat: Polyurethane varnish matching topcoat.
- b. Intermediate Coat: Polyurethane varnish matching topcoat.
- c. Topcoat: Varnish, interior, polyurethane, oil modified, satin on woodwall panels, semigloss on wood trim.

END OF SECTION

SECTION 101400 - SIGNAGE

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. Interior room identification signs w/ names, numbers, symbols and tactile (braille) dots.
 - 2. Exterior identification signs w/ names, numbers, symbols and tactile (braille) dots.
- B. Related Sections include the following:
 - 1. Division 22 Section "Identification for Plumbing Piping and Equipment" for labels, tags, and nameplates for plumbing systems and equipment.
 - 2. Division 23 Section "Identification for HVAC Piping and Equipment" for labels, tags, and nameplates for HVAC systems and equipment.
 - 3. Division 26 Sections for electrical service and connections for illuminated signs.
 - 4. Division 26 Section "Identification for Electrical Systems" for labels, tags, and nameplates for electrical equipment.
 - 5. Division 26 Section "Interior Lighting" for illuminated Exit signs.

1.3 DEFINITIONS

- A. ADA-ABA Accessibility Guidelines: U.S. Architectural & Transportation Barriers Compliance Board's "Americans with Disabilities Act (ADA) Accessibility Guidelines for Buildings and Facilities; Architectural Barriers Act (ABA) Accessibility Guidelines."

1.4 SUBMITTALS

- A. Product Data: For each type of product indicated.
- B. Shop Drawings: Show fabrication and installation details for signs.
 - 1. Show sign dimensions, mounting heights, pre-drilled holes, locations of supplementary supports and accessories.
 - 2. Provide message list, typestyles, symbols, tactile dots (Braille), and layout for each sign.
- C. Samples for Selection: Manufacturer's color charts consisting of actual units or sections of units showing the full range of colors available for the following:
 - 1. Acrylic sheet.

- D. Interior Sign Schedule: Use designations as follows:
 - 1. DMR DIRECTOR XXX
 - 2. ELECTRICAL XXX
 - 3. DMR OFFICE ACCESS/ELECTRICAL XXX (AUTHORIZED PERSONNEL ONLY)
 - 4. BARN ACCESS (AUTHORIZED PERSONNEL ONLY)
 - 5. RESTROOM XXX
 - 6. RESERVE XXX
 - 7. RESERVE XXX
 - 8. RESERVE XXX
- E. Exterior Sign Schedule: Use designations as follows:
 - 1. DMR PUBLIC ENTRANCE
 - 2. DMR DIRECTOR'S OFFICE (PRIVATE - PUBLIC ACCESS w/ ARROW)
 - 3. AUTHORIZED PERSONNEL ONLY
 - 4. AUTHORIZED PERSONNEL ONLY
 - 5. AUTHORIZED PERSONNEL ONLY
 - 6. AUTHORIZED PERSONNEL ONLY
 - 7. RESERVE
 - 8. RESERVE
 - 9. RESERVE
- F. Maintenance Data: For signs to include in maintenance manuals.
- G. Tectile: Required for all interior signs, ADA Braille, transparent raised dots.
- H. Warranty: Special warranty specified in this Section.
- I. Coordination: GC shall coordinate signage w/ Architect & Owner during submittal process.

1.5 QUALITY ASSURANCE

- A. Fabricator Qualifications: Shop that employs skilled workers who custom-fabricate products similar to those required for this Project and whose products have a record of successful in-service performance.
- B. Source Limitations for Signs: Obtain each sign type indicated from one source from a single manufacturer.
- C. Regulatory Requirements: Comply with applicable provisions in ADA-ABA Accessibility Guidelines.

1.6 PROJECT CONDITIONS

- A. Field Measurements: Verify recess openings by field measurements before fabrication and indicate measurements on Shop Drawings.

1.7 COORDINATION

- A. Coordinate signage schedules with Architect during Submittals.

- B. Coordinate placement of anchorage devices with templates for installing signs.

PART 2 - PRODUCTS

2.1 MATERIALS

- A. Acrylic Sheet: ASTM D 4802, Category A-1 (cell-cast sheet), Type UVA (UV absorbing).

2.2 PANEL SIGNS

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - 1. Manufacturers of Panel Signs:
 - a. Minuteman Signs
 - b. Mohawk Sign Systems.
 - c. Welch Architectural Signage.
 - d. Bangor Neon.
- B. Exterior & Interior Panel Signs: Provide smooth sign panel surfaces constructed to remain flat under installed conditions within a tolerance of plus or minus 1/16 inch measured diagonally from corner to corner, complying with the following requirements:
 - 1. Sign Types: Exterior identification/directional Signs, Room Designation Signs.
 - 2. Basis of Design Background Color: as selected by Architect by manufacturer's full range.
 - 3. Basis of Design Embossed Color: as selected by Architect by manufacturer's full range.
 - 4. Substrate: Fabricate signs mechanically and smoothly finished to eliminate cut marks.
 - 5. Thickness: 1/8-inch ACM acrylic.
 - 6. Edge Condition: Straight, polished smooth.
 - 7. Corner Condition: Square.
 - 8. Sign Locations: Field coordinate with the Architect.
 - 9. Interior Signs: Raised text, raised symbols, raised braille dots.
 - 10. Exterior Signs: Flush text, no braille dots, use only fade resistant materials.
 - 11. Interior Sign Sizes: Adjust dimensions if symbols are required.
 - 1) Text & Braille Only: 4-inches x 8-inches.
 - 2) Text, Symbols & Braille: 9-inches x 8-inches.
 - 12. Exterior Sign Sizes: Adjust dimensions if symbols are required.
 - 1) Text Only: 9-inches x 12-inches.
- C. Braille: Use embossing process for all Braille areas. Emboss Braille dots onto surface of Back Plate material.
- D. Assembly: Joint to exact sized acrylic pieces, polish edges smooth.
- E. Copy: Helvetica.

- F. 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.
- G. Provide characters complying with ADA Accessibility Guidelines and ICC/ANSI A117.1. Text shall be accompanied by Grade 2 braille.

2.3 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 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.

2.4 ACRYLIC SHEET FINISHES

- A. Colored Coatings for Acrylic Sheet: For copy and background colors, provide colored coatings, including inks, dyes, and paints, that are recommended by acrylic manufacturers for optimum adherence to acrylic surface and that are UV and water resistant for three years for application intended.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of work.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

- A. Locate signs and accessories where indicated, using mounting methods of types described and complying with manufacturer's written instructions.
 - 1. Install signs level, plumb, and at ADA compliant heights, with sign surfaces free of distortion and other defects in appearance.

2. Interior Wall Signs: Install signs on walls adjacent to latch side of door where applicable. Where not indicated or possible, such as double doors, install signs on nearest adjacent walls. Locate to allow approach within 3 inches of sign without encountering protruding objects or standing within swing of door.
- B. Wall-Mounted Signs: Comply with sign manufacturer's written instructions except where more stringent requirements apply.
1. Interior Signs: Double-sided-high-tack tape, mount signs to smooth, nonporous surfaces.
 2. Exterior Signs: Stainless steel, raised-round-head-tamperproof fasteners, mount signs to smooth, nonporous surfaces, four fasteners per sign, pre-drilled holes shall be min. $\frac{3}{4}$ " from all edges.

3.3 CLEANING AND PROTECTION

- A. After installation, clean soiled sign surfaces according to manufacturer's written instructions. Protect signs from damage until acceptance by Owner.

END OF SECTION

SECTION 102800 - TOILET ACCESSORIES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. This Section includes the following:
 - 1. Toilet accessories.
 - 2. Custodial accessories.
- B. Related Sections include the following:
 - 1. Division 06 "Rough Carpentry" for wood blocking required for Toilet Accessories.
- C. Owner-Furnished Material: As determined by the Construction Manager.

1.3 SUBMITTALS

- A. Product Data: For each type of product indicated. Include the following:
 - 1. Construction details and dimensions.
 - 2. Anchoring and mounting requirements, including requirements for cutouts in other work and substrate preparation.
 - 3. Material and finish descriptions.
 - 4. Features that will be included for Project.
 - 5. Manufacturer's warranty.
- B. Product Schedule: Indicating types, quantities, sizes, and installation locations by room of each accessory required.
 - 1. Identify locations using room designations indicated on Drawings.
 - 2. Identify products using designations indicated on Drawings.
- C. Maintenance Data: For toilet and bath accessories to include in maintenance manuals.

1.4 QUALITY ASSURANCE

- A. Source Limitations: For products listed together in the same articles in Part 2, provide products of same manufacturer unless otherwise approved by The Construction Manager.

1.5 COORDINATION

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

1.6 WARRANTY

- A. Special Mirror Warranty: Manufacturer's standard form in which manufacturer agrees to replace mirrors that develop visible silver spoilage defects and that fail in materials or workmanship within specified warranty period.

- 1. Warranty Period: 15 years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 MATERIALS

- A. Stainless Steel: ASTM A 666, Type 304, 0.0312-inch minimum nominal thickness, unless otherwise indicated.
- B. Steel Sheet: ASTM A 1008/A 1008M, Designation CS (cold rolled, commercial steel), 0.0359-inch minimum nominal thickness.
- C. Galvanized Steel Mounting Devices: ASTM A 153/A 153M, hot-dip galvanized after fabrication.
- D. Fasteners: Screws, bolts, and other devices of same material as accessory unit and tamper-and-theft resistant where exposed, and of galvanized steel where concealed.
- E. Mirrors: ASTM C 1503, Mirror Glazing Quality, clear-glass mirrors, nominal 6.0 mm thick.

2.2 TOILET ACCESSORIES

- A. Preparation: In existing locations provide wood board removals, wood blocking and wood board repairs as required. In new locations, provide blocking as required.
- B. Toilet Tissue (Roll) Dispensers.
- C. Paper Towel Dispensers.
- D. Liquid-Soap Dispensers.
- E. Grab Bars:

1. Basis-of-Design Product: Bobrick 6806 Series
2. Configuration and Length: Three (3), as indicated to meet code (2 horizontal & 1 vertical).
3. Mounting: Flanges with concealed fasteners.
4. Material: Stainless steel, 0.05 inch thick, smooth finish, No. 4, satin finish on ends and slip-resistant texture in grip area.
5. Outside Diameter: 1-1/2 inches.
6. Set-Screws: Oriented downwards.

F. Mirror Units:

1. Basis-of-Design Product: Bobrick B-165 Series
2. Frame: Stainless-steel channel.
3. Corners: Mitered and mechanically interlocked.
4. Hangers: Produce rigid, tamper- and theft-resistant installation, using wall bracket of galvanized steel, equipped with concealed locking devices requiring a special tool to remove.
5. Size: 24-inches x 36-inches.

G. Sanitary-Napkin Disposal Units:

1. Basis-of-Design Product: Bobrick B-270.
2. Mounting: Surface mounted.
3. Door or Cover: Self-closing, disposal-opening cover.
4. Receptacle: Removable.
5. Material and Finish: Stainless steel, No. 4 finish (satin).

2.3 CUSTODIAL ACCESSORIES

A. The design for accessories is based on products indicated. Subject to compliance with requirements, provide the named product or a comparable product by one of the following:

1. A & J Washroom Accessories, Inc.
2. American Specialties, Inc.
3. Bradley Corporation.
4. General Accessory Manufacturing Co. (GAMCO).

B. Mop and Broom Holder:

1. Basis-of-Design Product: Bobrick B-239
2. Description: Unit with shelf, hooks, holders, and rod suspended beneath shelf.
3. Length: 36 inches.
4. Hooks: Four, top & bottom hook type.
5. Mop/Broom Holders: Three, spring-loaded, rubber hat, cam type.
6. Material and Finish: Stainless steel, No. 4 finish (satin).
7. Shelf: Not less than nominal 0.05-inch- thick stainless steel.

2.4 FABRICATION

- A. General: Fabricate units with tight seams and joints, and exposed edges rolled. Hang doors and access panels with full-length, continuous hinges. Equip units for concealed anchorage and with corrosion-resistant backing plates.
- B. Keys: Provide universal keys for internal access to accessories for servicing and resupplying.

PART 3 - EXECUTION

3.1 INSTALLATION

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

3.2 ADJUSTING AND CLEANING

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

END OF SECTION

SECTION 104416 - FIRE EXTINGUISHERS

PART 1 - GENERAL

1.1 SUMMARY

- A. Section includes portable, hand-carried fire extinguishers and mounting brackets for fire extinguishers.
- B. Owner-Furnished Material: Hand-carried fire extinguishers.

1.2 PREINSTALLATION MEETINGS

- A. Preinstallation Conference: Conduct conference at Project site w/ the Construction Manager.
 - 1. Review methods and procedures related to fire extinguishers including, but not limited to, the following:
 - a. Schedules and coordination requirements.

1.3 ACTION SUBMITTALS

- A. Product Data: For each type of product. 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.

1.4 INFORMATIONAL SUBMITTALS

- A. Warranty: Sample of special warranty.

1.5 CLOSEOUT SUBMITTALS

- A. Operation and Maintenance Data: For fire extinguishers to include in maintenance manuals.

1.6 COORDINATION

- A. Coordinate type and capacity of fire extinguishers with fire-protection brackets to ensure fit and function.

1.7 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 when testing interval required by NFPA 10 is within the warranty period.
 - b. Faulty operation of valves or release levers.
 - 2. Warranty Period: Six years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

- 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 FM Global.

2.2 PORTABLE, HAND-CARRIED FIRE EXTINGUISHERS

- A. Fire Extinguishers: Type, size, and capacity for each fire-protection cabinet and mounting bracket indicated.
 - 1. Source Limitations: Obtain fire extinguishers, fire-protection cabinets, and accessories, from single source from single manufacturer.
 - 2. Valves: Manufacturer's standard.
 - 3. Handles and Levers: Stainless steel.
 - 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 10-A:120-B:C, 20-lb (9.1-kg), nominal capacity, with monoammonium phosphate-based dry chemical in enameled-steel container. Coordinate extinguisher type w/ extinguisher cabinets.

2.3 MOUNTING BRACKETS

- A. Mounting Brackets: Manufacturer's standard galvanized steel, designed to secure fire extinguisher to wall or structure, of sizes required for types and capacities of fire extinguishers indicated, with plated or black baked-enamel finish.

1. Source Limitations: Obtain mounting brackets and fire extinguishers from single source from single manufacturer.
2. Install without fire-extinguisher cabinets at:
 - a. Barn four (4) units.
 - b. DMR Office: Two (2) units.
 - c. Entry Building: One (1) unit.
 - d. Pumphouse: One (1) unit.
 - e. Pole Barn: Two (2) units.

PART 3 - EXECUTION

3.1 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.

3.2 INSTALLATION

- A. General: Install fire extinguishers and mounting brackets in locations indicated and in compliance requirements of authorities having jurisdiction.
- B. Mounting Brackets: Fasten mounting brackets to surfaces, square and plumb, at locations indicated.
 1. Mounting Height: Top of fire extinguisher to be at 42 inches (1067 mm), above finished floor.
- C. Cleaning: Clean fire extinguishers & fire extinguisher cabinets prior to Substantial Completion.

END OF SECTION

SECTION 108000 - OTHER SPECIALTIES

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. DMR Office Transaction Window Treatments.
 - 2. DMR Office Transaction Window Communication Device.
 - 3. Entry Building Floor Mat.
 - 4. Entry Building & DMR Walk-Off Mats.
 - 5. Emergency Eyewash Stations.

1.3 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

2.1 CELLULAR SHADES & ACCESSORIES

- A. Located at DMR Office Transaction Window:
 - 1. Basis of Design Product: Graber Crystal Pleat or equal. Jerry Chase's Blind Time, 24 Meadowhill Drive, Farmington, ME 04344, Phone: 207.621.9832, FAX: 877.690.1998, Website: www.blindtime.com
 - 2. Installed at Transaction Window fastened to header of hardwood frame.
 - 3. Submit product data for each product specified, including typical installation details to meet project needs.
 - 4. Type: 3/8" Single Cell.
 - 5. Operation: Compressing upward folding, fixed at top of side-lite/.
 - 6. Mount: Clip type fastened to and between hollow metal frame.
 - 7. Model: Garden Retreat Solitaire.
 - 8. Control: Manufacturer's standard cord type with end plugs.
 - 9. Lift: Right from inside.
 - 10. Fabric: Manufacturer's standard.
 - 11. Components: Manufacturer's standard drive.
 - 12. Extruded Aluminum Color: As selected by Architect from Manufacturer's full range.
 - 13. Headrail Color: Color as selected by Architect from Manufacturer's full range.

2.2 COMMUNICATION DEVICE:

A. Located at DMR Office Transaction Window:

1. Basis of Design Product: TTU-1A-X Talk-Thru for continuous operation as provided by Alpha Communications, 42 Central Drive, Farmington, NY 11735-1202, TEL: 1.631.777.5500, FAX: 1.631.777.5599, WEB: AlphaCommunications.com, EMAIL: info@alphacommunications.com
2. Country of Origin: USA.
3. Outside Face Plate: Solid aluminum w/ anodized finish, tamper-resistant, 5" diameter x 0.50".
4. Inside Control Housing: Machined aluminum, anodized finish, tamper-resistant, 5" diameter x 3.50" Diameter.
5. Weight: 4.50 lbs.
6. Partition Hole: 3.5" recommended by Manufacturer.
7. Partition Thickness: 1" insulating glass, co-ordinate with glazing manufacturer as specified in Section 088000 Glazing.
8. Mounting conditions: Integral with new Aluminum Storefront Window assembly.
9. Panel Controls: Listen volume, talk, volume, on-off switch.
10. Audio Frequency Response: Selectively shaped for maximum voice intelligibility.
11. Audio Power: 2 Watts per amplifier.
12. Distortion: < 2%.
13. Listen Mode: 20 db compression.
14. Talk Mode: Vox.
15. Microphone: Electret (inside gooseneck).
16. Outside Attenuation: ~70% reduction after 30 seconds.
17. Gooseneck: 24" long, specify when ordering unit.
18. Power Supply: Input: 120VAC, 60 Hz, Output: 15 VDC, 175mA, Hard wired from ceiling w/ extruded aluminum mire-mold or sleeve.
19. Grommet: Install grommet in countertop as indicated.

2.3 RUBBER FLOOR MATS:

A. Located at Entry Building:

1. Basis of Design Product: ULINE Custom sized, long-life sealed rubber mats.
2. Website: <https://www.uline.com/CustomProduct/CustomStaticCustomSizedMats.htm#>
3. Thickness: 3/8" thick.
4. Number: Two Mats (2) mats.
5. Dimensions: Custom
 - a. Transaction Window: 5'0" x 4'0"
 - b. Workspace: 5'0" x 2'0"
6. Color & Finish: Black, marbled, slip resistant, easy clean finish.
7. Installation: loose laid on sealed concrete, removable, as indicated.

2.4 WALK-OFF MATS:

A. Located at Entry Building:

1. Basis of Design Product: ULINE Custom sized, Mud Master mats.
2. Website: https://www.uline.com/BL_1759/Mud-Master-Mats
3. Thickness: 1/2" thick.
4. Number: Three (3) mats.
5. Dimensions: Standard

- a. DMR Office: 4'0" x 3'0" each (Door #1)
- b. DMR Office: 6'0" x 4'0" each (Door #3)
- c. Entry Building: 5'0" x 3'0" (Door #1)
- 6. Color & Finish: Charcoal, slip resistant ridges in Olefin carpet, rubber perimeter.
- 7. Installation DMR Office: loose laid on finished floor, removable, as indicated.
- 8. Installation Entry Building: loose laid on sealed concrete, removable, as indicated.

2.5 EMERGENCY EYEWASH STATIONS:

- A. Located at Barn, DMR Office, Entry Building, Wash House, Pump House and Pole Barn.
 - 1. Basis of Design Product: Honeywell (Eyesaline) Wall Eyewash Stations as provided by ULINE.
 - 2. Website: https://www.uline.com/BL_991/Honeywell-Wall-Eyewash-Stations
 - 3. Model No.: H-6115 16 oz. Two-Bottle Station, total capacity per station 32 oz.
 - 4. Dimensions: 12"x15"x4".
 - 5. Fasteners: 2" Corrosion resistant, round head, coarse thread wood screws, including plastic expanding plug anchors in gypsum walls.
 - 6. Provide & install 6 stations.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Install Cellular Shades as indicated and according to manufacturers' written instructions.
- B. Install Communication Device and grommet as indicated and according to manufacturers' written instructions. Test for proper operation.
- C. Install Rubber Floor Mats as indicated according to manufacturers' written instructions, do not adhere to sealed concrete substrate. Protect with RamBoard until Substantial completion.
- D. Install Walk-Off Mats as indicated according to manufacturers' written instructions, do not adhere to substrates. Protect with RamBoard until Substantial completion.
- E. Install Emergency Eyewash Stations in a code compliant manner, 33" – 45" high, Coordinate mounting locations in all areas indicated w/ Owner.

3.2 ADJUSTING AND CLEANING

- A. Adjust specialties for unencumbered, smooth operation and verify that mechanisms function properly. Replace damaged or defective items.
- B. Remove all protective materials upon Substantial Completion.
- C. Clean surfaces prior to inspection. Replace damaged or defective items.

3.3 MANUALS & WARRANTIES

- A. Provide manuals and Manufacturer's Warranties as part of O&M closeout procedures.

END OF SECTION

SECTION 22 00 10- BASIC PLUMBING REQUIREMENTS

PART 1 - GENERAL

1.1 SUMMARY OF PLUMBING WORK

- A. The Work includes, but is not limited to, the following:
 - 1. Furnish all labor, materials, equipment, transportation and perform all operations as required to install a complete plumbing system in accordance with these specifications and applicable Drawings.
 - 2. Study the drawings and specifications and coordinate Mechanical and Plumbing work with that of Architectural and other trades. Report all discrepancies to the Engineer prior to submitting a bid.
 - 3. Other work as required to provide complete and operating mechanical and plumbing systems.

1.2 RELATED DOCUMENTS

- A. Drawings, Division 00, including General and Supplementary Conditions and Division 01 Specification Sections, apply to Division 22 and all its Sections.

1.3 RELATED WORK DESCRIBED ELSEWHERE

- A. Provide under the appropriate Section, all cutting, patching, trenching, plastering, chases, slots, furring, grounds, masonry foundations, excavation, backfilling, pads, conduits, etc., incidental to the installation of plumbing apparatus. Execute the work by qualified trades as shown on the Drawings and under the direction of this Section.
- B. Electrical work: Plumbing work shall include the installation of all motors, temperature controls, limit switches, etc., as herein specified. Work by the electrical sub-contractor (EC) shall include all other switches, pilot lights, fused and non-fused disconnect switches, outlets, motor starters, except as herein specified, and all necessary wiring and fuses to properly connect all mechanical/electrical equipment.
- C. The following work shall be provided under the designated Sections:
 - 1. Cutting and patching: By the General Contractor.
 - 2. Division 01, General Requirements: Temporary toilets.
 - 3. Division 31, Earth Work, Division 33 Utilities: New sanitary sewers and manholes and new storm sewers and drywells.
 - 4. Division 31, Earth Work, Division 33 Utilities: New water mains and services.
 - 5. Division 31, Earthwork: Trenching and backfilling
 - 6. Division 07, Division 08, Openings: Flashing for vents and roof drains at roof.
 - 7. Division 26, Electric Work.

1.4 ALTERNATES

- A. There are no plumbing alternates in the project.

1.5 ENGINEER/ARCHITECT

- A. The term “Engineer” shall refer to the mechanical consulting Engineer whose seal appears on the mechanical drawings for this project and, for the purposes of contractual matters, shall be synonymous with the term “Architect” or “Architect/Engineer.”

1.6 WORK SEQUENCE & COORDINATION

- A. Provide on a timely basis the proper trade with all locations and details as required.
- B. Install work under this section so as to conform to the progress of the work of other sections. Complete the mechanical work as soon as conditions of the building will permit.
- C. Coordinate in advance with other trades the shape, size and position of all necessary openings, sleeves, supports and related to avoid conflicts. In the event of unavoidable conflicts, consult Engineer for resolution.
- D. Refer to Division 26 specifications for electrical work required for mechanical. Verify that the electrical characteristics of the mechanical equipment being provided is compatible with the project electric power circuits available; if in doubt consult Engineer.
- E. The Plumbing Contractor shall coordinate with the electrical contractor and the project and/or site electrical service and distribution to verify supply power, voltage, etc.
- F. Prior to ordering plumbing equipment, the Plumbing Contractor shall verify equipment voltage and all required electrical accessories to be provided including, but not limited to disconnects, starters, VFD’s, controls (if applicable), etc. with the Electrical Contractor.

1.7 STANDARDS OF MATERIALS

- A. All materials and equipment shall be new and of the latest design of the respective manufacturers. All material and equipment of the same classification shall be the product of the same manufacturer unless otherwise specified.
- B. Where standards have been established by the following, they shall conform to those standards as to quality, fabrication, application, and installation and be not less than further required under this specification.
 - 1. Underwriters Laboratories, Inc. (UL).
 - 2. American National Standards Association (ANSI).
 - 3. National Fire Protection Association (NFPA).
 - 4. Occupational Safety and Health Administration (OSHA).
 - 5. Standards of local Building Codes
 - 6. American Society of Heating Refrigeration and Air Conditioning Engineers (ASHRAE)

1.8 SUBSTITUTIONS

- A. Any proposal for a substitution shall be made in writing by the Contractor, who shall submit full details for consideration and obtain written acceptance of the Engineer.

- B. Acceptance of a proposed substitution by the Engineer shall not relieve the Contractor from his responsibility to provide a satisfactory installation of the Work in accordance with the intent of the plans and specifications and shall not affect his guarantee covering all parts of the work.
- C. Any material or equipment submitted for acceptance which is arranged differently or of a different physical size and/or weight from that shown or specified shall be accompanied by shop drawings indicating the different arrangements of size and the method of making the various connections to the equipment. The final results shall be compatible with the system as designed.
- D. Any additional cost, by this or other trades, resulting from the substitution of equipment shall be paid by this Contractor.
- E. Any cost savings resulting from a substitution shall be deducted from the contract amount.
- F. In the event a proposed substitution for material or equipment has been rejected, Engineer will only review subsequent submittals for that material or equipment that are not substitutes.

1.9 SUBMITTALS

- A. Submit under procedures given in Division 01.
- B. Shop Drawings: Before any materials are purchased or released for production, submit to the Engineer an electronic set of shop drawings showing all the HVAC materials proposed to be furnished and installed.
- C. Record Drawings: During progress of the Work, maintain an accurate record of all changes made in the system installation from the layout and materials shown on the approved shop drawings. At the completion of the project, transfer all information onto a set of new blue-line prints and submit them to the Engineer.
- D. Owner's Manual: Upon completion of this portion of the Work, and as a condition of its acceptance, deliver to the Engineer for the Owner two copies of a manual describing the system:
 1. Provide manuals in durable plastic ring binders, nominal 8½ x 11" size.
 2. Identification on, or readable through, the front cover stating general nature of the manual.
 3. A copy of all reviewed submittals and shop drawings.
 4. Complete instructions regarding operation and maintenance of all equipment involved.
 5. Complete name and address of nearest vendor of replaceable parts.
 6. Copy of all guarantees and warranties issued.
 7. Where contents of manuals include manufacturer's catalog pages, clearly indicate the precise items included in this installation.
- E. Submit shop drawings and product data grouped in sets to include complete submittals of related systems, products, and accessories in a single submittal. Clearly mark each submittal with appropriate specification section and paragraph reference.
- F. Mark dimensions and values in units to match those specified.
- G. Submittals shall be reviewed by, and carry the approval stamp of, the subcontractor and be initialed and dated by the reviewer.

- H. Submit certificate of final inspection and approval from authority having jurisdiction, and record electrical drawings.
- I. Upon request, provide samples for inspection. Samples will be returned after inspection is completed.

1.10 PROJECT/SITE CONDITIONS

- A. Install work in locations shown on drawings, unless prevented by project conditions.
- B. Prepare drawings showing proposed rearrangement of work to meet project conditions, including changes to Work specified in other sections. Obtain permission of Engineer before proceeding.
- C. Inspection:
 - 1. Prior to commencing the work of this Section, carefully inspect the installed work of all other trades to verify that the work is complete to the point where this installation may properly commence.
 - 2. Verify that plumbing work may be installed in strict accordance with all pertinent codes and regulations and the approved Shop Drawings.
- D. Discrepancies
 - 1. In the event of discrepancy, immediately notify the Engineer.
 - 2. Do not proceed with installation in areas of discrepancy until the discrepancies have been fully resolved.

1.11 DEMOLITION

- A. **All existing plumbing equipment shall remain unless noted otherwise.**
- B. The plumbing contractor shall be responsible for removal and/or relocation of existing fixtures and equipment and the removal and/or capping of associated waste, vent, hot, cold and gas lines.
- C. Removed equipment shall be turned over to the owner or properly disposed of by the contractor as directed by the owner.

1.12 DEFINITIONS

- A. In this Section, the word “furnish” means to supply and deliver to the site ready for installation. The word “install” means to unload and place in proper position at the site and perform all operations necessary for secure mounting and correct operation ready for the intended service or use. The word “provide” means to furnish and install.

1.13 WORKMANSHIP

- A. Qualifications of Workmen: Use sufficient qualified workmen and competent supervisors in the execution of the work to ensure proper and adequate installation of system throughout and to comply with the project schedule.

- B. Codes: Work and/or mechanical equipment shall conform with all Local and State Rules and Regulations as well as the most recent state and city adopted versions of the National Fire Protection Association and the Building Officials and Code Administrators (BOCA), Maine Uniform Building and Energy Code, Maine State Plumbing Code, Ventilation Standard ASHRAE 62.1 and the Maine State Energy Code (ASHRAE 90.1). These codes are considered a part of these specifications.
- C. In the event of a conflict with required codes or an obvious misapplication of equipment, material, or other installation, before proceeding, promptly notify the Engineer. In no event shall any work be installed that is contrary to applicable codes.
- D. Qualification of Workmen: Use sufficient journeyman plumbers and competent supervisors in the execution of this portion of the work to ensure proper and adequate installation of plumbing throughout.

1.14 PRODUCT HANDLING

- A. Protection: Protect all materials before, during and after installation and protect the installed work and materials of all other trades.
- B. Replacements: In the event of damage, immediately make all repairs and replacements necessary to the acceptance of the Engineer at no additional cost to the Owner.

1.15 DEVIATIONS AND DISCREPANCIES

- A. The Drawings are intended to indicate only diagrammatically the extent, general character, and approximate locations of the mechanical work and exact locations shall be determined in the field subject to approval by the Engineer. Work indicated, but having minor details obviously omitted such as pipe and duct rise, drop and/or fittings, shall be furnished complete to perform the functions intended without additional cost to the Owner. Follow the architectural, structural, and electrical drawings so that work under this section is properly installed and coordinated with other sections.
- B. The Drawings and specifications are complementary each to the other and what is called for in one shall be as binding as if called for by both. In the event of conflicting information on the drawings, or between or within drawings and specifications, or between trades, that which is better, best, most stringent, or most expensive will govern, except as may otherwise be permitted by Engineer.
- C. Bidders shall study plans and specifications and in the event there are any apparent errors, omissions, conflicts, or ambiguities, shall contact Engineer for clarification prior to submitting their bid.

1.16 INSURANCE

- A. The Contractor shall purchase and maintain all Workers' Compensation Insurance, Public Liability and Property Damage 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 and SUPPLEMENTARY CONDITIONS.

1.17 SAFETY REGULATIONS

- A. All work shall be performed and/or installed to conform to all requirements of the Occupational Safety and Health Act and all amendments thereto.

1.18 TEMPORARY HEAT

- A. The Mechanical Contractor shall comply with the requirements for temporary heat as specified in Division 01.
- B. The use of electric heaters for temporary heating is prohibited.

1.19 CHANGE ORDERS

- A. No change shall be made from the work, equipment, or materials under this section except as directed in writing by Engineer.
- B. All requests for change in contract price and scope shall be accompanied by a breakdown list of materials with unit and extended prices and labor hours with unit and extended price, plus markups that have been applied.

1.20 PERMITS

- A. Apply for, obtain and pay for all permits and inspections required by law and notify proper authorities in ample time for inspections to be made prior to completion of the Work.

1.21 ASBESTOS ABATEMENT

- A. If during the course of the work, the existence of asbestos or asbestos containing materials is encountered or suspected in the structure or building, promptly notify the Owner and Engineer. The Owner shall be responsible for all asbestos related activities that may be required including: site surveys, sampling, testing, removal specifications and removal.
- B. Do not perform any work prior to receipt of written instructions from the Owner.

1.22 CLOSING IN UNINSPECTED WORK

- A. General: Do not cover up or enclose work until it has been properly and completely inspected and approved.
- B. Noncompliance: Should any of the work be covered up or enclosed prior to all required inspections and approvals, uncover the work as required, and after it has been completely inspected and approved, make all repairs and replacements with such materials as are necessary to the approval of the Engineer and at no additional cost to the Owner.

1.23 CONTRACT CLOSEOUT

- A. Final Cleaning:

1. Prior to acceptance of the buildings, thoroughly clean all exposed portions of the plumbing installation, removing all labels and all traces of foreign substance.
 2. Execute final cleaning prior to final inspection.
 3. Clean interior and exterior surfaces. Vacuum carpeted and soft surfaces.
 4. Clean debris from site, roofs, gutters, downspouts, and drainage systems.
 5. Clean all strainers and floor drains.
- B. Project Record Documents: Submit the following
1. Record Documents and Shop Drawings: Legibly mark each item to record actual construction.
 2. Submit documents to Engineer prior to claim for final application for payment.
- C. Final Adjustment: Provide necessary mechanics and/or engineers as necessary to make final adjustment of operation of the systems so that the systems are turned over to the Owner in first class operating condition.
- D. Owner Training: On completion of the job, the Contractor shall provide a competent technician to thoroughly instruct the owner's representative in the care and operation of the system. The time of instruction shall be arranged with the Owner.
- E. Warranties: Warrant all work and materials for a period of one year commencing with the acceptance by the Owner of the completed installation in accordance with the Contract Documents. Replace any work, materials, equipment, or system, which develops defects within the warranty period, without cost to the Owner. Specific equipment may require a warranty greater than one year and shall be complied with as noted within the equipment specification.

END OF SECTION

SECTION 22 05 00 – COMMON WORK RESULTS FOR PLUMBING

PART 1 - GENERAL

1.1 SECTION INCLUDES

A. The work of this section includes, but is not limited to the following:

1. Exterior Sleeves and Mechanical Seals
2. Interior Pipe Sleeves and Escutcheons.
3. Firestopping.
4. Hangers and Supports.
5. Valves.
6. Hose Bibbs
7. Backflow Prevention.
8. Pressure Reducing Valves
9. Pressure Gauges.
10. Thermometers.
11. Mixing Valves.
12. Electric Heating Cable – Freeze Protection.
13. Fire Protection System.
14. Fire Extinguishers and Cabinets.
15. Equipment Identification.
16. Electric Motor Efficiency Requirements.

1.2 RELATED SECTIONS

1. Section 22 00 10, Basic Plumbing Requirements.

1.3 SUBMITTALS

- A. Submit in accordance with Section 22 00 10.
- B. Product Data: Provide catalog data for the following:
1. All equipment included in this section.

PART 2 - PRODUCTS

2.1 EXTERIOR SLEEVES AND MECHANICAL SEALS

- A. Exterior Sleeves: Where piping passes through exterior walls, provide and install a complete pipe sleeve/hydrostatic wall closure system.
1. Wall sleeve: Steel pipe, two sizes larger than active pipe and the same length as the thickness of the wall, ASTM A 53, Type E, Grade B, Schedule 40, galvanized, non-threaded ends.

- B. Mechanical Seals: Modular sealing unit, designed for field assembly, to fill annular space between pipe and sleeve:
 - 1. Link-Seal Model LS wall seal by Thunderline Corp. or approved equal, hydrostatic closure device comprised of identical interlocking links of solid synthetic rubber compounded to resist ozone, water, chemicals and extreme temperature variations.
 - 2. Each link shall be connected by corrosion resistant bolts and nuts to form a belt which is to fit snugly around the pipe. Under each bolt and nut there shall be a metal pressure plate so that when each nut is tightened the rubber links will expand between the pipe and sleeve to form a continuous, air and water tight seal.

2.2 INTERIOR PIPE SLEEVES AND ESCUTCHEONS

- A. Masonry and/or fire rated wall and floor penetrations: Steel Pipe, ASTM A 53, Type E, Grade B, Schedule 40, galvanized, non-threaded ends.
- B. Non-masonry wall penetrations: Schedule 40 PVC with non-threaded ends, or #24 gauge galvanized steel tubes with wired or hemmed ends.
- C. Sealing:
 - 1. Caulk spaces between sleeves and pipes with a modular mechanical type seal consisting of interlocking synthetic rubber links shaped to continuously fill the annular space between the object and sleeve, connected with bolts and pressure plates causing rubber sealing elements to expand when tightened to make smoke and watertight. Thunderline Link-Seal or equal.
- D. Escutcheons: Two piece nickel plated steel floor and ceiling plates.

2.3 FIRESTOPPING

- A. Refer to Section 23 05 00, Common Work Results for HVAC for firestopping at all fire rated penetrations.

2.4 HANGERS AND SUPPORTS

- A. General
 - 1. All hangers and supports shall be specially manufactured for that purpose and shall be the pattern, design and capacity required for the location of use.
 - 2. Piping specified herein shall not be supported from piping or equipment of other trades.
 - 3. Hangers shall be heavy duty steel adjustable band type; plain for steel and cast iron pipe, and copper plated for copper tubing.
 - 4. Exposed vertical risers 3/4" and smaller shall be supported at the mid-point between each floor with split-ring type hangers; copper plated for copper tubing.
 - 5. Provide insulation saddles for all cold water and roof leader piping.
- B. Hanger Rods
 - 1. Hanger rods shall be all-thread rod in concealed areas, and rods threaded on ends of rod only in finished areas and the Boiler Room. Rod size shall be 3/8" for piping 2" and under; 1/2" for 2 1/2" to 6"; 5/8" over 6".
 - 2. Provide lag points with rod couplings for fastening to wood, toggle bolts in concrete blocks or structural slabs and compound anchor shields and bolts in poured concrete.

3. Supports: Provide structural iron supports, as required.

2.5 VALVES

- A. Provide valves by a single manufacturer by one of the following: Jenkins, Nibco, Crane, Fairbanks, Stockham, or approved equal.
 1. Gate Valves - Shall be 125# WSP bronze, soldered ends, Nibco S-121 Disc, Jenkins 1242, Crane 1334.
 2. Globe Valves - 2" and under shall be 125# WSP bronze, solder ends, with renewable composition disc, Nibco S-235 (Y) Crane 1310.
 3. Check Valves - 300# WOG bronze swing check, regrinding bronze disc, screw-in cap, Nibco S-413 (BWY), Jenkins 1222, Crane 1342.
 4. Drain Valves - Shall be 125# WSP hose-end boiler drains. Nibco No. 72 or equivalent.
 5. Ball Valves - Acceptable in lieu of gate and globe valves, in sizes ½" to 2". 400 lb. WOG bronze body, screwed or solder ends, bronze ball, Buna stem seals, Buna-N or equal resilient seats, lever handle. Equal to Nibco T-580.
- B. Isolation valves: Provide isolation valves at the base of all hot and cold water risers supplying two or more floors.

2.6 HOSE BIBBS

- A. Watts Model SC8-6 cast brass hose bibb hex shoulder, ¾" male NPT with tee handle and tamper proof vacuum breaker or equal.

2.7 BACKFLOW PREVENTION

- A. General: Install backflow preventers at all cross connections to prevent the backflow of contaminated water into the potable water supply in accordance with the local and state plumbing codes. Units shall be of bronze construction with bronze strainer and stainless steel internal parts and tight seating rubber check valve assemblies. The device (specified or indicated on the plans) shall meet the requirements of A.S.S.E. Standard 1013.
- B. Reduced Pressure Zone Type: A reduced pressure backflow preventer shall be a complete assembly including tight-closing shut-off valves before and after the device and also be protected by a strainer. The design shall include test cocks, a pressure-differential relief valve located between two positive seating check valves. The device, (specified or indicated on plans) shall meet the requirements of A.S.S.E. Standard 1013 and AWWA-C511-92. It shall be suitable for supply pressure up to 175 psi and temperatures up to 140°F, Watts Regulator Company 909, Febco 825Y or Wilkens 575.
- C. Double Check Valve Type
 1. ½ and ¾" sizes: Watts No.9D backflow preventer with intermediate atmospheric vent shall be used to prevent flow of polluted water into the potable water system. Unit shall be suitable for supply pressures up to 175 psi and supply temperatures up to 210°F constant and 250°F intermittent. The device shall meet the requirements of ASSE standard 1012. Unit may be installed vertically or horizontally and is suitable for use under continuous pressure, Febco 815.
 2. ¾" and larger: Watts No. 007/700 has bronze body construction and is standardly equipped with a strainer, gate valves and ball type test cocks that may be installed either

horizontally or vertically. Sizes: 3/4", 1", 1½" and 2". The device shall meet the requirements of ASSE standard 1015 and AWWA - C510-92. Suitable for supply pressures up to 175 lbs. and for supply water temperatures up to 140°F. Febco 805, Wilkens 550.

D. Vacuum Breakers

1. Pressure Type Vacuum Breakers: Watts No. 800 are suitable for working temperatures from 33°F. to 210°F. and pressures from 15 psi to 150 psi. Unit includes test cocks and tight seating gate valves. Units are suitable for continuous supply pressure.
2. Atmospheric Vacuum Breakers: Watts No. 288A are suitable for working pressures up to 125 psi and maximum temperatures to 210°F. Unit No. 8 series shall be used to prevent backflow of polluted water at hose connections.

E. Schedule

1. All hose bibbs and service sinks - Type 8A.

2.8 PRESSURE REDUCING VALVES

- A. A Lead Free Water Pressure Reducing Valve shall be installed on the water service pipe near its entrance to the building. The water pressure reducing valve shall be constructed using lead free materials. Lead free regulators shall comply with state codes and standards, where applicable, requiring reduced lead content. Provision shall be made to permit the bypass flow of water back through the valve into the main when pressures, due to thermal expansion on the outlet side of the valve, exceed the pressure in the main supply. Pressure reducing valves with built-in bypass check valves and strainer will be acceptable. Approved valves shall comply with ASSE 1003. Valve shall be a Watts Series LFN223B or LFN223BS (with strainer).

2.9 PRESSURE GAUGES

- A. Furnish and install a pressure gauge at the water service entrance and elsewhere as indicated on the Drawings.
- B. Gauges to be phosphor-bronze bourdon tube dial type with 3½" stainless steel case, glass window, white face, black markings, brass movement, brass socket, with 1% accuracy at mid-scale, and 0 to 160 psig range. Equal to Trerice No. 800, Weiss TL-P or Moeller x16x07.
- C. Schedule
1. Water Service: 0-160 psig
 2. Water Booster: 0-160 psig

2.10 THERMOMETERS

- A. Furnish and install thermometers at the water heater outlets and elsewhere as indicated on the Drawings. Thermometers to be bi-metal, adjustable angle dial type with 3" stainless steel case and glass window. Provide each unit with a brass separable socket. All thermometers shall be provided with stems long enough to get a true reading of the water temperatures and set in a location to be visible. Thermometers to be as manufactured by Trerice, Weiss or Moeller. Equal to Trerice B-83600.
- B. Schedule

1. DHW Heater: 0-180°F

2.11 MIXING VALVES

- A. Multiple Unit: Leonard Model 270, 370, 470 Thermostatic Mixing Valves, bronze body, copper encapsulated thermostat, brass and engineered polymer internals, stainless steel spring, lead free, locking temperature adjustment knob (tamper-resistant), integral check valves on inlets, MIPS connections, rough bronze finish. Unit shall comply with ASSE 1070.
 1. Makes - Leonard, Powers, Symmons or equal.

2.12 ELECTRIC HEATING CABLE (FREEZE PROTECTION)

- A. General
 1. An electric self-regulating heating cable shall be applied as indicated to maintain freeze protection to -20 F. Coordinate location with the architect.
- B. Materials
 1. The self-regulating heater shall consist of two (2) 16 AWG nickel-coated copper bus wires embedded in parallel in a self-regulating polymer core that varies its power output to respond to temperature all along its length, allowing the heater to be cross over itself without over-heating, to be used directly on plastic pipe, and to be cut to length in the field. The heater shall be covered by a radiation cross-linked modified polyolefin dielectric jacket. (Optional: For installation on plastic piping, the heater shall be applied using aluminum tape (AT180). To provide a good ground path where none exists and to enhance the heater's ruggedness, the heater shall have an outer braid of tinned-copper and an outer jacket of modified polyolefin (-CR).)
 2. In order to provide energy conservation and to prevent overheating, the heater shall have a self-regulation factor of at least 90 percent. The self-regulation factor is defined as the percentage reduction, without thermostatic control, of the heater output going from 40 F pipe temperature operation to 150 F pipe temperature operation.
 3. **The heater shall operate on line voltages of 240 volts single phase without the use of transformers.**
 4. The required heater output rating shall be 8 watts per foot at 50 F. (Heater selection based on 1" fiberglass insulation on metal piping).
 5. The heater shall be XL-Trace as manufactured by Raychem Corporation or equal.
 6. Power connection, end seal, splice and tee kit components shall be applied in the field.
 7. The system shall be controlled by an ambient sensing thermostat set at 40 F, either directly or through an appropriate contactor.
 8. Ground fault circuit breaker shall be provided as required by NEC.
 9. Installation
 - a. Apply the heater linearly on the pipe after piping has been successfully pressure tested. Secure the heater to piping with cable ties or fiberglass tape.
 - b. Apply "electric traced" signs to the outside of the thermal insulation.
- C. After installation and before and after installing the thermal insulation, subject heat to testing using a 2500 VDC megger. Minimum insulation resistance should be 20 megaohms regardless of length. The installer shall test for both heating cable bus wires to verify the connection of any splices.

2.13 FIRE EXTINGUISHERS AND CABINETS

- A. Provide and install U.L. approved fire extinguishers with cabinets or brackets as shown. Location of extinguishers and cabinets shall be as shown on the DRAWINGS or as directed.
- B. Extinguishers
 - 1. Type - All purpose "A-B-C" dry chemical extinguishers, 5 or 10 lb. as indicated. Provide wall mounting bracket.
 - 2. Type - K wet chemical extinguishers, 5 or 10 lb. as indicated, suitable for kitchen use (Class K fires). Provide wall mounting bracket.
 - 3. Extinguishers shall be charged and ready for use.
- C. Cabinets: Recessed/semi-recessed series 1700 cabinets for single portable fire extinguisher. Cabinet shall include: 22 gauge steel box, one piece 22 gauge tubular steel door, one piece 20 gauge steel frame with continuous steel hinge. Cabinet furnished with white baked enamel finish. Provide full 1/4" clear glass door with acrylic glazing and cam latch door.
- D. Mount extinguishers with top not more than 5 ft. above floor. Coordinate height, recess depth and location with architect.
- E. Fire extinguishers and cabinets shall be as manufactured by Potter Roemer, J&L, Standard, or Moon.

2.14 ELECTRIC MOTOR EFFICIENCY RATINGS

- A. Motors 1/3 hp and smaller shall be wired for 120 volt, 1 phase, 60 hz; motors 1/2 hp and larger shall be wired for 3 phase, 60 Hz, unless specifically shown otherwise. Motors 1 Hp and larger shall be NEMA Premium Efficiency Motors in accordance with The NEMA Premium™ efficiency levels are contained in NEMA Standards Publication MG 1- 2006, in Tables 12-12 and 12-13, respectively. Additionally, all mechanical equipment shall comply with efficiency requirements as outlined in ASHRAE 90.1 2016 or MUBEC (Maine Uniform Building and Energy Code).

PART 3 - EXECUTION

3.1 GENERAL

- A. Inspection
 - 1. Prior to all work of this section, carefully inspect the installed work of all other trades and verify that all such work is complete to the point where this installation may properly commence.
 - 2. Verify that plumbing can be installed in strict accordance with all pertinent codes and regulations and the approved Shop Drawings.
- B. Discrepancies
 - 1. In the event of discrepancy, immediately notify the Architect/Engineer.
- C. Do not proceed with installation in areas of discrepancy until all such discrepancies have been fully resolved.

3.2 CLEANING

- A. Prior to acceptance of the building, thoroughly clean all exposed portions of the plumbing installation, remove all labels and all traces of foreign substance, using only a cleaning solution approved by the manufacturer of the plumbing item and being careful to avoid all damage to finished surfaces.
- B. Clean debris from site, roofs, gutters, downspouts, and drainage systems.
- C. Clean all strainers and floor drains.
- D. Fill all traps.

3.3 EQUIPMENT IDENTIFICATION

- A. Valves shall be provided with brass tags and chains securely attached to the stem or body. They shall be suitably identified by number or name to indicate the service. A framed and glazed directory of these items shall be prepared to show the location and function of each item. The directory shall be mounted in the mechanical room and will be incorporated as part of the Operating and Maintenance Instructions.
- B. All mechanical equipment shall be neatly stenciled in a conspicuous place indicating the service or equipment number.
- C. All pipes shall be identified and provided with flow arrows in accordance with the Maine State Plumbing Code.

END OF SECTION

SECTION 22 07 00 – PLUMBING INSULATION

PART 1 - GENERAL

1.1 SECTION INCLUDES

- A. The work of this section includes mechanical insulation for the following:
 - 1. Cold water lines.
 - 2. Hot water lines.
 - 3. Piping below handicapped sinks and lavatories.

1.2 RELATED SECTIONS

- 1. Section 22 00 10, Basic Plumbing Requirements.
- 2. Section 22 11 16, Domestic Water Piping
- 3. Section 22 13 19, Sanitary Waste & Vent Piping

1.3 SUBMITTALS

- A. Submit in accordance with Section 22 00 10.
- B. Product Data: Provide catalog data for the following:
 - 1. All equipment included in this section including thickness and application.

1.4 QUALITY ASSURANCE

- A. Manufacturer: A company specializing in the manufacture of mechanical insulation with a minimum of five years experience.

PART 2 - PRODUCTS

2.1 GENERAL

- A. Insulation systems shall have a flame spread rating per ASTM E 84 of 25 or less and a smoke developed and fuel contributed rating of 50 or less.

2.2 PIPING INSULATION

- A. Glass Fiber Insulation: Provide manufacturer's standard product by one of the following acceptable manufacturers:
 - 1. CertainTeed
 - 2. Knauf Fiberglass
 - 3. Owens-Corning
 - 4. Schuller International, Inc.
 - 5. Approved equal.

- B. Minimum pipe insulation thickness (inches), based on minimum thermal resistance (R) of 4.0 per inch of thickness on a flat surface at a mean temperature of 75°F: Unit to be fiberglass heavy density sectional pipe insulation system having a factory applied vapor barrier laminate all-service jacket.

Piping System Type	Fluid Temp Range, °F	Runouts	Size 0<1"	Size 1" to <1 1/2"	Size 1 1/2" to <4"	Size 4" to 8"	Size 8" and Larger
Domestic cold water		1/2	1/2	1/2	1	1	1
Domestic hot water	105+	1	1	1	1	1	1
Recirculation water	105+	1	1	1	1	1	1

Piping System Type	Fluid Temp Range, °F	Size 0≤ 1 1/2"	Size >1 1/2" to <4"	Size 4" to 8"	Size 8" and Larger
Process or safe system		1/2	1/2	1	1
Heating, hi pres/temp	350+/-	2 1/2	3	4	4
Heating, med pres/temp	251 – 350	1 1/2	3	3	3
Heating, low pres/temp	201 - 250	1 1/2	3	3	3
Heating, low temp	141 - 200 105 - 140	1 1/2	2	2	2
Cooling, chilled water, brine, Refrigerant	40 – 60 <40	1 1/2	1 1/2	1 1/2	1 1/2

2.3 PIPING BELOW HANDICAPPED LAVATORIES AND SINKS:

- A. Handicapped lavatory P-Trap and angle valve assemblies shall be insulated with the fully molded, Truebro, Handi Lav-Guard insulation kit, Model #102, light gray color with three-piece interlocking trap assembly and two-piece interlocking angle valve assemblies. Fasteners shall be nylon-type supplied with kit.

PART 3 - EXECUTION

3.1 PIPING

- A. Cold Water: Insulate all cold water piping above grade with fiberglass heavy density sectional pipe insulation system having a factory applied vapor barrier laminate all-service jacket. Entire insulation jacket lap, butt closure strips, exposed butt ends, and fitting covers to be sealed with white vapor barrier adhesive. Provide additional sealing of jacket with flare type staples to eliminate "fishmouths." Staples shall not penetrate more than ½ the insulation thickness.

- B. Hot Water Lines: Insulate all hot water and hot water recirculation piping with fiberglass heavy density sectional pipe insulation system with all-service jacket. Longitudinal jacket flaps to be secured with flare type staples to eliminate "fishmouths." Cut insulation to include hangers.
- C. Wrap all fittings with fiberglass insulation and cover with a one piece PVC fitting cover secured with flare type staples. Cover joints with 4" insulation straps over.
- D. Finish the ends of insulation on exposed pipes at valves, flanges, unions, etc., neat with covering to match jacket and secured with mastic.
- E. Do not insulate valves, flanges and unions.

END OF SECTION

SECTION 22 11 16 – DOMESTIC WATER PIPING

PART 1 - GENERAL

1.1 SECTION INCLUDES

- A. The work of this section includes, but is not limited to the following:
 - 1. Interior and exterior water piping service and distribution

1.2 RELATED SECTIONS

- 1. Section 22 00 10, Basic Plumbing Requirements.
- 2. Section 22 05 00, Common Work Results for Plumbing.
- 3. Section 22 07 00, Plumbing Insulation.

1.3 SUBMITTALS

- A. Submit in accordance with Section 22 00 10 for the following:
 - 1. Pipe and fittings for all types of piping utilized.

PART 2 - PRODUCTS

2.1 PIPE

- A. Domestic Water Piping
 - 1. All hot and cold water piping shall be hard drawn copper tube with wrought or cast brass copper fittings and made up with 95-5 tin antimony solder.
 - 2. Below grade and below slab piping shall be type "K" soft temper; all other copper piping shall be type "L".
 - 3. Lead solder or flux with more than .2% lead content is prohibited.
 - 4. PEX cross-linked polyethylene tubing manifold system suitable for potable water use.
 - Floor drain primers only**
 - a. ASTM F877.
 - b. Maximum temperature use 140°F.
 - c. Sustained pressure test 1000 hours at 190 psi at 180°F.
 - d. Brass or copper insert fittings with crimp rings, ASTM F1807.

PART 3 - EXECUTION

3.1 INSTALLATION OF PIPING AND EQUIPMENT

- A. General
 - 1. Install all piping promptly, capping or plugging all open ends and making pipe generally level and plumb, free from traps, and in a manner to conserve space for other work.
 - 2. Provide uniform pitch of 1/4" per foot wherever possible but never less than 1/8" per foot or as shown on DRAWINGS for all horizontal waste and drainage piping within the

- building; pitch all vents for proper drainage; install vent piping with each bend 45° minimum from the horizontal wherever structural conditions will permit.
3. Inspect each piece of pipe, tubing, fittings, and equipment for defects and obstructions; promptly remove all defective material from the job site.
 4. Install pipes to clear all beams and obstructions; do not cut into or reduce the size of load-carrying structural members without the approval of the Architect/Engineer.
 5. Back vent all fixtures where required by the Plumbing Code.
 6. All risers and off-sets shall be substantially supported.
 7. Maximum Hanger Spacing:
 - a. Copper - ½ to 1": 6' on run; 2' from offset
 - b. Copper - 1 1/4" up: 10' on run; 4' from offset
 - c. Steel - All sizes: 10' on run; 6' from offset
 - d. Plastic - All: 6' on run; no sags permitted
 8. Arrange all piping to maintain required grade and pitch to lines and to prevent vibration. Provide expansion loops and anchors where shown on DRAWINGS.
 9. Make all changes in pipe size with reducing fittings.
 10. Provide drains at all low points in water piping with ½" gate valve with hose nipple, or hose-end boiler drain.
 11. No piping shall be installed in such a manner as to permit back siphonage or reverse flow of any liquid in water piping under any conditions.
- B. Joints and Connections
1. Smoothly ream all cut pipe; cut all threads straight and true; apply best quality Teflon tape to all male pipe threads but not to inside of fittings; use graphite on all cleanout plugs.
 2. Pack all joints in cast iron soil and waste pipe and fittings, using oakum and securing with one inch deep lead caulking, fully and properly caulked and smoothly finished, or install "push-on" or "no-hub" joints per manufacturer's requirements.
- C. Make all joints in copper pressure pipe with a 95-5 tin-antimony solder applied in strict accordance with the manufacturer's recommendations, except underground water to be silver soldered. Make joints in non-pressure copper tube with 50-50 tin-lead solder.

3.2 STERILIZATION OF WATER PIPES

- A. General: Purge new or repaired potable water systems of deleterious matter and disinfect prior to use. Follow the method prescribed by the health authority having jurisdiction, or, if a method is not prescribed by that authority, then follow the procedure described in either AWWA C601 or AWWA D105, or as described below. This requirement shall apply to "on-site" or "in-plant" fabrication of a system or a modular portion of a system.
1. Flush the pipe system with clean, potable water until dirty water does not appear at the points of outlet.
 2. The system or part thereof shall be filled with a water/chlorine solution containing at least 50 parts per million of chlorine, and the system or part thereof shall be valved off and allowed to stand for 24 hours.
 3. The system or part thereof shall be filled with a water/chlorine solution containing at least 200 parts per million of chlorine and allowed to stand for three hours.
 4. Following the allowed standing time, flush the system with clean potable water until chlorine does not remain in the water coming from the system.

5. Repeat the procedure if it is shown by a bacteriological examination made by the authority that contamination is still present in the system.
 6. Provide all labor, equipment, materials, and test kits for chlorine application and tests.
 7. Chlorinate only when the building is unoccupied.
- B. Submit letter to Engineer certifying that sterilization has been performed and tested according to the above requirements.

3.3 TESTING

- A. General
1. Test all parts of the plumbing installation as specified, as required by applicable codes, and where and as directed by the Engineer. Make tests before work is covered by earth fill, building construction, or pipe covering. All testing, test gauges and equipment by the Contractor at no additional cost to Owner.
- B. Piping Tests
1. Hot and cold water piping shall be subjected to a hydrostatic pressure test of 100 psi for two hours with no pressure loss. Locate and repair leaks and repeat tests until work is tight.

END OF SECTION

SECTION 22 11 23 – WATER PRESSURE BOOSTER SYSTEM

PART 1 - GENERAL

1.1 SECTION INCLUDES

- A. Constant speed variable flow factory assembled water booster system and related work.

1.2 RELATED SECTIONS

1. Section 22 00 10, Basic Plumbing Requirements.
2. Section 22 05 00, Common Work Results for Plumbing.
3. Section 22 11 16, Domestic Water Piping.
4. Section 22 07 00, Plumbing Insulation.

1.3 SUBMITTALS

- A. Submit in accordance with Section 22 00 10 for the following:
 1. Pipe and fittings for all types of piping utilized.

PART 2 - PRODUCTS

2.1 WATER PRESSURE BOOSTER SYSTEM (CONSTANT SPEED)

- A. **Single Source Responsibility:** The booster pump system shall come as a prepackaged unit with suction and discharge headers, pumps, isolation valves on the suction and discharge side of each pump, check valves on the discharge side of each pump, a pressure tank for use in maintaining stable pressure output control from the pumps, pressure gauges on the suction and discharge headers, a control panel with electrical disconnects, fusing, and a programmable logic control, and wiring from the pumps to the control. The unit shall be provided as a complete system by the pump manufacturer.
- B. **1.02 Certifications:** The pumps used in the assembly must be certified to CSA 108 and UL 778 standards. The control panel shall be UL 508A labeled. The system shall be certified to NSF 372.
- C. **Serial Number:** Each package shall be given a unique serial number for tracking purposes and the unique number must be provided on a label supplied with the unit. The unique serial number must enable the supplier to identify the date code for assembly, the software version used in the HMI, and the material test reports for the stainless steel piping used in the assembly.
- D. **Scope:** Factory-assembled and tested booster pump package for use in potable water systems. System will include controls, isolation valves, check valves, drain valves, pressure gauges, pressure transducer, mounting frame, and booster pump hydro-pneumatic tank. The system to be equipped with the following attributes/capabilities:
 1. **Modularity and Pump Arrangement:** The system will be designed to permit the quick addition or deletion of pumping circuits allowing the system to be configured with two to four, equal sized, booster pumps.

2. Site Connection Flexibility: The suction and discharge manifolds on the package will be configured in such a manner as to allow site piping connections on
3. either end of each manifold.
4. Manifold Connection Options: Connection capabilities on the manifolds to include both grooved or flanged (using an adapter kit) options.
5. All Stainless Construction: All wetted components (other than seals, gaskets and O-rings) to be constructed using stainless steel materials. No brass, bronze, copper, or epoxy coated materials are permitted.
6. Lock Out/Tag Out Ease of Maintenance: The system shall be constructed in a manner which allows the power to each pump to be locked out, thereby allowing the system to continue operation while a pump is being replaced or serviced.
7. Remote Access: Control panel shall have the option of having remote accessibility through either a Modbus card or Ethernet card connection. The Ethernet connection shall permit access to view, monitor, and change the control parameters through the use of mobile app programs.
8. Mounting: The package shall be constructed to be wall hung.
9. System Drains: The package will be supplied with drain valves on both the suction and discharge headers to facilitate system start and maintenance activities.
10. Pressure Relief Valve Port: A threaded connection port is to be provided to allow for the installation of a pressure relief valve by the installer.
11. Quick Pump Electrical Connections: Each pump electrical connection to the control panel will be equipped with quick connection plugs to permit the pump to be electrically (power and control) connected or disconnected via a plug arrangement which does not require any tools or the need to open the electrical panel.
12. Pressure rating: 150 psi

E. Pump/Motor Construction:

1. Outer Shell: Deep drawn 300 series stainless steel, 1.5 mm wall thickness, laser welded
2. Suction/Discharge: 1.25" NPT threaded 304 stainless steel casting, with integrated face seals, and flange connections to allow for quick connection to an oval connection
3. O-Rings: NBR – Nitrile Buna Rubber rated to 104 °F (40 °C)
4. Floating Seal Ring: PTFE
5. Pump Mechanical Seal: Carbide / Ceramic / Buna Rubber bellow seal
6. Internal Motor Seal: Silicon / Carbide / Buna Rubber bellow seal
7. Pump Hydraulic Parts: 316 stainless steel and laser welded.
8. Fasteners: 316 stainless steel
9. Motor Construction Type: Integrated dry, air-cooled, immersed chamber
10. Motor Insulation: Class F – IP68 rated for full submersion
11. Motor Bearings: Ball bearing type rated to 104 °F (40 °C)
12. Discharge End: 6202 double sealed
13. Suction End: 6303 double sealed
14. Motor Shaft and Coupling: 304 stainless steel
15. Motor Lead/Washers and Cable Gland: 14 Ga SJOOW/Nitrile and CuZn Nickel plated brass
16. Oil Chamber Motor Isolation Chamber: Medical grade white oil – Marcol 82
17. Heat Sink Cooling for VFD: Die cast aluminum
18. VFD Enclosure: Polycarbonate (Flame Retardant, UL 94 V-0)
19. Drive Gaskets: Close cell foam nitrile rubber
20. Drive Fasteners: 304 stainless steel
21. Mounting Base: 300 series stainless steel

F. Pump Performance/Specification:

1. Pump, motor, VFD control to provide at least 60 psi incremental boost to 10 gpm, 50 psi incremental boost to 25 gpm, and 20 psi incremental boost to 40 gpm.
2. Pump Power Rating: 1.2 hp (0.9 kw)

G. System Construction:

1. Manifolds: Suction and discharge manifolds to be constructed using 3" diameter 304/304L stainless steel pipe. Both sides of each manifold to have grooves for connecting the site piping and manifold end cap assemblies. Adapter kits shall be available for sites preferring to use flanged connections with their site water piping.
2. Pump Isolation Valves: Two-piece, full port, ball valves 304 stainless steel with PFTE seats shall be provided on the suction and discharge side of each pump.
3. Backflow Prevention: Inline, spring-loaded check valves constructed of 304 stainless steel with PFTE seals and a PFTE cage shall be installed on the discharge side of each pump.
4. Pressure Tank: A bladder type pressure tank shall be provided with the assembly to provide a smooth signal for pump control and have a max operating working pressure of at least 150 psi. The tank shall also come with an air fill valve to allow the pressure charge inside the tank to be changed.
5. Pressure Sensors: 4 - 20ma pressure transducer with a range of 0 - 150 psi
6. Pressure Gauges: 2.5" diameter, liquid filled stainless steel pressure gauges shall be installed on the suction and discharge headers.
7. Nipples/Bushings: Shall be constructed with 304 stainless steel.
8. Mounting Frame: The unit shall be equipped with mounting hardware to permit the unit to be wall hung in a vertical orientation. The frame is to be constructed with 304 stainless steel and permanently affixed to the package assembly.

H. Controls/Electrical:

1. Panel: The control panel shall provide proper terminations for the incoming site power, a lockable disconnect switch, fuses to protect the incoming power supply, separate lockable fused disconnect switches on the power supply to each pump, a power supply unit (with fuse protection), and a color touch screen programmable logic controller.
2. HMI: A 4.3" color touchscreen HMI equipped with at least (2) analog inputs, (12) digital inputs, (8) transistor or digital outputs. The controller shall have the optional capability of providing remote access via Modbus card or Ethernet.
3. Package Control (consisting of the pump and the PLC control) must be capable of turning the pumps on and modulating the pump operating to meet an adjustable pressure set point. The package control must be equipped to sense and interrupt the pump operating in case of:
 - a. Motor overload
 - b. Under voltage
 - c. Locked pump
 - d. Open motor circuit
 - e. Short circuit
 - f. Overheated drive,
 - g. Over temperature
 - h. Insufficient water supply
 - i. Turn package on and off, including each individual pump for calibration
 - j. Active/idle mode
 - k. Run hours for each pump, including time schedule for the system

4. Variable Frequency Drive - NEMA 4 (IP56) rated enclosure, heat-sink cooled, with no external fan. Control should accept 230V single phase, 60 Hz input power, and supply three-phase output power at variable voltages and frequencies dependent on the applications pump flow and pressure requirements. Pump control should allow for external shut-off from a condition of over-heat generated by excessive fluid temperatures more than 140 °F. VFD to provision additional shut-off installed in a series connection to the over-temperature system based on application specific control devices. VFD to be controlled directly through digital on/off signal logic methodology to provide increased or decreased power output based on immediate usage demands.
- I. Installation: Install package system according to manufacturer's written instructions and with access for periodic maintenance, including removing motors, impellers, couplings, and accessories.
- J. Commissioning: Verify that system controls have been set up correctly for the required application.
- K. Start Up: Engage a factory-authorized service representative to train owner's maintenance personnel to adjust, operate, and maintain pumps.
- L. Variable Frequency Drive Specification: NEMA 4 (IP56) rated enclosure, heat-sink cooled, with no external fan. Control should accept 230V single phase, 60 Hz input power, and supply three-phase output power at variable voltages and frequencies dependent on the applications pump flow and pressure requirements. Pump control should allow for external shut-off from a condition of over-heat generated by excessive fluid temperatures more than 140 °F. VFD to provision additional shut-off installed in a series connection to the over-temperature system based on application specific control devices. VFD to be controlled directly through digital on/off signal logic methodology to provide increased or decreased power output based on immediate usage demands.

PART 3 - EXECUTION

3.1 GENERAL

- A. Install as detailed on the Drawings.
- B. Factory Test: After factory assembly, the packaged pumping system shall be hydrostatically tested as well as undergo a complete electric and hydraulic test from 0 to 100% design flow at the factory. All controls, pump sequencing devices, alarms and instrumentation shall be tested and calibrated for proper operation during factory testing.
- C. Warranty: The booster system shall be warranted in writing against defects in materials or workmanship under normal use and service for a period of one year after date of original operation but not more than 18 months from date of shipment from the Company's factory when installed and used in accordance with good standard practice.
- D. Start-Up Service: The service of a factory trained representative shall be made available on the jobsite for start-up and instructing operating personnel.

END OF SECTION

SECTION 22 13 19 – SANITARY WASTE & VENT PIPING

PART 1 - GENERAL

1.1 SECTION INCLUDES

- A. The work of this section includes, but is not limited to the following:
 - 1. Sanitary waste and vent piping and associated fittings.
 - 2. Cleanouts
 - 3. Low temperature condensate drainage

1.2 RELATED SECTIONS

- 1. Section 22 00 10, Basic Plumbing Requirements.
- 2. Section 22 05 00, Common Work Results for Plumbing.
- 3. Section 22 07 00, Plumbing Insulation.

1.3 SUBMITTALS

- A. Submit in accordance with Section 22 00 10 for the following:
- B. Product Data: Provide catalog data for the following:
 - 1. All equipment included in this section.
 - 2. Submittal sheets to include all sizes and dimensions.

PART 2 - PRODUCTS

2.1 GENERAL

- A. Provide basic materials as specified in Section 22 00 10, and as additionally required by this Section.

2.2 PIPE

- A. Sanitary Soil, Waste, Vents, and Roof Drainage (Choice of following)
 - 1. Service weight cast iron soil pipe and fittings with B&S "push-on" gasket joints or "No-Hub" sleeve couplings CISPI Standard 301-72.
 - 2. Type "DWV" copper tubing and solder type drainage fittings, 50/50 solder. (Type "K" copper on urinal wastes.)
 - 3. Schedule 40 polyvinyl-chloride "PVC-DWV" pipe and solvent cemented socket drainage fittings.
- B. Vents through roof shall be black "ABS-DWV" pipe.

2.3 CLEANOUTS

- A. Provide cleanouts for soil, waste and storm piping at base of all stacks, where shown on the Drawings and as required by code.
 - 1. Floor Cleanouts: Flush with floor, round adjustable tops, bronze plug and lead seal, scoriated secured nickel bronze top, flashing flange with flashing device, inside caulk. Units shall be Josam 58000(-25) (-41); Smith Fig. 4026F-C or equal by Zurn, Watts or Wade.
 - 2. Wall Cleanouts: "T" fittings with bronze slotted plug and lead seal, stainless steel wall cover; Josam 58790 Smith Fig. 4531 or 4551 or equal by Zurn, Watts or Wade.
 - 3. Urinals: Provide a cleanout above the fixture connection fitting serving each urinal.

2.4 LOW TEMPERATURE CONDENSATE DRAINAGE

- A. General: Provide condensate drainage system for all cooling/refrigeration equipment. Piping shall be schedule 40 PVC with solvent cemented socket drainage fittings. Discharge into the sanitary system shall be through an air gap.
- B. Air gap fitting shall be used when piped into sanitary drainage. Fitting shall be equal to Josam, Model 88910 coated cast iron air gap with air ports and female threaded inlet and outlet.
- C. Provide "P" trap in condensate drainage piping from evaporator drain pans in cooling units. Trap rise shall be sufficient to maintain trap seal at fan inlet suction pressure.
- D. Provide condensate drainage for the following systems:
 - 1. DSS Units

PART 3 - EXECUTION

3.1 GENERAL

- A. Provide pipe insulation according to Section 22 07 00.
- B. Roof Leaders and Roof Drains: Insulate all horizontal rain water conductor lines above floor with 1" thick insulation. Provide insulation saddles for all hangers.

3.2 INSTALLATION OF PIPING

- A. General:
 - 1. Provide uniform pitch of 1/4" per foot wherever possible but never less than 1/8" per foot or as shown on Drawings for all horizontal waste and drainage piping within the building; pitch all vents for proper drainage; install vent piping with each bend 45° minimum from the horizontal wherever structural conditions will permit.
 - 2. Back vent all fixtures where required by the Plumbing Code.
 - 3. All risers and offsets shall be substantially supported.
 - 4. Maximum Hanger Spacing: According to Section 22 05 00.
- B. Joints and Connections:
 - 1. Smoothly ream all cut pipe; cut all threads straight and true; apply best quality Teflon tape to all male pipe threads but not to inside of fittings; use graphite on all cleanout plugs.

2. For cast iron soil and waste pipe and fittings, pack all joints with oakum and secure with one inch deep lead caulking, fully and properly caulked and smoothly finished, or install "push-on" or "no-hub" joints per manufacturer's requirements.
3. Make all joints in copper pressure pipe with a 95-5 tin-antimony solder applied in strict accordance with the manufacturer's recommendations, except underground water to be silver soldered. Make joints in non-pressure copper tube with 50-50 tin-lead solder.

3.3 TESTING

- A. Test all parts of the plumbing installation as specified, as required by applicable codes, and where and as directed by the Engineer. Make tests before work is covered by earth fill, building construction, or pipe covering. All testing, test gauges and equipment by the Contractor at no additional cost to Owner.
- B. Piping Tests: Plug all openings except at the highest point above the roof, and fill the entire system with water to the point of overflow. Water level shall hold constant for two (2) hours. Inspect each joint for visible leaks. All leaks shall be repaired. Doping of pinholes in soil pipe or fittings is not permitted.

3.4 CLEANING

- A. Prior to acceptance of the building, thoroughly clean all exposed portions of the plumbing installation, remove all labels and all traces of foreign substance, using only a cleaning solution approved by the manufacturer of the plumbing item and being careful to avoid all damage to finished surfaces.
- B. Clean all floor drains and traps. Fill all traps. Clean all strainers and faucet aerators.

END OF SECTION

SECTION 22 31 00 – PLUMBING SYSTEM WATER TREATMENT

PART 1 - GENERAL

1.1 SECTION INCLUDES

- A. The work of this section includes, but is not limited to the following:

1. Water treatment for Plumbing systems.

1.2 RELATED SECTIONS

1. Section 22 00 10, Basic Plumbing Requirements.
2. Section 22 05 00, Common Work Results for Plumbing.
3. Section 23 11 16, Domestic Water Piping
4. Section 22 11 23, Water Pressure Booster System (If applicable).
5. Section 22 11 24, Well Water Systems (If applicable).

1.3 SUBMITTALS

- A. Submit in accordance with Section 22 00 10.
- B. Product Data: Provide catalog data for the following:
1. Chemical pumps, contact tank, description of operation, required flow rates , flow meters, solution tanks, secondary containment, piping

PART 2 - PRODUCTS

2.1 WATER TREATMENT SYSTEM

- A. The intent is to provide a chlorination water treatment system for the two well pumps at the facility. The following system shall be installed and verified by a qualified water system treatment professional. The system is to be installed by Norlens Water Treatment, Orrington, Maine or equal.
- B. System Description / Operation
1. Re: New Chlorination System: 23 State Park Road, Lamoine, Maine
 2. Note: pH estimated at 7
 3. System to have a single feed pump that will inject based on flow rate. The flow for one well pump is approximately 3gpm and the other pump rate is approximately 6gpm. Both pumps can operate at the same time or one pump at a time. A water meter with 4-20MA signal will control the pump operation. Two 120-gallon retention tanks shall allow for flexibility in potential flow rates and allow for lower chlorine residuals.
- C. Retention Tank:
1. Features:
 - a. Convenient Inlet/Outlet piping connection at the top of the tank

- b. Inlet/Outlet Adapter easily accommodates the use of a vacuum breaker
 - c. Inlet/Outlet Butress thread for strength
 - d. Bypass valve option available
 - e. Full 3/4" blow down drain at lowest point of tank
 - f. 360° degree drain orientation
 - g. Black one piece polyethylene liner for impact and corrosion resistance
 - h. Model RT120: 24" D x 79" H
 - i. 5 year Limited Warranty
 - 2. Specifications
 - a. Maximum Operating Pressure 75 psi/517 kPa
 - b. Maximum Operating Temperature 120°F 49°C
 - c. Maximum Allowable Operating Vacuum 0
 - d. A Vacuum/Pressure Relief Valve of adequate size must be incorporated in the plumbing
- D. In-line Flow Meter: 1" Repco Model V3039
- E. Storage Tank:
- 1. Pulsafeeder Tank: 50 gallon tank heavy duty HPDE tank with rigid cover and top pump mounting capability, integral top with 4" diameter opening, 23" D x 42.5" H.
- F. Chemical Feed Pump – Based on Stenner Model S34
- 1. Specifications
 - a. Flow Rate Output Control 4-20mA input signal or manual
 - b. Reproducibility ±2%
 - c. Maximum Working Pressure 25 psi (1.7 bar), 100 psi (6.9 bar)
 - d. Maximum Operating Temperature 104°F (40°C)
 - e. Maximum Suction Lift 25 ft (7.6 m) vertical lift, based on water
 - f. Motor Type Brushless DC motor
 - g. Shaft rpm (average maximum) 45
 - h. Duty Cycle Continuous
 - i. Maximum Viscosity 1500 Centipoise
 - j. Motor Voltage (Amp Draw)
 - k. 120V 60Hz 1PH (0.6)
 - l. Power Cord Type
 - m. 120V 60Hz SJTOWA,
 - n. Power Cord Plug End
 - o. 120V 60Hz 5-15P,
 - p. Power Cord Length 6 ft (1.8 m)
 - q. Classification Indoor/Outdoor
 - 2. Materials of Construction
 - a. All Housings Polycarbonate
 - b. Pump Tube (S34) Santoprene® (FDA approved), or Versilon®
 - c. (S44, S54) Santoprene® (FDA approved)
 - d. Check Valve Duckbill (S34) Santoprene® (FDA approved), or Pellethane®
 - e. Ball Check Valve Components (S44, S54)
 - f. - Ceramic ball (FDA approved); Tantalum spring; FKM seat & O-ring OR
 - g. - Ceramic ball (FDA approved); Stainless steel spring; EPDM seat; Santoprene® O-ring
 - h. Pump Head Rollers (S34, S44) Polyethylene (S34, S44) Polycarbonate
 - i. Pump Head Guide Rollers (S44, S54) Polyethylene

- j. Roller Bushings (S34, S44) Oil impregnated bronze
 - k. Roller Ball Bearings (S54) Stainless steel
 - l. Suction/Discharge Tubing, Ferrules Polyethylene (FDA approved)
 - m. Tube Fittings, Injection Fittings PVC or Polypropylene (both NSF listed)
 - n. Connecting Nuts PVC or Polypropylene (both NSF listed)
 - o. 3/8" Adapter (S34) PVC or Polypropylene (both NSF listed)
 - p. Suction Line Strainer and Cap PVC or Polypropylene (both NSF listed); ceramic weight
 - q. All Fasteners Stainless steel
 - r. Pump Head Latches (S34) Polypropylene
 - s. Pump Head Thumbscrews (S44, S54) Stainless steel; PVC
 - t. Pump Head Support and Transition Sleeve (S44, S54) Santoprene®
 - u. Tube Pull (S44, S54) PVC
 - v. Leak Detect Components (S3V, S4V) Hastelloy® (S3V, S4V) Hastelloy® ; Stainless steel
3. Accessories
- a. 3 Connecting nuts 3/8"
 - b. 1 Ball check valve
 - c. 1 Weighted suction line strainer 3/8"
 - d. 1 20' Roll of suction/discharge tubing
 - e. 3/8", white or UV black
 - f. 1 Additional pump tube
 - g. 1 Mounting bracket
 - h. 1 Manual

G. Provide piping necessary for complete system: Refer to Section 23 11 16.

H. Disinfection Parameters:

4 Log Reduction of Viruses

Worksheet/Calculators

Free Chlorine Residual	.5ppm
Water Temp. F	50°
pH	7
Peak Flow	9gpm
Retention Tank	240gallons
Baffle Factor	.54
Log Reduction	4.65

I. One year's service as indicated below.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Flush and clean water system as required.

- B. One year service required in Part I of this Section shall include, but not be limited to, the following:
1. Deliver and maintain water treatment chemical for one year.
 2. Collect and analyze samples of circulation water every thirty days for one year, and adjust rate of chemical feed to suit each system.
 3. Inspect and maintain chemical feeding devices of one year. Inspection and maintenance should be performed at minimum intervals of every thirty days.
 4. Test water according to project requirements.

END OF SECTION

SECTION 22 33 00 – DOMESTIC WATER HEATERS

PART 1 - GENERAL

1.1 SECTION INCLUDES

- A. The work of this section includes, but is not limited to the following:
 - 1. Water Heaters

1.2 RELATED SECTIONS

- 1. Section 22 00 10, Basic Plumbing Requirements.
- 2. Section 22 05 00, Common Work Results for Plumbing.
- 3. Section 22 07 00, Plumbing Insulation.
- 4. Section 22 11 16, Domestic Water Piping.

1.3 SUBMITTALS

- A. Submit in accordance with Section 22 00 10 for the following:
 - 1. Water Heaters

PART 2 - PRODUCTS

2.1 ELECTRIC WATER HEATER

- A. Glass lined steel storage heater, 150 psi working pressure, 2" thick high density fiberglass insulation and heavy steel jacket with acrylic finish.
- B. Ten year warranty.
- C. 98% efficient immersion type low watt density heating elements with capacities as indicated on the drawings.
- D. Adjustable thermostats with automatic overheat safety control and manual reset.
- E. Unit shall have valved drain, pressure/temperature relief (Watts # 40 XL) and vacuum relief valves and thermometer in outlet. Provide Taco WAGS (Water and gas safety) valve in drain pan of unit.
- F. Provide insulation blanket
- G. Unit shall be Lochinvar, State or A.O. Smith.

2.2 LEAK DETECTOR

- A. General: Provide Taco LeakBreaker, or equal, which is installed on the incoming cold water supply to the water heater, shutting off the water to a leaking water heater. The plumb and plug

design is specifically engineered for use on a new or retrofit installation. Components are pre-wired to simplify the installation process, just plug in the sensor, valve, power supply and/or batteries. LeakBreaker can be tested anytime and then be reset to guard against a future leak. The LeakBreaker with eLink™ technology uses Wi-Fi® to send alerts via email or text. Notifications will be sent when the device detects status changes for the following: alarm activation, AC or battery power, sensor and valve connection, and module connectivity.

B. Construction:

1. Control Panel:
 - a. High performance engineered polymer
 - b. Actuator Body: High performance engineered polymer
 - c. Gears: High performance, internally lubricated, engineered polymer
2. Valve
 - a. Body: Forged brass
 - b. Stem: Brass
 - c. Press Ring: Brass
 - d. Ball: Brass (Chrome Plated)
 - e. Seats: Modified Teflon®
 - f. O-Rings: Viton®

C. Features:

1. eLink™ sends text and/or email alerts
2. WLAN 802.11 — b/g/n Compatible
3. Re-Settable and Testable
4. Quick Connect Wiring
5. Operates on Batteries or Power Supply - Power Supply with Battery Backup on eLink Model
6. Multi-Color LED Status Light
7. Audible Alarm
8. Alarm Mute
9. 2 N/O; N/C Dry Contacts
10. Full Port Valve
11. Easy Removable Actuator

D. Specifications:

1. Max. Operating Pressure140 PSI
2. Max. Shut Off Pressure.....125 PSI
3. Max. Static Pressure.....300 PSI
4. Maximum Ambient Temp.....135°F
5. Water Temp.....33°F to 220°F
6. ServicePotable Water
7. Flow Coefficient.....Cv 32 Kv 27.3

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Provide 4” high drip pan and Taco leak detector where indicated on the plans.

- B. Pipe the discharge from the pressure relief valve to the drain pan using copper tubing. Properly support piping both in the horizontal and vertical.
- C. Maintain manufacturers recommended clearances around units.

END OF SECTION

SECTION 22 40 00 – PLUMBING FIXTURES & EQUIPMENT

PART 1 - GENERAL

1.1 SECTION INCLUDES

- A. The work of this section includes, but is not limited to the following:
 - 1. Plumbing fixtures.

1.2 RELATED SECTIONS

- 1. Section 22 00 10, Basic Plumbing Requirements.
- 2. Section 22 05 00, Common Work Results for Plumbing.
- 3. Section 22 11 16, Domestic Water Piping
- 4. Section 22 13 19, Sanitary Waste & Vent Piping.

1.3 SUBMITTALS

- A. Submit in accordance with Section 22 00 10.
- B. Product Data: Provide catalog data for the following:
 - 1. All plumbing fixtures including, drains, supplies and all accessories and options.

PART 2 - PRODUCTS

2.1 PLUMBING FIXTURES AND EQUIPMENT

- A. General:
 - 1. Furnish and install all plumbing fixtures shown on the Drawings and as hereinafter Scheduled.
 - 2. To establish a standard of quality and design desired, specifications have been based generally on the use of Kohler Company fixtures; Elkay sinks and Sloan flush valves. An equal type and quality of fixture as manufactured by Zurn, American Standard or Eljer Company or flush valve by Coyne and Delaney is acceptable. Stainless steel sinks by Just are also acceptable.
 - 3. All fixtures are to be white vitreous china where not otherwise specified. All fittings shall have chromium finish.
 - 4. **Refer to Architectural drawings for mounting heights of all fixtures.**
- B. Water Closets:
 - 1. Type P-1A (Tank Type Suitable for ADA)
 - a. Fixture: K-3999-U Highline vitreous china toilet with elongated bowl, 1.28 gallons per flush gravity flush, insuliner tank lining, 12" rough in, flush valve and float valve assembly.
 - b. Supply: K-7637 3/8" angle supply with annealed vertical tube and stop.
 - c. Seat: K-4731-C Lustra solid plastic open front seat with check hinge.

C. Lavatories:

1. Type P-2A (Wall Lavatory Suitable for ADA)
 - a. Fixture: K-2032 Greenwich 20" x 18" vitreous china wall mounted lavatory with 4" faucet centers. Drilled for concealed arm carrier.
 - b. Trim: K-15182 Coralais single lever, 4-1/4" reach, 4" height, pop-up drain, spout, aerator and drain with 1-1/4" tailpiece.
 - c. Supplies: K-13711 3/8" I.P.S. supplies with loose key stops.
 - d. Trap: K-8998 1 1/4" cast brass "P" trap.
 - e. Support: Model 0700-M31, floor mounted lavatory supports with concealed arms or 0700-D-Z for back to back applications.

D. Safety Fixture/Station

1. Type P-3A
 - a. Fixture: Guardian Equipment G1540
 - b. SCEW-1 – 16 Gallon AquaGuard™ gravity flow portable eyewash unit with heavy duty polyethylene tank, wall or counter mounted. Supplied with 3' drain hose and epoxy-coated steel bracket. Delivers 8 GPM for 15 minutes. Unit shall include ANSI compliant sign.
 - c. Performance: Unit shall be fully assembled and tested to meet or exceed ANSI Z358.1 – 2014, and come with a full 2-year warranty.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Provide traps in wastes and stop valves on hot and cold water supplies to all fixtures.

END OF SECTION

SECTION 23 00 10 – BASIC HVAC REQUIREMENTS

PART 1 - GENERAL

1.1 SUMMARY OF MECHANICAL WORK

- A. The Mechanical Work includes, but is not limited to, the following:
 - 1. Furnish all labor, materials, equipment, transportation and perform all operations as required to install a complete plumbing system in accordance with these specifications and applicable Drawings.
 - 2. Study the drawings and specifications and coordinate Mechanical and Plumbing work with that of Architectural and other trades. Report all discrepancies to the Engineer prior to submitting a bid.
 - 3. Other work as required to provide complete and operating mechanical and plumbing systems.

1.2 RELATED DOCUMENTS

- A. Drawings, Division 00, including General and Supplementary Conditions and Division 01 Specification Sections, apply to Division 23 and all its Sections.

1.3 RELATED WORK DESCRIBED ELSEWHERE

- A. Provide under the appropriate Section, all cutting, patching, trenching, plastering, chases, slots, furring, grounds, masonry foundations, excavation, backfilling, pads, conduits, etc., incidental to the installation of HVAC apparatus. Execute the work by qualified trades as shown on the Drawings and under the direction of this Section.
- B. Electrical work: HVAC work shall include the installation of all motors, temperature controls, limit switches, etc., as herein specified. Work by the electrical sub-contractor (EC) shall include all other switches, pilot lights, fused and non-fused disconnect switches, outlets, motor starters, except as herein specified, and all necessary wiring and fuses to properly connect all mechanical/electrical equipment.
- C. The following work shall be provided under the designated Sections:
 - 1. Cutting and patching: By the General Contractor.
 - 2. Division 01, General Requirements: Temporary toilets.
 - 3. Division 31, Earth Work, Division 33 Utilities: New sanitary sewers and manholes and new storm sewers and drywells.
 - 4. Division 31, Earth Work, Division 33 Utilities: New water mains and services.
 - 5. Division 31, Earthwork: Trenching and backfilling
 - 6. Division 07, Division 08, Openings: Flashing for vents and roof drains at roof.
 - 7. Division 26, Electric Work.

1.4 ALTERNATES

- A. Under Alternate #2 the DMR Office vestibule is deleted. Under Alternate #2 relocate the electric heater EH-1 to common wall between Office #1 and Office #2.

1.5 ENGINEER/ARCHITECT

- A. The term “Engineer” shall refer to the mechanical consulting Engineer whose seal appears on the mechanical drawings for this project and, for the purposes of contractual matters, shall be synonymous with the term “Architect” or “Architect/Engineer.”

1.6 WORK SEQUENCE & COORDINATION

- A. Provide on a timely basis the proper trade with all locations and details as required.
- B. Install work under this section so as to conform to the progress of the work of other sections. Complete the mechanical work as soon as conditions of the building will permit.
- C. Coordinate in advance with other trades the shape, size and position of all necessary openings, sleeves, supports and related to avoid conflicts. In the event of unavoidable conflicts, consult Engineer for resolution.
- D. Refer to Division 26 specifications for electrical work required for mechanical. Verify that the electrical characteristics of the mechanical equipment being provided is compatible with the project electric power circuits available; if in doubt consult Engineer.

1.7 STANDARDS OF MATERIALS

- A. All materials and equipment shall be new and of the latest design of the respective manufacturers. All material and equipment of the same classification shall be the product of the same manufacturer unless otherwise specified.
- B. Where standards have been established by the following, they shall conform to those standards as to quality, fabrication, application, and installation and be not less than further required under this specification.
 - 1. Underwriters Laboratories, Inc. (UL).
 - 2. American National Standards Association (ANSI).
 - 3. National Fire Protection Association (NFPA).
 - 4. Occupational Safety and Health Administration (OSHA).
 - 5. Standards of local Building Codes
 - 6. American Society of Heating Refrigeration and Air Conditioning Engineers (ASHRAE)

1.8 SUBSTITUTIONS

- A. Any proposal for a substitution shall be made in writing by the Contractor, who shall submit full details for consideration and obtain written acceptance of the Engineer.
- B. Acceptance of a proposed substitution by the Engineer shall not relieve the Contractor from his responsibility to provide a satisfactory installation of the Work in accordance with the intent of the plans and specifications and shall not affect his guarantee covering all parts of the work.

- C. Any material or equipment submitted for acceptance which is arranged differently or of a different physical size and/or weight from that shown or specified shall be accompanied by shop drawings indicating the different arrangements of size and the method of making the various connections to the equipment. The final results shall be compatible with the system as designed.
- D. Any additional cost, by this or other trades, resulting from the substitution of equipment shall be paid by this Contractor.
- E. Any cost savings resulting from a substitution shall be deducted from the contract amount.
- F. In the event a proposed substitution for material or equipment has been rejected, Engineer will only review subsequent submittals for that material or equipment that are not substitutes.

1.9 SUBMITTALS

- A. Submit under procedures given in Division 01.
- B. Shop Drawings: Before any materials are purchased or released for production, submit to the Engineer an electronic set of shop drawings showing all the HVAC materials proposed to be furnished and installed.
- C. Record Drawings: During progress of the Work, maintain an accurate record of all changes made in the system installation from the layout and materials shown on the approved shop drawings. At the completion of the project, transfer all information onto a set of new blue-line prints and submit them to the Engineer.
- D. Owner's Manual: Upon completion of this portion of the Work, and as a condition of its acceptance, deliver to the Engineer for the Owner two copies of a manual describing the system:
 - 1. Provide manuals in durable plastic ring binders, nominal 8½ x 11" size.
 - 2. Identification on, or readable through, the front cover stating general nature of the manual.
 - 3. A copy of all reviewed submittals and shop drawings.
 - 4. Complete instructions regarding operation and maintenance of all equipment involved.
 - 5. Complete name and address of nearest vendor of replaceable parts.
 - 6. Copy of all guarantees and warranties issued.
 - 7. Where contents of manuals include manufacturer's catalog pages, clearly indicate the precise items included in this installation.
- E. Submit shop drawings and product data grouped in sets to include complete submittals of related systems, products, and accessories in a single submittal. Clearly mark each submittal with appropriate specification section and paragraph reference.
- F. Mark dimensions and values in units to match those specified.
- G. Submittals shall be reviewed by, and carry the approval stamp of, the subcontractor and be initialed and dated by the reviewer.
- H. Submit certificate of final inspection and approval from authority having jurisdiction, and record electrical drawings.

- I. Upon request, provide samples for inspection. Samples will be returned after inspection is completed.

1.10 PROJECT/SITE CONDITIONS

- A. Install work in locations shown on drawings, unless prevented by project conditions.
- B. Prepare drawings showing proposed rearrangement of work to meet project conditions, including changes to Work specified in other sections. Obtain permission of Engineer before proceeding.
- C. Inspection:
 - 1. Prior to commencing the work of this Section, carefully inspect the installed work of all other trades to verify that the work is complete to the point where this installation may properly commence.
 - 2. Verify that H & V work may be installed in strict accordance with all pertinent codes and regulations and the approved Shop Drawings.
- D. Discrepancies
 - 1. In the event of discrepancy, immediately notify the Engineer.
 - 2. Do not proceed with installation in areas of discrepancy until the discrepancies have been fully resolved.

1.11 DEMOLITION

- A. **All existing HVAC equipment shall remain unless noted otherwise.**
- B. The mechanical contractor shall be responsible for the removal or relocation of existing HVAC equipment and the associated piping, ductwork and controls.
- C. Removed equipment shall be turned over to the owner or properly disposed of by the contractor as directed by the owner.

1.12 DEFINITIONS

- A. In this Section, the word “furnish” means to supply and deliver to the site ready for installation. The word “install” means to unload and place in proper position at the site and perform all operations necessary for secure mounting and correct operation ready for the intended service or use. The word “provide” means to furnish and install.

1.13 WORKMANSHIP

- A. Qualifications of Workmen: Use sufficient qualified workmen and competent supervisors in the execution of the work to ensure proper and adequate installation of system throughout and to comply with the project schedule.
- B. Codes: Work and/or mechanical equipment shall conform with all Local and State Rules and Regulations as well as the most recent state and city adopted versions of the National Fire Protection Association and the Maine Uniform Building and Energy Code, Maine State

Plumbing Code, Ventilation Standard ASHRAE 62.1, the Maine State Energy Code (ASHRAE 90.1). These codes are considered a part of these specifications.

- C. In the event of a conflict with required codes or an obvious misapplication of equipment, material, or other installation, before proceeding, promptly notify the Engineer. In no event shall any work be installed that is contrary to applicable codes.
- D. Qualification of Workmen: Use sufficient journeyman plumbers and competent supervisors in the execution of this portion of the work to ensure proper and adequate installation of plumbing throughout.

1.14 PRODUCT HANDLING

- A. Protection: Protect all materials before, during and after installation and protect the installed work and materials of all other trades.
- B. Replacements: In the event of damage, immediately make all repairs and replacements necessary to the acceptance of the Engineer at no additional cost to the Owner.

1.15 DEVIATIONS AND DISCREPANCIES

- A. The Drawings are intended to indicate only diagrammatically the extent, general character, and approximate locations of the mechanical work and exact locations shall be determined in the field subject to approval by the Engineer. Work indicated, but having minor details obviously omitted such as pipe and duct rise, drop and/or fittings, shall be furnished complete to perform the functions intended without additional cost to the Owner. Follow the architectural, structural, and electrical drawings so that work under this section is properly installed and coordinated with other sections.
- B. The Drawings and specifications are complementary each to the other and what is called for in one shall be as binding as if called for by both. In the event of conflicting information on the drawings, or between or within drawings and specifications, or between trades, that which is better, best, most stringent, or most expensive will govern, except as may otherwise be permitted by Engineer.
- C. Bidders shall study plans and specifications and in the event there are any apparent errors, omissions, conflicts, or ambiguities, shall contact Engineer for clarification prior to submitting their bid.

1.16 INSURANCE

- A. The Contractor shall purchase and maintain all Workers' Compensation Insurance, Public Liability and Property Damage 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 AND SUPPLEMENTARY CONDITIONS.

1.17 SAFETY REGULATIONS

1.18 All work shall be performed and/or installed to conform to all requirements of the Occupational Safety and Health Act of 1970 and all amendments thereto

1.19 TEMPORARY HEAT

- A. The Mechanical Contractor shall comply with the requirements for temporary heat as specified in Division 01.
- B. The use of electric heaters for temporary heating is prohibited.

1.20 CHANGE ORDERS

- A. No change shall be made from the work, equipment, or materials under this section except as directed in writing by Engineer.
- B. All requests for change in contract price and scope shall be accompanied by a breakdown list of materials with unit and extended prices and labor hours with unit and extended price, plus markups that have been applied.

1.21 PERMITS

- A. Apply for, obtain and pay for all permits and inspections required by law and notify proper authorities in ample time for inspections to be made prior to completion of the Work.

1.22 ASBESTOS ABATEMENT

- A. If during the course of the work, the existence of asbestos or asbestos containing materials is encountered or suspected in the structure or building, promptly notify the Owner and Engineer. The Owner shall be responsible for all asbestos related activities that may be required including: site surveys, sampling, testing, removal specifications and removal.
- B. Do not perform any work prior to receipt of written instructions from the Owner.

1.23 EFFICIENCY MAINE REQUIREMENTS

- A. The Contractor shall coordinate with the Engineer, equipment distributors and Efficiency Maine to obtain energy efficiency incentives and discounts. Refer to Efficiency Maine for the most recent and applicable programs.

1.24 CLOSING IN UNINSPECTED WORK

- A. General: Do not cover up or enclose work until it has been properly and completely inspected and approved.
- B. Noncompliance: Should any of the work be covered up or enclosed prior to all required inspections and approvals, uncover the work as required, and after it has been completely

inspected and approved, make all repairs and replacements with such materials as are necessary to the approval of the Engineer and at no additional cost to the Owner.

1.25 CONTRACT CLOSEOUT

A. Final Cleaning:

1. Prior to acceptance of the buildings, thoroughly clean all exposed portions of the heating installation, removing all labels and all traces of foreign substance. Provide clean air filters in all air handling equipment.
2. Execute final cleaning prior to final inspection.
3. Clean interior and exterior surfaces. Vacuum carpeted and soft surfaces.
4. Clean debris from site, roofs, gutters, downspouts, and drainage systems.
5. Replace filters of operating equipment.
6. At the closeout of the project and before occupancy the building shall be flushed for 48 hours with all air handling units set at 100% of their respective scheduled outside air quantities.

B. Project Record Documents: Submit the following

1. Record Documents and Shop Drawings: Legibly mark each item to record actual construction.
2. Submit documents to Engineer prior to claim for final application for payment.

C. Final Adjustment: Provide necessary mechanics and/or engineers as necessary to make final adjustment of operation of the systems so that the systems are turned over to the Owner in first class operating condition.

D. Owner Training: On completion of the job, the Contractor shall provide a competent technician to thoroughly instruct the owner's representative in the care and operation of the system. The time of instruction shall be arranged with the Owner.

E. Warranties: Warrant all work and materials for a period of one year commencing with the acceptance by the Owner of the completed installation in accordance with the Contract Documents. Replace any work, materials, equipment, or system, which develops defects within the warranty period, without cost to the Owner. Specific equipment may require a warranty greater than one year and shall be complied with as noted within the equipment specification.

END OF SECTION

SECTION 23 05 00 – COMMON WORK RESULTS FOR HVAC

PART 1 - GENERAL

1.1 SECTION INCLUDES

A. The work of this section includes, but is not limited to the following:

1. Interior Pipe Sleeves and Escutcheons.
2. Firestopping.
3. Hangers and Supports.
4. Equipment Identification.
5. Electric Motor Efficiency Requirements.
6. General equipment installation requirements

1.2 RELATED SECTIONS

1. Section 23 00 10, Basic HVAC Requirements.

1.3 SUBMITTALS

- A. Submit in accordance with Section 23 00 10.
- B. Product Data: Provide catalog data for the following:
1. All equipment included in this section.

1.4 QUALITY ASSURANCE

- A. Steel Support Welding: Qualify welder personnel and install according to AWS D1.1, “Structural Welding Code—Steel”,
- B. Steel Piping Welding: Qualify welder personnel and install according to ASME Boiler and Pressure Vessel Code, Section IX, “Welding and Brazing Qualifications.” Comply with ASME B31 Series, “Code for Pressure Piping” for all piping installations.
- C. Certify that all welder personnel have passed AWS qualification tests applicable to the work and that their certification is current.
- D. The Mechanical Contractor shall coordinate with the electrical contractor and the project and/or site electrical service and distribution to verify supply power, voltage, etc.
- E. Prior to ordering mechanical equipment, the Mechanical Contractor shall verify equipment voltage and all required electrical accessories to be provided including, but not limited to disconnects, starters, VFD’s, controls (if applicable), etc. with the Electrical Contractor.

PART 2 - PRODUCTS

2.1 INTERIOR PIPE SLEEVES AND ESCUTCHEONS

- A. Masonry and/or fire rated wall and floor penetrations: Steel Pipe, ASTM A 53, Type E, Grade B, Schedule 40, galvanized, non-threaded ends.
- B. Non-masonry wall penetrations: Schedule 40 PVC with non-threaded ends, or #24 gauge galvanized steel tubes with wired or hemmed ends.
- C. Sealing:
 - 1. Caulk spaces between sleeves and pipes with a modular mechanical type seal consisting of interlocking synthetic rubber links shaped to continuously fill the annular space between the object and sleeve, connected with bolts and pressure plates causing rubber sealing elements to expand when tightened to make smoke and watertight. Thunderline Link-Seal or equal.
- D. Escutcheons: Two piece nickel plated steel floor and ceiling plates.

2.2 FIRESTOPPING MATERIALS

- A. Provide under this section in accordance with Section 07841.
- B. Use only through-penetration firestop products that have been tested for specific fire resistance rated conditions conforming to construction assembly type, penetrating item type, annular space requirements, and fire rating required for the application:
 - 1. Latex Sealants: Single component latex formulations that when cured do not re-emulsify during exposure to moisture.
 - 2. Firestop Devices: Factory assembles steel collars lined with intumescent material sized to fit a specific outside diameter of penetrating item.
 - 3. Firestop Putty: Intumescent, non-hardening, water resistant putties containing no solvents, inorganic fibers or silicone compounds.
 - 4. Wrap Strips: Single component intumescent elastomeric strips faced on both sides with a plastic film.
 - 5. Firestop Pillows: Re-useable, non-curing, mineral fiber core encapsulated with an intumescent coating contained in a flame retardant poly bag.
 - 6. Silicone Sealants: Moisture curing, single component, silicone elastomeric sealant for horizontal surfaces (pourable or non-sag) or vertical surface (non-sag).
 - 7. Silicone Foam: Multi-component, silicone based, liquid elastomers that when mixed expand and cure in place to produce a flexible, non-shrinking foam.
- C. Firestop systems shall be UL classified and rated for the type of construction where it is applied.

2.3 HANGERS AND SUPPORTS

- A. General
 - 1. All hangers and supports shall be specifically manufactured for that purpose and shall be the pattern, design and capacity required for the location of use.
 - 2. Piping specified herein shall not be supported from piping or equipment of other trades.
 - 3. Hangers shall be heavy duty steel adjustable clevis type; plain for steel and cast iron pipe and copper plated for copper tubing.

4. Exposed vertical risers 3/4" and smaller shall be supported at the mid-point between each floor with split ring type hangers; copper plated for copper tubing.
5. All hangers on chilled water piping are to be installed on the exterior of the insulation with appropriate saddles.

B. Hanger Rods

1. Hanger rods shall be all thread rod in concealed area, and rods threaded on ends of rod only in finished areas and the Boiler Room. Rod size and spacing shall be as follows:

Nominal Pipe Size (in)	Maximum Span (ft)	Minimum Rod Diameter (in)
1	7	3/8
1 1/2	9	3/8
2	10	3/8
3	12	1/2
3 1/2	13	1/2
4	14	5/8
5	16	5/8
6	17	3/4
8	19	7/8
10	22	7/8
12	23	7/8

2. Provide lag points with rod couplings for fastening to wood, toggle bolts in concrete blocks or concrete structural slabs and compound anchor shields and bolts in poured concrete.

C. Supports

1. Provide and install angle iron supports for pipe hangers as required. Angle iron supports shall be adequate size for span and piping load.

D. Safety

1. **Any support for piping, ductwork or equipment which is installed below seven (7) feet above finished floor shall have sharp edges blunted or rounded-off and shall be padded with 1" foam insulation to prevent possible personnel injury.**

2.4 ELECTRIC MOTOR EFFICIENCY RATINGS

- A.** Motors 1/3 hp and smaller shall be wired for 120 volt, 1 phase, 60 hz; motors 1/2 hp and larger shall be wired for 3 phase, 60 Hz, unless specifically shown otherwise. Motors 1 Hp and larger shall be NEMA Premium Efficiency Motors in accordance with The NEMA Premium™ efficiency levels are contained in NEMA Standards Publication MG 1- 2006, in Tables 12-12 and 12-13, respectively.

- B. Additionally, all mechanical equipment shall comply with efficiency requirements as outlined in ASHRAE 90.1 2016 or MUBEC (Maine Uniform Building and Energy Code).

PART 3 - EXECUTION

3.1 GENERAL

- A. Inspection
 - 1. Prior to commencing the work of this Section, carefully inspect the installed work of all other trades to verify that such work is complete to the point where this installation may properly commence.
 - 2. Verify that equipment can be installed in strict accordance with all pertinent codes and regulations and the approved Shop Drawings.
- B. Discrepancies:
 - 1. In the event of discrepancy, immediately notify the Architect/Engineer.
 - 2. Do not proceed with installation in areas of discrepancy until all such discrepancies have been fully resolved.

3.2 INSTALLATION OF PIPING AND EQUIPMENT

- A. General:
 - 1. Install all piping promptly, capping or plugging all open ends and making pipe generally level and plumb, free from traps, and in a manner to conserve space for other work.
 - 2. Inspect each piece of pipe, tubing, fittings, and equipment for defects and obstructions; promptly remove all defective material from the job site.
 - 3. Install pipes to clear all beams and obstructions; do not cut into or reduce the size of load-carrying structural members without the approval of the Architect/Engineer.
 - 4. All risers and offsets shall be substantially supported.
 - 5. Arrange all piping to maintain required grade and pitch and to prevent vibration.
 - 6. Provide expansion loops and anchors where shown on Drawings.
 - 7. Make all changes in pipe size with reducing fittings.
 - 8. Provide drains at all low points in water piping with ½" gate valve with hose nipple, or hose-end boiler drain.
 - 9. Install piping to prevent back siphoning or reverse flow of liquid under all operating conditions.
- B. Joints and Connections:
 - 1. Smoothly ream all cut pipe; cut all threads straight and true; apply best quality Teflon tape to all male pipe threads but not to inside of fittings; use graphite on all cleanout plugs.
 - 2. Make all joints in copper pressure pipe with a 95-5 tin-antimony solder applied in strict accordance with the manufacturer's recommendations, except underground water to be silver soldered. Make joints in non-pressure copper tube with 50-50 tin-lead solder.
- C. Installation of mechanical equipment:
 - 1. In general all equipment is to be installed in accordance with the manufacturers recommendations and installation instructions.

2. All mechanical equipment shall be installed with adequate space available to perform normal maintenance and accessibility shall be provided for filter replacement.

3.3 FIRESTOPPING

- A. Install through penetration firestop systems in accordance with firestop system manufacturer's written installation instructions for products and applications indicated.
- B. Engage an experienced installer who is trained, certified, licensed, or otherwise qualified by the firestop system manufacturer to install the firestop products.
- C. Coordinate construction of openings and penetrating items to ensure that firestop systems are installed according to specified requirements.
- D. Provide firestop systems that are compatible with one another, with the substrates forming openings, with the items penetrating the firestop system, and under the conditions of service for the application being considered.
- E. Provide components for each firestop system that are needed to install fill materials. Use only components specified by the firestop system manufacturer and approved by the qualified testing agency for the designated system.
- F. Keep areas of work accessible until inspection by the AHJ has been completed.
- G. Inspecting Agency: Owner may engage a qualified independent inspecting agency to inspect the completed firestop system. The independent agency shall comply with ASTM E 2174 requirements including inspecting personnel qualifications, method of conducting inspections, and preparation of test reports.
- H. Where deficiencies are found, repair or replace the firestop systems so that they comply with requirements. Proceed with enclosing firestop systems with other construction only after inspection reports are issued and the firestop installations comply with requirements.

- 3.4 Protect the firestop system during and after installation to insure that the systems do not deteriorate and are not damaged during the remaining period of construction. In the event damage or deterioration occurs, remove affected firestop system and replace with new materials in compliance with this specification.]

3.5 EQUIPMENT IDENTIFICATION

- A. Valves: Provide with brass tags and chains securely attached to the stem or body. Identify by number or name to indicate the service.
- B. Provide a framed and glazed directory to show the location and function of each item. The directory shall be mounted in the mechanical room and will be incorporated as part of the Operating and Maintenance Instructions.
- C. All mechanical equipment including pumps, air handling units, boilers, fan coil units, unit heaters, condensers, etc., shall be neatly stenciled in a conspicuous place indicating the service or equipment number.

- D. All pipes shall be identified and provided with flow arrows spaced at 50 foot intervals with the exception of drops or risers to terminal units.

END OF SECTION

SECTION 23 05 93 – TESTING, ADJUSTING & BALANCING

PART 1 - GENERAL

1.1 SECTION INCLUDES

A. The work of this section includes, but is not limited to the following:

1. Demonstration of mechanical equipment.
2. Duct testing, adjusting and balancing.
3. Equipment testing adjusting and balancing.
4. Mechanical equipment starting.
5. Pipe testing, adjusting and balancing.

1.2 RELATED SECTIONS

1. Section 23 00 10, Basic HVAC Requirements
2. Section 23 09 33, Electric / Electronic Temperature Controls

1.3 SUBMITTALS

A. Submit in accordance with Section 23 00 10:

1. Provide report indicating all operational parameters as listed below for all new and existing (where indicated) HVAC and plumbing equipment.

1.4 QUALITY ASSURANCE

A. Balancing Contractor shall be approved by Engineer and be one of the following testing and balancing contractors:

1. Yankee Balancing
2. Central Air Balance
3. Tekon Technical Consultants Inc.
4. Air Solutions and Balancing
5. Maine Air Balance
6. Tab Tek

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION

3.1 TESTING AND BALANCING

A. Upon completion of the heating, ventilating and air conditioning systems of the building, the Mechanical Contractor shall employ an independent balance firm to check, adjust and balance

all HVAC and plumbing equipment included in the contract. Notify Engineer two days in advance of start of balancing.

- B. It is the balancing contractors responsibility to refer to Section 23 09 33 3.1 "Description of Operation" and to coordinate with the temperature control contractor to determine all operating modes and required CFM's, GPM's etc for the mechanical systems, which shall be reflected in the balancing report.
- C. All instruments used in the checking, adjusting and balancing shall be accurately calibrated and maintained. Accuracy tests on instruments shall be performed in the presence of and whenever requested by the Engineer.
- D. Air and water balance and checking shall not begin until systems have been completed and are in full working order. The Mechanical Contractor shall put all heating, ventilating, and air conditioning systems and equipment into full operation and shall continue the operating of same during each working day of testing and balancing. Before starting any air system, the complete system shall be checked to make sure all components are in place and operating properly and that all manual dampers are open.
- E. Duct traverses shall be made to determine air flow and properly balance air quantities in main ducts for all ducted units. Traverse shall be made as close to the unit as possible to get an accurate measurement.
- F. All air terminals shall be tested with three readings taken and the average recorded along with that specified.
- G. Take all necessary air flow measurements to determine the output of the fans and units. Revise the RPM of the equipment as necessary to produce the CFM required at the various air outlets or inlets. The final air flow readings at the air outlets and inlets shall be within -5% to +10% of the air volumes indicated on the plans, however, relative space pressurization shall remain positive or negative as designed.
- H. The various systems shall operate with a minimum of air noise and the use of the air volume control dampers at the diffusers and registers to restrict air flow to the point they are noisy will not be acceptable.
- I. Balancing information shall be provided for all operating conditions on any piece of equipment designed to operate at multiple CFM or GPM settings
- J. Upon completion of the checking, adjusting and balancing, the Contractor shall submit six (6) certified copies of the Mechanical systems Test and Balance Report to the A/E for approval. The Report shall be in tabulated form with each piece of equipment or outlet properly identified by its equipment number or room number and location and shall include the following:
 - 1. Air Systems
 - a. Fan/Air Handling Unit Designation and service Location
Manufacturer
Model Number
Serial Number
 - b. Capacities (specified and actual) Total CFM
Return CFM
Outside air CFM

- Total static pressure
 - Inlet static pressure
 - Discharge static pressure
 - Fan RPM
- c. Motor and Drive Data (specified/actual/manufacture)
 - Horsepower
 - Phase
 - Voltage
 - Amperage
 - RPM
 - Service factor
 - Sheave size and number of grooves
 - Fan sheave size and number of grooves
 - Belts - quantity and model number
- d. Duct Traverse Data
 - Equipment designation
 - Duct size and location
 - Effective area
 - Duct velocity (specified/actual)
 - CFM (specified/actual)
 - Pressure
- e. Outlet Data
 - Equipment designation and type
 - Equipment location
 - Equipment size
 - CFM (design, initial, final)
- 2. Water Systems
 - a. Pumps
 - Designation and service
 - Location
 - Manufacturer
 - Model number
 - Serial number
 - b. Capacities (specified and actual)
 - GPM
 - TDH
 - Amperage
 - Suction pressure
 - Discharge pressure
 - Pressure differential
 - c. Motor (specified and actual)
 - Horsepower
 - Voltage
 - Amperage
 - Phase
 - d. Terminal Heaters and Branch Mains
 - System and location
 - Heater designation
 - Valve size
 - Setting, differential and GPM (specified and actual)
 - Pressure drops through heating and cooling coils

- K. Air balance dampers shall be adjusted and the position marked.
- L. Water flow fittings shall be adjusted and the position marked.
- M. Check operation of fire dampers, reset and tag date of test on side of duct next to access panel.

END OF SECTION

SECTION 23 07 00 – HVAC INSULATION

PART 1 - GENERAL

1.1 SECTION INCLUDES

- A. The work of this section includes mechanical insulation for the following:
 - 1. Refrigeration piping.
 - 2. Exterior refrigeration piping covers.
 - 3. HRU's (Thickness as indicated below)
 - a. Supply duct from unit.
 - b. Return duct to unit.
 - c. Outside air duct to unit.
 - d. Exhaust air duct from unit to louver, gooseneck or GRV
 - 4. Last seven (7) feet of exhaust ducts (not including HRU's or ERV's) up to wall cap, louver, brickvent or roof fan.

1.2 RELATED SECTIONS

- 1. Section 23 00 10, Basic HVAC Requirements.
- 2. Section 23 05 00, Common Work Results for HVAC.

1.3 SUBMITTALS

- A. Submit in accordance with Section 23 00 10.
- B. Product Data: Provide catalog data for the following:
 - 1. Insulation for all equipment listed in this section including type, thickness, application and jacketing.

1.4 QUALITY ASSURANCE

- A. Manufacturer: A company specializing in the manufacture of mechanical insulation with a minimum of five years experience.

PART 2 - PRODUCTS

2.1 GENERAL

- A. Insulation systems shall have a flame spread rating per ASTM E 84 of 25 or less and a smoke developed and fuel contributed rating of 50 or less.

2.2 PIPING INSULATION

- A. Glass Fiber Insulation: Provide manufacturer's standard product by one of the following acceptable manufacturers:

1. CertainTeed
2. Knauf Fiberglass
3. Owens-Corning
4. Schuller International, Inc.
5. Approved equal.

- B. Minimum pipe insulation thickness (inches), based on minimum thermal resistance (R) of 4.0 per inch of thickness on a flat surface at a mean temperature of 75°F: Unit to be fiberglass heavy density sectional pipe insulation system having a factory applied vapor barrier laminate all-service jacket.

Piping System Type	Fluid Temp Range, °F	Runouts	Size 0<1"	Size 1" to <1 1/2"	Size 1 1/2" to <4"	Size 4" to 8"	Size 8" and Larger
Domestic cold water		1/2	1/2	1/2	1	1	1
Domestic hot water	105+	1	1	1	1	1	1
Recirculation water	105+	1	1	1	1	1	1

Piping System Type	Fluid Temp Range, °F	Size 0≤ 1 1/2"	Size >1 1/2" to <4"	Size 4" to 8"	Size 8" and Larger
Process or safe system		1/2	1/2	1	1
Heating, hi pres/temp	350+/-	2 1/2	3	4	4
Heating, med pres/temp	251 – 350	1 1/2	3	3	3
Heating, low pres/temp	201 - 250	1 1/2	3	3	3
Heating, low temp	141 - 200 105 - 140	1 1/2	2	2	2
Cooling, chilled water, brine, Refrigerant	40 – 60 <40	1 1/2	1 1/2	1 1/2	1 1/2

2.3 REFRIGERATION PIPING

- A. Insulate refrigeration suction and liquid lines with Armaflex II elastomeric expanded closed cell insulation, thickness per table above, with a thermal conductivity of 0.27 @ 75°F, temperature range of -40 to 180°F and permeability of 0.17. Insulation shall be installed using adhesive #520 applied to 100% of surface. Apply two (2) coats of vinyl lacquer finish over all exterior insulation.
- B. Exterior Refrigeration Piping Covers: Provide refrigeration covers as manufactured by Fortress, model number LD122 or equal. Fortress professional duct/ fitting system hides unsightly AC line set. 2 duct sizes - 3.5" and 4.5", accommodate single or multiple line-set configurations. Longer ducting length - 8ft. Allows for fewer joints, 17 fittings assure a complete professional finish for even the most demanding installations. 1 Year Warranty. Professional grade polymers

to deliver long lasting durability. Fortress line set cover series was specifically developed to bridge the gap between the lightweight and the more costly lineset cover products available on the market. Made in the USA, Fortress has a number of innovations to suit the USA conditions - such as 8' lengths of duct and a 12 month guarantee. Available in 2 sizes and 4 different colors

1. Available Colors:
 - a. White - LD122W
 - b. Ivory - LD122I
 - c. Gray - LD122G
 - d. Brown - LD122B
 2. Features:
 - a. Application - Fortress is perfect for mini-splits, high velocity and conventional split Air conditioning systems.
 - b. Strong - Fortress ducting is extruded with our special formula rigid polyvinyl chloride, which is UV and weather resistant The result is a long lasting quality product that will remain attractive and provide protection for many years.
 - c. Protective - Fortress protects linesets, wiring and drain pipes from weather, vandalism and pest damage.
 - d. Easy to install - Fortress installs quickly, and can be easily accessed for repairs or replacement of the line set.
 - e. Stylish - Fortress eliminates unsightly line set used in a typical installation. Ducting is available in two lineset sizes and four neutral colors - white, ivory, brown and gray to compliment any residential or commercial building.
- C. Paintable - Brush, spray or roller to match or compliment custom colors. Follow paint manufacturers recommendations for vinyl products.

2.4 DUCT INSULATION

- A. Interior Supply, Return and Exhaust: 1½" thick fiberglass duct wrap with a factory applied vapor barrier facing and an R-value of 5 in accordance with ASTM C518 at a mean temperature of 75 °F. Material to carry U.L. label and be by one of the following acceptable manufacturers:
1. CertainTeed
 2. Knauf Fiberglass
 3. Owens-Corning
 4. Schuller International, Inc.
 5. Approved equal.
- B. Uninsulated Space Outside Air, Supply, Return and Exhaust Ductwork: 3" thick fiberglass duct wrap with a factory applied vapor barrier facing. Material to carry U.L. label and be by one of the following acceptable manufacturers:
1. CertainTeed
 2. Knauf Fiberglass
 3. Owens-Corning
 4. Schuller International, Inc.
 5. Approved equal.

PART 3 - EXECUTION

3.1 DUCT INSULATION

- A. Installation: Install all insulation using skilled insulation workmen regularly employed in the trade.
- B. Interior: All laps to be sealed and held in place with adhesive and flare staples. All lap joints to be folded under before stapling so no raw insulation will be showing. On the bottom of ducts 24" or wider, provide mechanical fasteners approximately 12" O.C.
- C. Insulation shall be continuous through interior partitions.

END OF SECTION

SECTION 23 09 33 – ELECTRIC/ELECTRONIC CONTROLS

PART 1 - GENERAL

1.1 SECTION INCLUDES

- A. The work of this section includes, but is not limited to the following:
 - 1. HVAC instrumentation.
 - 2. Electric and electronic control.
 - 3. Sequence of operation.

1.2 RELATED SECTIONS

- 1. Section 23 00 10, Basic HVAC Requirements.

1.3 SUBMITTALS

- A. Submit in accordance with Section 23 00 10.
- B. Submittal Brochure - The following shall be submitted for approval prior to installation:
 - 1. Control drawings with detailed wiring diagrams, including bill of material and description of operation for all systems.
 - 2. Panel layouts and name plate lists for all local and central panels.
 - 3. Valve and damper schedules showing size, configuration, capacity and location of all equipment.
 - 4. Product data for all control system components.
 - 5. The complete sequence of operation of the control system.
 - 6. The locations of all control equipment.
 - 7. Upon completion of the installation and final system adjustment, provide a full set of As-built Drawings of the installation and the control strategies.

1.4 QUALITY ASSURANCE

- A. General: Furnish and install as hereinafter specified a complete system of electric/electronic temperature controls. The system shall be manufactured by Honeywell, Siemens or Invertek and shall be installed by trained control mechanics regularly employed in installation and calibration of ATC equipment by the manufacturer of temperature control equipment. **It is acceptable to employ the use of DDC controllers to comply with the sequence of operation provided the Owner has access to adjustment points within the system.**
- B. Acceptable installers:
 - 1. Mechanical Contractor – **Assuming all requirements in this section are met.**
 - 2. Maine Controls - Presumpscot Street, Portland, Maine
 - 3. Siemens Controls - Route 1, Falmouth, Maine
 - 4. Honeywell - County Road, Westbrook, Maine
 - 5. XL Mechanical – Odlin Road, Bangor Maine
 - 6. Trane Company – Westbrook, Maine

1.5 COORDINATION

- A. Coordination of The Work: The following work shall be furnished by designated contractor under supervision of the Control Contractor.
1. Heating Contractor shall:
 - a. Install automatic valves and separable wells that are specified to be supplied by the Control Contractor.
 - b. Furnish and install all necessary valved pressure taps, water, drain and overflow connections and piping.
 - c. Provide on magnetic starters furnished, all necessary auxiliary contacts with buttons and switches in the required configurations.
 2. Sheet Metal Contractor shall:
 - a. Install all automatic dampers and associated access panels.
 - b. Provide necessary blank-off plates required to install dampers that are smaller than duct size.
 - c. Assemble multiple section dampers with required interconnecting linkages and extend required number of shafts through duct for external mounting of damper motors.
 - d. Provide access doors or other approved means of access through ducts for service to all control equipment.
 - e. Install smoke detectors in duct or equipment for Electrical Contractor.
 3. The General Contractor shall:
 - a. Provide all necessary cutting, patching, and painting.
 - b. Provide access doors or other approved means of access through ceilings and walls for service to control equipment.
- B. Wiring: All wiring for installation of temperature controls shall be by Temperature Control Contractor. Electrical Contractor shall furnish and install power wiring for equipment and wiring for smoke detectors.
1. All wiring shall comply with the requirements of Division 26, Electrical. Wiring not complying with the requirements of Division 26 shall be corrected by the EC at the expense of the ATC Contractor.
 2. Temperature control panels are indicated on the drawings with power supply by EC. Wiring for additional or relocated panels shall be at the expense of the ATC Contractor.

PART 2 - PRODUCTS

2.1 TEMPERATURE CONTROL

- A. Scope: The control system shall consist of all area thermostats, temperature transmitters, controllers, air stream thermostats, valves, dampers, damper operators, switches, timeclocks and other accessory equipment to fulfill the intent of the specification and provide for a complete and operable system.
1. All electric wiring incidental to the temperature control system shall be provided as a part of the automatic temperature control system.
- B. Thermostats

1. Electric Thermostats
 - a. Instruments shall be commercial style, metal cover, proportional or single acting as noted or required. Contacts shall be rated for motor horsepower as required. Covers shall have visible thermometer, set point adjustment knob except when concealed or removable key adjustment is noted.
 - b. Remote bulb thermostats shall be used as noted and when thermostat cannot be located in controlled space due to space electrical rating or corrosion requirements. Provide guard for bulb sensor.
 - c. Wet area thermostats shall be used where noted. Provide NEMA 4 enclosure for remote bulb thermostat. Cover shall be hinged with snap lock closure. Mount remote bulb on side of enclosure and provide guard. Seal around capillary penetrating enclosure. Other methods of control such as an explosion proof thermostat will be considered if they provide high resistance to moisture.
2. Duct and Immersion Thermostat
 - a. Duct and immersion thermostats of the single input type shall have integral set point adjustments and throttling ranges adequate for the application. Duct thermostats shall have sensing elements of sufficient length, accuracy and type to measure average duct temperature in each location.
 - b. Controllers shall be designed and constructed for equipment room use and shall not be affected by ambient temperature and humidities.
 - c. Duct mounted or immersion type shall have spans of one hundred degrees or two hundred degrees Fahrenheit as required. Averaging element sensors shall have a minimum nine-foot capillary element. Temperature sensors shall be of rigid stem using bimetallic sensing elements except where averaging is required.
 - d. Sensors shall be of corrosion resistant construction, tamper proof, suitable for mounting on a vibrating surface. If capillary, shall be temperature compensated and armored or installed in protective tubing.
 - e. All sensing elements for water pipe mounting shall be furnished complete with separable protecting wells filled with heat conductive compound. Sensors shall be factory calibrated and tamper proof. If easily adjustable sensors are provided, they shall be located inside metal enclosures with cylinder lock and key to prevent unauthorized setting.
- C. Low Temperature Safety Thermostat: Electric two position manual reset with 20-foot low point sensitive elements (not averaging type) installed to cover the entire duct area. Devices used on integral coil face and bypass units shall have remote thermostat and bulb in accordance with manufacturer's requirements.
- D. High Temperature Safety Thermostat: Electric, duct mounted manual reset type with adjustable set point (75 to 165 degrees Fahrenheit).
- E. Miscellaneous Devices
 1. Provide all the necessary relays, positioners, 7-day timeclocks, transformers, etc. to make a complete and operable system.
 2. Locate these devices on local panel unless specified otherwise.
- F. Panels
 1. Provide to enclose all relays, switches and controllers as required.
 2. Panels shall be front access with gasketed, hinged covers, and finished with a corrosion resistant finish.
 3. Install required indicating and control devices in the cover.

4. Provide terminal strips for all electrical connections.
 5. Panels shall be central and/or local as indicated or required.
 6. Each panel shall have its own combination fused disconnect switch as required.
- G. Methane, Hydrogen Sulfide and Chlorine Detectors
1. All gas detectors shall be furnished and installed under Division 13.
 2. Provide power and alarm indication wiring to the Main Control Panel under Division 13.
 3. Provide one set of SPDT dry contacts in each detector for use by the ATC contractor only.
- H. Gauges: Provide thermometers and pressure indicating gauges where shown on the drawings and other points throughout the system where the visual indication of temperature or pressure is required or will prove beneficial to operating personnel in the operation of their control system. Gauges will not be required on room-type thermostats.

PART 3 - EXECUTION

3.1 DESCRIPTION OF OPERATION

- A. Well Pumps (**Well Pump Control and Wiring is by Electrical**):
1. WP-1 Well Pump in Well HD4: Unit shall come on anytime the existing level controller in the existing storage tank comes on, and shall remain off otherwise.
 2. Existing Well Pump in Well HD5: Unit shall come on anytime the existing level controller in the existing storage tank comes on, and shall remain off otherwise.
 3. It is the intent that both well pumps operate together off the same level controller.
 4. Provide two visual alarm indicator lights, labeled "HD4 WELL PUMP FAILURE" and "HD5 WELL PUMP FAILURE" on the outside of the pump house to activate in the event of a well pump failure.
 5. Provide cell phone alarm communicator to send a text in the event of a pump failure. Coordinate with the State Park's service provider
 6. Provide control panel with manual disconnects and indicator lights for each pump.
- B. Electric Heaters: Electric line voltage wall mounted thermostat shall cycle fan and electric heat to maintain set point.
- C. Electric Baseboard: Electric line voltage wall mounted thermostat shall electric heat to maintain set point. Units in the same room as DDS units shall operate as back-up to the heat pumps. See below
- D. Fans: Provide all fans with speed switches mounted at the unit for balancing. The switch will be wired by the electrical unless noted otherwise.
1. IT Room EF-1 shall cycle on through and electric wall mounted thermostat whenever the temperature rises above 80°F in the IT Room.
 2. EF-2 shall be controlled by local wall switches (by electrical).
- E. Heat Recovery Unit (HRU-1) and Electric Duct Mounted Coil EDH-1:
1. HRU shall be provided with supply and exhaust fans.
 2. Unit shall run continuously in the occupied mode and remain off during the unoccupied mode as cycled by the programmable time clock..

3. Duct Mounted Coil EDH-1: The duct mounted coil shall be controlled by an electric SCR controller in response to a discharge duct sensor. The unit shall deliver a constant volume of 70°F air to the space.
 4. Provide unit coil freeze protection sensor to de-energize HRU-1 below 38°F.
- F. Ductless Split Systems (DSS): Units shall cycle through its integral controls to maintain setpoint. Unit to be provided with auxiliary contactors to activate back-up electric baseboard radiation in the event the DSS unit cannot maintain temperature.

3.2 SYSTEM TURNOVER AND SERVICE

- A. Upon completion of the installation, start up the system and perform necessary testing and run diagnostics to ensure proper operation. An acceptance test in the presence of the Owner's Representative, the Architect, and the Engineer shall be performed. When the system performance is deemed satisfactory by these observers, the system parts will be accepted for beneficial use and placed under warranty.
- B. Instruction and Adjustment - Upon completion of the project, the Temperature Control Contractor shall:
 1. Adjust for use by Owner, all thermostats, controllers, valves, damper operators, and software relays provided under this section.
 2. Furnish two (2) instruction manuals covering function and operation of control systems. Provide factory authorized Technician to instruct Owner's personnel in operation and care of control systems and equipment.
- C. Guarantee: The control system shall be guaranteed for a period of one year from the date of acceptance by the Owner.

3.3 TRAINING/OWNER'S INSTRUCTIONS

- A. Provide two copies of an operator's manual describing operating and routine maintenance service procedures to be used with the system.
- B. Provide a competent technician to instruct the owner's representative upon completion of the project. Instructions shall be given by the ATC as scheduled by the Owner, during normal work hours, for a period not more than 16 hours. The instructions shall consist of both hands-on and classroom training at the job site.

END OF SECTION

SECTION 23 23 00 – REFRIGERATION PIPING

PART 1 - GENERAL

1.1 SECTION INCLUDES

- A. The work of this section includes, but is not limited to the following:
 - 1. Refrigeration piping.
 - 2. Refrigeration piping specialties.

1.2 RELATED SECTIONS

- 1. Section 23 00 10, Basic HVAC Requirements.
- 2. Section 23 05 00, Common Work Results for HVAC.
- 3. Section 23 07 00, HVAC Insulation.

1.3 SUBMITTALS

- A. Submit in accordance with Section 23 00 10.
- B. Product Data: Provide catalog data for the following:
 - 1. Refrigeration piping.
 - 2. Refrigeration piping specialties.
 - 3. Roof penetrations sleeves

PART 2 - PRODUCTS

2.1 REFRIGERATION PIPING

- A. Material shall be as follows:
 - 1. Type "L" hard copper tubing (ACR grade) shall be used in all refrigerant systems. ASTM B280
 - 2. "Stay-Brite" or 95-5 solder shall be used in making all joints.
 - 3. Forged or wrought copper fitting shall be used.
 - 4. Armaflex Type "FR" fire retardant insulation shall be used as indicated.
 - 5. Specialties shall be Sporlan or Alco.
 - 6. Flexible piping connectors shall be used where compressors have vibration isolators. Unit shall be model DM-7407, stainless steel braided suitable for the applicable refrigerant at 380 psi minimum as manufactured by DME Incorporated or equal.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. General: Furnish, install, support and test a refrigerant piping system of the type and size and in the location shown on the Drawings. Refer to Section 23 05 00 for basic materials and installation methods.
- B. Refrigeration work shall be performed by a firm regularly engaged in the installation and service of refrigeration systems of the type specified. Install refrigerant piping in an approved manner in accordance with the best practice of the trade.
- C. Installation shall include the following:
 - 1. Thoroughly clean the inside surfaces of copper tubing using Virginia Number 10 degreasing solvent or refrigerant-113, or approved equal.
 - 2. During soldering, the pipe and fillings shall be kept full of inert gas, N or CO₂ to prevent formation of scale.
 - 3. Thermal expansion and contraction forces shall be absorbed through proper use of directional changes or U bends in the piping layout.
 - 4. The piping shall be properly anchored to minimize the transmission of vibration from the compressor into the piping system.
 - 5. Under minimum load conditions, gas velocity shall not be less than 500 FPM through horizontal lines and 1,000 FPM through vertical lines.
 - 6. Pitch all horizontal lines a minimum of 1/2" in 10' in the direction of refrigerant flow.
 - 7. Horizontal dimensions of traps shall be as small as possible.
 - 8. Keep hot gas bypass valves close to the compressor discharge.
 - 9. Insulate hot gas lines exposed to outdoor ambient with 1" thick unicellular plastic insulation.
 - 10. Insulate all suction lines with unicellular plastic insulation according to Section 23 07 00.
- D. Testing: After the refrigeration system is installed and before any piping is insulated, covered, or anchored, thoroughly leak test the entire system, make any necessary repairs, and retest as necessary.
 - 1. Do not include the compressor in the leak test and exercise care not to damage any controls or relief valves by the test pressure.
 - 2. Use oil-pumped, dry nitrogen with a pressure regulator controlling the system pressure.
 - 3. Each solder connection shall be tapped with a rubber mallet and checked for leaks using a soap solution.
 - 4. Repair all leaks by disassembling the connection, cleaning and remaking the fitting.
 - 5. After all leaks have been repaired, charge the system with refrigerant, initially to 10 psig, then boost to 150 psig (or that required by local codes) using nitrogen. Check the entire circuit for leaks using a halide torch or electronic leak detector. Repair any leaks and repeat test until all leaks are eliminated.
- E. Once all leaks have been repaired, charge the system to 150 psig and seal off. If there is no detectable pressure change after 24 hours, the system will be considered free of leaks.

END OF SECTION

SECTION 23 30 00 –HVAC AIR DISTRIBUTION

PART 1 - GENERAL

1.1 SECTION INCLUDES

- A. The work under this section includes all the required sheet metal extensions for grilles, manual dampers, automatic shutter deflectors, setting of control dampers, louvers, grilles, registers, diffusers, flexible connections, fire dampers, etc., as shown on the drawings or required to make the installation complete in accordance with the intent of the drawings and specifications.
- B. The work of this section includes, but is not limited to the following:
 - 1. Ductwork.
 - 2. Ductwork accessories
 - 3. Duct access doors.
 - 4. Diffusers, registers and grilles.
 - 5. Brickvents and backdraft dampers.
 - 6. Fire dampers.

1.2 RELATED SECTIONS

- 1. Section 23 00 10, Basic HVAC Requirements.
- 2. Section 23 05 00, Common Work Results for HVAC.
- 3. Section 23 07 00, HVAC Insulation.

1.3 SUBMITTALS

- A. Submit in accordance with Section 23 00 10.
- B. Product Data: Provide catalog data for the following:
 - 1. All equipment, and accessories, included in this section.
- C. **Shop drawing submittals shall show CFM, size, throw, SP and NC levels in tabular form for each grille or diffuser.**
- D. Shop drawings shall be submitted certifying AMCA compliance, and showing free area and pressure drop for each louver and/or brickvent submitted.
- E. Shop drawing submittals for fire dampers shall show size, quantity, rating and orientation of the unit.

PART 2 - PRODUCTS

2.1 DUCTWORK

- A. General:

1. Standing seams shall not be used on any HVAC ductwork 24 inches or less.
 2. For ducts smaller than 24" size provide un-reinforced flat seams using appropriate SMACNA material gauges.
- B. Ductwork Material and Application: Construct ducts using the following materials, in the locations indicated:
1. Galvanized Sheet Metal - Generally used throughout H & V system for supply, return, exhaust and outside air intakes unless noted otherwise. All galvanized ducts and fittings shall be a minimum of G-60 galvanized sheet metal in accordance with ASTM A525 and A527 specifications. Gauges shall be in accordance with current SMACNA standards.
 2. Factory Fabricated Flexible Round Duct - Where shown on Drawings.
 3. United McGill Corporation "Uni-Seal" or equal round spiral lockseam construction duct and fittings for all exposed ductwork throughout the facility.
- C. Requirements:
1. All dampers and deflectors shall be #22 gauge minimum and stiffened as required.
 2. All joints in ducts shall be made substantially airtight. Substantially airtight shall mean that no air leakage is noticeable through the senses of feeling or hearing at all joints and connections. All branches, turns, etc., shall be made with long radius elbow and fittings or shall be provided with fixed turning vanes designed to reduce the resistance of the elbow to the equivalent of a long radius elbow with a throat radius of not less than duct width.
 3. All ducts shall be installed with necessary offset, changes in cross sections, risers, or drops, etc., which may be required. Construct with approved joints and substantially support in an approved manner.
 4. Provide flexible equipment connections at the intake and discharge of each fan. Connections shall be made from Venglas neoprene coated glass fabric as furnished by Ventfabrics, Inc.
- D. Galvanized Steel Ducts: Ducts shall be constructed of galvanized steel sheets, with a G60 zinc coating, of lock-forming quality in accordance with SMACNA and ASHRAE recommendations and requirements as to gauge, support, bracing, seams, joints, connections, cross breaking, and accessories.
- E. Duct Sealant: Airseal #33 sealant/mastic, or equal.
1. Fiber reinforced suitable for indoor and outdoor use and shall comply with U.L. Class 1 construction.
 2. Flame spread of 0 and smoke developed rating of 5, per ASTM-E-84, suitable for duct pressures up to 10" W.C.

TABLE #2 RECOMMENDED RECTANGULAR DUCT CONSTRUCTION		
Dimension of Longest Side (Inches)	Galvanized Sheet Gauge	Min. Reinforcing Angle Size & Max. Longitudinal Spacing Between Transverse Joints
	(Low Pressure)	
thru 12	26	None
13-18	24	None
19-30	24	1 x 1 x 1/8 @ 60 in.
31-42	22	1 x 1 x 1/8 @ 60 in.
43-54	22	1½ x 1½ x 1/8 @ 60 in.
55-60	20	1½ x 1½ x 1/8 @ 60 in.
61-84	20	1½ x 1½ x 1/8 @ 30 in.
85-96	18	1½ x 1½ x 3/16 @ 30 in..
97-120	18	2 x 2 x 1/4 @ 30 in.
Over 120	18	2 x 2 x 1/4 @ 30 in.
	(Medium Pressure)	
thru 12	24	None
13-18	24	1 x 1 x 16 ga @ 48 in.
19-24	22	1 x 1 x 1/8 @ 48 in.
25-36	22	1 1/4 x 1 1/4 x 1/8 @ 40 in.
37-48	22	1 ½ x 1 ½ x 1/8 @ 24 in.
49-60	20	2 x 2 x 3/16 @ 24 in.
61-72	20	2½ x 2½ x 3/16 @ 24 in
73-84	18	2½ x 2½ x 3/16 @ 24 in
85-96	18	1½ x 1½ x 1/8 @ 24 in.
97 & over	18	2 x 2 x 1/8 @ 24 in.
	(High Pressure)	
thru 12	22	None
13-18	22	1 x 1 x 16 ga @ 48 in.
19-24	22	1 x 1 x 1/8 @ 48 in.
25-36	22	1 1/4 x 1 1/4 x 1/8 @ 32 in.
37-48	22	2 x 2 x 1/8 @ 30 in.
49-60	20	2 x 2 x 3/16 @ 24 in.
61-72	20	1½ x 1½ x 1/8 @ 24 in.
73-84	18	1½ x 1½ x 1/8 @ 24 in.
85-96	18	1½ x 1½ x 1/8 @ 24 in.
97 & over	16	2 x 2 x 1/8 @ 24 in.

- F. Flexible Duct: Flexible duct shall be insulated, wire reinforced, with vapor barrier coating, and shall be U.L. listed. Performance specifications include: Temperature range -20°F to 250°F; pressure range -1/2" to +2" W.G.; 4000 FPM max. velocity and thermal conductance .19. Type GSL as manufactured by Genflex.
- G. Duct Access Doors: Provide duct access doors in the following locations:
 - 1. Before duct mounted coils.
 - 2. At control dampers.
 - 3. At fire dampers.
 - 4. At smoke dampers.
 - 5. Upstream of smoke detector sampling tubes.
 - 6. At maximum 20 foot intervals and at the base of each vertical riser in horizontal return air, exhaust air and fresh air intake ductwork, in accordance with NFPA 90A.
 - 7. At any location where a duct mounted component required access for maintenance or service.
 - 8. Access doors less than 12 inches square shall be secured with sash locks. Access doors up to 18 inches square shall have 2 hinges and 2 sash locks. Access doors larger than 18 inches square shall have 3 hinges and 2 compression latches.

2.2 AIR DEVICES

- A. Aluminum Backdraft Damper:
 - 1. Provide low leakage backdraft damper. Leakage rate shall be less than 12 CFM per square foot at 1/2" W.G.
 - 2. Frame construction shall be extruded aluminum with .09" wall thickness.
 - 3. Linkage shall be 1/8" x 1/2" aluminum tie bars concealed in frame with Zytel bearings.
 - 4. Blades shall be .025" formed aluminum with overlapping vinyl edge seals.
 - 5. Temperature range shall be -40°F to +200°F.
 - 6. Units shall be Ruskin Model BD2/A1.
- B. Fire Dampers:
 - 1. Fire dampers shall be installed to comply with NFPA Code No. 90A for 2 hour fire wall or 3 hour fire wall, refer to Architectural drawings. Each unit shall bear a U.L. label in accordance with the latest version of UL 555.
 - 2. Fire dampers at ceiling diffusers shall be specifically listed and designed for such use and shall have 1-1/2 hour minimum rating. Fusible element shall be accessible by removing ceiling diffuser. Model shall be Ruskin CFD5 or equal. Provide ceramic fiber thermal blanket as indicated.
 - 3. Fire dampers to be equal to Ruskin. All blades shall be spring loaded and located outside the air stream. Provide types as shown and required. Provide wall sleeves as shown and required. Provide accessible insulated doors in duct at all fire dampers.
 - 4. Transfer grilles with no ductwork shall have Ruskin model IBDT or equal thinline dampers where indicated on the plans.
 - 5. Fire dampers shall be dynamic type suitable for activation with airflow.
- C. Volume Dampers: Provide volume dampers at each branch take off for supply, return, exhaust and outside air ducts. Dampers shall be located as close to main duct as possible.
 - 1. Round Volume Dampers: In lieu of butterfly type dampers Ruskin "Iris" calibrated dampers are acceptable. IRIS damper frame shall be 22 gage steel or 316 stainless (as called for on schedules). Frame shall fully encapsulate IRIS blade segments, holding

them firmly into position, and have rolled mounting beads to increase the overall strength of the assembly. Full circumference duct seal shall be furnished on the air entering and air leaving side of the frame to insure a tight duct connection. Casing leakage shall not exceed 6 cfm. IRIS blade segments shall be internally linked and driven by a factory calibrated manual adjustment knob. All linkage parts shall be fully encapsulated and out of the air stream for years of dependable, maintenance-free operation. Manual adjustment knob shall be calibrated to the exact aperture position and aligned with the K factor set point to provide linear response flow control. Flow measurement shall be +/- 5%. Assembled units shall be furnished with specific charts designed for the exact size and blade aperture configuration. Air pressure taps shall be integral to the damper frame and positioned on either side of the IRIS blade segments. The damper shall have minimal self-generated noise characteristics as detailed on published sound data to be included with submittals. Damper in all respects shall be equivalent to Ruskin Model VFBD35.

2. Dampers Adjacent to Supply Grilles: Provide Young Regulator model 820 volume dampers for locations close to supply grilles to minimize noise at the grille.

D. Brickvents

1. General - Brickvents shall be provided as a portion of this Contract. Pressure drop shall not exceed 0.1 inches of water for a 16"x8" unit at 400 cfm or for a 16"x5" unit at 260 cfm..
2. Materials - All brickvents shall be constructed of extruded aluminum blades and channels. Units shall not be provided with insect screens.
3. Finish - Brickvents shall have a Kynar finish.
4. Brickvent Type - Unit shall be 4 inch thick, equal to Penn model B100 or B68 as indicated on the drawings. Brickvents of other manufacturers are acceptable providing free area, performance, and construction are similar.

2.3 DIFFUSERS, GRILLES AND REGISTERS

- A. Install grilles and registers at the air supply, return and exhaust openings and as shown on the Drawings. The equipment schedule is based generally on model numbers of Metalaire to establish a standard of quality; units of equal distribution, air throw and noise generated as manufactured by Tuttle and Bailey, Titus, Anemostat or equal are acceptable. Units to be provided with white baked enamel finish as noted.

B. Supply Air:

1. 5500-2 square and rectangular ceiling diffusers, extruded aluminum, removable fixed pattern louvered core, straight deflector blades (without a horizontal lip), beveled overlap margin, white paint finish.
2. 5500-6 square and rectangular ceiling diffusers, extruded aluminum, removable fixed pattern louvered core, straight deflector blades (without a horizontal lip), lay-on extension panel for 24"x24" T-bar ceilings, white paint finish.
3. 5500S – Same as 5500 only steel construction.
4. V4004/H4004 supply grilles, double deflection, adjustable louvers, extruded aluminum.
5. V4004S/H4004S same as V4004/H4004 only with steel frame.
6. Registers - Same as V4004/H4004 with opposed blade damper.
7. 6600 series linear slot diffuser suitable for sidewall mounting, extruded aluminum, white finish, directional pattern control.

C. Return/Exhaust Air

1. CC5-1 grille with 1/2"x-1/2"x1/2" grid core, aluminum construction, white finish, suitable for surface mount.
2. CC5-6 grille similar to GC5 with flat border for lay-in ceiling.
3. H4002RS-1 grille, formed steel, fixed horizontal bars on .666" centers, 40° deflection or 0° deflection as indicated on schedule.
4. H4002R-1 same H4002RS-1 only aluminum.
5. Registers - Same as 4538 or H4002R-1 with opposed blade damper.

PART 3 - EXECUTION

3.1 GENERAL

- A. All work shall conform to ASHRAE duct construction recommendations, SMACNA "Low Velocity Duct Construction Standards", and applicable NFPA requirements (see Table #2).
- B. Ducts: The size of ducts as marked on the drawings will be adhered to as closely as possible. The right is reserved by the Engineer to vary the sizes of ducts to accommodate structural conditions during the progress of the work without additional cost to the Owners. The duct layout is schematic to indicate size and general arrangement only. Sizes given are "inside clear" dimensions. All ducts shall be arranged to adjust to "field conditions". The ductwork trade shall coordinate his work with other trades.
- C. All dampers, grilles, registers, ducts, air handling units and fans shall be adjusted to the satisfaction of the Engineer, to obtain an even distribution of the air throughout the system. All of the supply outlets and exhaust registers must be balanced to the air volumes shown to produce the required results. A copy of the balancing report shall be submitted to the Engineer for approval.
- D. On larger ducts all protruding edges and corners shall be rounded and/or turned down to eliminate a potential hazard to workers around ductwork.
- E. Indoor Air Quality: The interior of the duct system and all equipment shall be kept free from dirt, rubbish, etc., during construction. This includes but is not limited to sealing open ductwork, air handling units, fans, fan-coil units, unit ventilators, blower coils etc with polyethylene. No air moving equipment shall be started until construction has been completed to a point such that airborne construction dust is no longer present. At completion of the project, the Contractor shall thoroughly clean all equipment, ductwork, etc., to the satisfaction of the Engineer. If it is determined by the Engineer that the ductwork or air moving equipment contains a significant amount of dust or debris the Contractor shall have, at the contractors expense, the ductwork and equipment cleaned by a recognized duct cleaning contractor approved by the Engineer.
- F. Duct Sealing: Thoroughly clean all new and existing ducts prior to the application of sealant. Seal all transverse joints, longitudinal seams and duct wall penetrations ducts in accordance with SMACNA, Seal Class A. Apply sealant in accordance with the manufacturer's recommendations.
- G. Louvers / Brickvents: The bottom of all ductwork connecting to louvers and brickvents shall slope such that any water entering the unit will drain out off the unit. All ductwork shall be sealed water tight for the last 7 feet of duct up to the louver or brickvent.

END OF SECTION

SECTION 23 34 00 – HVAC FANS

PART 1 - GENERAL

1.1 SECTION INCLUDES

- A. The work of this section includes, but is not limited to the following:

1. Ventilation fans.

1.2 RELATED SECTIONS

1. Section 23 00 10, Basic HVAC Requirements.
2. Section 23 05 00, Common Work Results for HVAC.
3. Section 23 30 00, HVAC Air Distribution.

1.3 SUBMITTALS

- A. Submit in accordance with Section 23 00 10.
- B. Product Data: Provide catalog data for the following:
1. Ventilation Fans: Submittals shall include fan curves, CFM, SP, motor horsepower, voltage, size, color, model number, sound data, dimensions and all applicable accessories.

PART 2 - PRODUCTS

2.1 VENTILATION FANS

- A. Acceptable Manufacturers:
1. Penn, Cook, Acme, Greenheck
- B. General: Provide return and exhaust fans with the capacities and of the types shown on the drawings.
1. All fans shall carry the AMCA Certified rating seal and shall be zone rated in accordance with AMCA Bulletin 300, when so indicated.
 2. Direct drive fans shall have performance similar to that shown. If performance is higher, provide a speed control for mounting at fan.
 3. Provide motors with thermal overload protection.
 4. All fans shall be provided with a readily visible label for identification including fan tag and room serviced.
 5. Fans with ECM motors shall either be "external speed control" for variable speed control or "motor mounted speed control" for balancing purposes only, as indicated.
 6. Fans shall be capable of performing at the capacity indicated on the "Fan Schedule". If the "Balance CFM" is less than the fan "CFM" on the schedule, the fan must perform at the larger of the two.

- C. Ceiling/Wall Cabinet Fans - Fans shall include an insulated housing, back draft damper, centrifugal fan wheel, aluminum grille and flange, terminal box, motor and disconnect plug. Fan speeds shall not exceed 1500 RPM.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Provide flexible connections at all fans.
- B. Fans shall not be operated until construction is complete. Prior to operation it shall be verified that all ductwork, diffusers and filters (where applicable) are clean.
- C. Verify all electrical characteristics are correct and the fan is rotating properly.

END OF SECTION

SECTION 23 72 00 – HEAT RECOVERY UNITS

PART 1 - GENERAL

1.1 SECTION INCLUDES

- A. The work of this section includes, but is not limited to the following:

1. Heat Recovery Units.

1.2 RELATED SECTIONS

1. Section 23 00 10, Basic HVAC Requirements.
2. Section 23 05 00, Common Work Results for HVAC.
3. Section 23 30 00, HVAC Air Distribution.
4. Section 23 21 13, Heating and Cooling Hydronic Piping.

1.3 SUBMITTALS

- A. Submit in accordance with Section 23 00 10.
- B. Product Data: Provide catalog data for the following:
1. Heat recovery units including but not limited to: construction, dimensions, size, weight, heating and/or cooling capacity, CFM, GPM, APD, sound data, fan motor horsepower, voltage, filter efficiency, filter, heat recovery efficiency, all entering and leaving temperatures and coil areas.
 2. All applicable accessories.

PART 2 - PRODUCTS

2.1 HEAT RECOVERY UNIT

- A. General: Energy Recovery Ventilator (ERV) shall be a packaged unit as manufactured by RenewAire or equal and shall transfer both heat and humidity using static plate core technology.
- B. Quality Assurance
1. The energy recovery ventilator shall be Certified by the Home Ventilating Institute (HVI) under CSA 439. Both a heating and a cooling test must be run to demonstrate year round energy recovery.
 2. Manufacturer shall be able to provide evidence of independent testing of the core by Underwriters Laboratory (UL), verifying a maximum flame spread index (FSI) of 25 and a maximum smoke developed index (SDI) of 50 thereby meeting NFPA 90A and NFPA 90B requirements for materials in a compartment handling air intended for circulation through a duct system. The method of test shall be UL Standard 723.

3. Unit shall be Listed under UL 1812 Standard for Ducted Air to Air Heat Exchangers. The unit must pass commercial flammability requirements and shall not be labeled "For Residential Use Only".
4. The ERV core shall be warranted to be free of manufacturing defects and to retain its functional characteristics, under circumstances of normal use, for a period of ten years from the date of purchase. The balance-of-unit shall be warranted to be free of manufacturing defects and to retain its functional characteristics, under circumstances of normal use, for a period of five years from the date of purchase.

C. Performance

1. Energy Transfer: The ERV shall be capable of transferring both sensible and latent energy between airstreams. Latent energy transfer shall be accomplished by direct water vapor transfer from one airstream to the other, without exposing transfer media in succeeding cycles directly to the exhaust air and then to the fresh air.
2. Passive Frost Control: The ERV core shall perform without condensing or frosting under normal operating conditions (defined as outside temperatures above -10°F and inside relative humidity below 40%). Occasional more extreme conditions shall not affect the usual function, performance or durability of the core. No condensate drains will be allowed.
3. Continuous Ventilation: Unit shall have the capacity to operate continuously without the need for bypass, recirculation, pre-heaters, or defrost cycles under normal operating conditions.
4. Positive Airstream Separation: Water vapor transfer shall be through molecular transport by hygroscopic resin and shall not be accomplished by "porous plate" mechanisms. Exhaust and fresh airstreams shall travel at all times in separate passages, and airstreams shall not mix.
5. Laminar Flow: Airflow through the ERV core shall be laminar over the products entire operating airflow range, avoiding deposition of particulates on the interior of the energy exchange plate material.

D. Product Construction

1. The energy recovery component shall be of fixed-plate cross-flow construction, with no moving parts.
2. No condensate drain pans or drains shall be allowed and unit shall be capable of operating in both winter and summer conditions without generating condensate.
3. The unit case shall be constructed of 24-gauge steel, with lapped corners and zinc plated screw fasteners. The case shall be finished with textured, powder coat paint (GR90 case shall be constructed of G90 galvanized steel.)
4. Access doors shall provide easy access to blowers, ERV cores, and filters. Doors shall have an airtight compression seal using closed cell foam gaskets.
5. Case walls and doors shall be fully insulated with 1 inch, expanded polystyrene foam insulation faced with a cleanable foil face on all exposed surfaces.
6. The ERV cores shall be protected by a MERV-8 rated, spun polyester, disposable filter in both airstreams.
7. The unit shall have a line-cord power connection and be supplied with an internal 24 VAC transformer and relay (G90 shall have hardwired line voltage connection and be controlled by line voltage controls provided by others.)
8. Standby power draw shall not exceed 1 Watt for the unit along with an optional automatic control.

E. Options

1. Provide unit and duct connection orientation per project schedule.
2. Double wall construction with 24-gauge galvanized steel liner.
3. MERV-13 filters for final installation after construction phase.
4. Electric duct coil and SCR controller with discharge duct sensor
5. 8" wall caps for outside air and exhaust
6. Programmable 24/7 time clock

F. Installation

1. Unit Location: Locate and orient unit to provide the shortest and most straight duct connections. Provide service clearances as indicated on the plans. Locate units distant from sound critical occupancies. Use integral mounting flange and hanging bar system to mount the unit to a structurally suitable surface. The units may be mounted in any orientation.
2. Vibration Isolation: Utilize factory supplied vibration isolation kit following instructions. Provide flexible duct connections at unit duct flanges.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Coordinate with other trades and verify that structure is ready to receive work and wall openings are correctly sized.
- B. Indoor Installation
 1. Units may be directly mounted on the floor, suspended on a platform, or hung from solid threaded rod attached to the unit shipping support brackets.
 2. Once in final position, make sure that the unit is level. Use shims if necessary.
 3. Installation must be in accordance with standard air handling structural weight and vibration isolating procedures and requirements.
- C. Provide flexible connectors at all duct connections.

END OF SECTION

SECTION 23 81 26 – SPLIT SYSTEM AIR CONDITIONING EQUIPMENT

PART 1 - GENERAL

1.1 SECTION INCLUDES

- A. The work of this section includes, but is not limited to the following:

1. Ductless split system heat pumps.

1.2 RELATED SECTIONS

1. Section 23 00 10, Basic HVAC Requirements.
2. Section 23 05 00, Common Work Results for HVAC.
3. Section 23 30 00, HVAC Air Distribution.
4. Section 23 21 13, Heating and Cooling Hydronic Piping.

1.3 SUBMITTALS

- A. Submit in accordance with Section 23 00 10.
- B. Product Data: Provide catalog data for the following:
1. Air handling units or fan coil units including but not limited to: construction, dimensions, size, weight, heating and/or cooling capacity, CFM, GPM, APD, sound data, fan motor horsepower, voltage, filter efficiency, filter and coil areas.
 2. Air-cooled condensing units.
 3. All applicable accessories.

PART 2 - PRODUCTS

2.1 MINI SPLIT HEAT PUMP SYSTEM

- A. System Description / Type:
1. MXZ Branch Box: The heat pump, **hyper heat**, air conditioning system shall be a Mitsubishi Electric MXZ-SM variable capacity multi-zone series. The system shall consist of two (2), three (3), four (4), five (5), six (6), seven (7), or eight (8) wall mounted, ceiling suspended, ceiling recessed, horizontal ducted, floor standing, and/or multi-position ducted indoor units with a wired or wireless remote controller, connected to a compact horizontal discharge outdoor unit which shall be of an inverter driven heat pump design.
 2. MXZ Ported: The heat pump air conditioning system shall be a Mitsubishi Electric MXZ-C variable capacity multi-zone series. The system shall consist of two (2), three (3), four (4) or five (5) wall mounted, ceiling suspended, ceiling recessed, horizontal ducted, floor standing and/or multi-position ducted indoor units with a wired or wireless remote controller, connected to a compact horizontal discharge outdoor unit which shall be of an inverter driven heat pump design.

3. MUZ-FS/MSZ-FS: The heat pump air conditioning system shall be a Mitsubishi Electric MSZ-FS split system series. The system shall consist of a slim silhouette, compact, wall mounted indoor fan coil section with wireless remote controller and a slim silhouette horizontal discharge outdoor unit which shall be of an inverter driven heat pump design.
4. MUFZ-KJ/MFZ-KJ: The heat pump air conditioning system shall be a Mitsubishi Electric MFZ split system series. The system shall consist of a compact, floor mounted indoor fan coil section with wireless remote controller and a slim silhouette horizontal discharge outdoor unit which shall be of an inverter driven heat pump design.
5. MUZ-GL/MSZ-GL: The heat pump air conditioning system shall be a Mitsubishi Electric MSZ-GL split system series. The system shall consist of a slim silhouette, compact, wall mounted indoor fan coil section with wireless remote controller and a slim silhouette horizontal discharge outdoor unit which shall be of an inverter driven heat pump design.
6. MUZ-HM/MSZ-HM: The heat pump air conditioning system shall be a Mitsubishi Electric MSZ-HM split system series. The system shall consist of a slim silhouette, compact, wall mounted indoor fan coil section with wireless remote controller and a slim silhouette horizontal discharge outdoor unit which shall be of an inverter driven heat pump design.
7. MUZ-WR/MSZ-WR: The heat pump air conditioning system shall be a Mitsubishi Electric MSZ-WR split system series. The system shall consist of a slim silhouette, compact, wall mounted indoor fan coil section with wireless remote controller and a slim silhouette horizontal discharge outdoor unit which shall be of an inverter driven heat pump design.
8. MUZ-JP/MSZ-JP: The heat pump air conditioning system shall be a Mitsubishi Electric MSZ-JP split system series. The system shall consist of a slim silhouette, compact, wall mounted indoor fan coil section with wireless remote controller and a slim silhouette horizontal discharge outdoor unit which shall be of an inverter driven heat pump design.
9. SUZ: The heat pump air conditioning system shall be a Mitsubishi Electric M-Series variable capacity mini-split type. The system shall consist of a combination of an indoor unit with a remote controller connected to a compact horizontal discharge outdoor unit which shall be of an inverter driven heat pump design.
10. MUY-GL/MSY-GL: The heat pump air conditioning system shall be a Mitsubishi Electric MSY-GL split system series. The system shall consist of a slim silhouette, compact, wall mounted indoor fan coil section with wireless remote controller and a slim silhouette horizontal discharge outdoor unit which shall be of an inverter driven heat pump design.
11. PUZ Series: The heat pump air conditioning system shall be a Mitsubishi Electric split system with Variable Speed Inverter Compressor technology. The system shall consist of a horizontal discharge, single phase outdoor unit, a matched capacity indoor section that shall be equipped with a wired wall-mounted, wireless wall-mounted, wireless handheld, or other remote controller.
12. PUY Series: The air conditioning system shall be a Mitsubishi Electric split system with Variable Speed Inverter Compressor technology. The system shall consist of a horizontal discharge, single phase outdoor unit, a matched capacity indoor section that shall be equipped with a wired wall-mounted, wireless wall-mounted, wireless handheld, or other remote controller.

PART 3 - EXECUTION

3.1 GENERAL

- A. Coordinate with other trades and verify that structure is ready to receive work and wall openings are correctly sized.
- B. Provide flexible connections at all ductwork connections.
- C. ACCU units are to be mounted on a concrete pad for ground installations and on 4"x4" sleepers on rooftop installations.

END OF SECTION

SECTION 23 82 36 – RADIATION

PART 1 - GENERAL

1.1 SECTION INCLUDES

- A. The work of this section includes, but is not limited to the following:

1. Electric baseboard

1.2 RELATED SECTIONS

1. Section 23 00 10, Basic HVAC Requirements.
2. Section 23 05 00, Common Work Results for HVAC.
3. Section 23 21 13, Heating and Cooling Hydronic Piping.

1.3 SUBMITTALS

- A. Submit in accordance with Section 23 00 10:
- B. Product Data: Provide catalog data for the following:
1. Radiation including but not limited to: construction, dimensions, size, heating capacity GPM, quantity and color.

PART 2 - PRODUCTS

2.1 RADIATION

- A. **General: It is the Mechanical Contractors responsibility to coordinate the mounting height of radiation with the electrician for coordination with electrical outlets including but not limited to receptacles, data and communication outlets.**
- B. Electric Baseboard (EBB)
1. Units shall be UL approved. Installation shall conform to the National Electrical Code and applicable local codes and regulations.
 2. EBB shall be manufactured by Berko, Qmark, Chromalox or Federal Pacific.
 3. Unit capacity, style and type shall be as shown on the Drawings. Twenty-two gauge, cold-rolled steel front cover shall be of a snap on design to provide easy access. Enclosure shall be painted with baked enamel finish. Terminal boxes shall be provided on both the left and right sides of units. Terminal boxes shall be fitted with a cover. Heating elements shall be aluminum sheathed with aluminum fins pressure bonded to element. Each baseboard electric heater shall be provided with a factory installed, linear type thermal protector. Unit shall be supplied with line voltage double pole thermostat with by-metal sensor and snap action switch to be mounted in junction box.

END OF SECTION

SECTION 23 82 39 – HEATERS

PART 1 - GENERAL

1.1 SECTION INCLUDES

- A. The work of this section includes, but is not limited to the following:

1. Electric Heaters

1.2 RELATED SECTIONS

1. Section 23 00 10, Basic HVAC Requirements.
2. Section 23 05 00, Common Work Results for HVAC.
3. Section 23 21 13, Heating and Cooling Hydronic Piping.

1.3 SUBMITTALS

- A. Submit in accordance with Section 23 00 10.
- B. Product Data: Provide catalog data for the following:
1. Unit heaters cabinet unit heaters and toe space heaters including but not limited to: construction, dimensions, size, weight, configuration, heating, CFM, GPM, APD, sound data, fan motor horsepower, color, voltage, filter efficiency, filter and coil areas.
 2. All applicable accessories.

PART 2 - PRODUCTS

2.1 ELECTRIC WALL HEATERS

- A. General: The heating equipment shall include an electric automatic fan forced air heater suitable for small area heating, as manufactured by QMark®, a Marley Engineered Products® Brand, Bennettsville, SC. Or equal. The heater shall be designed for wall mounting, recess or surface. Heaters shall be cETLus listed.
- B. Back Box: The back box shall be designed as a recessed rough-in box in either masonry or frame installations and is also used when surface mounting frames are used in surface mounting installations. The back box shall be heavy gauge galvanized steel and shall contain knockouts through which power leads enter.
- C. Inner Frame Assembly: The heater assembly, which fits into the back box, shall consist of a heavy gauge steel fan panel to which all of the operational parts of the heater are mounted. The inner frame assembly shall be completely pre-wired.
- D. Heating Element: The heating element shall be of the non-glowing design consisting of an 80/20 nickel-chromium resistance wire enclosed in a steel sheath to which plate fins are copper

brazed. The element shall cover the entire air discharge area to ensure uniform heating of all discharged air. It shall be warrantied for 5 years.

- E. On/Off Switch: A double-pole, single throw on/off switch shall be mounted on the back box for positive disconnect of power supply. It will be completely concealed behind the front cover.
 - F. Motor And Controls: The fan motor shall be impedance protected, permanently lubricated. Fan control shall be of the bi-metallic, snap-action type and shall activate fan after heating element reaches operating temperature, and continue to operate the fan after the thermostat is satisfied and until all heated air has been discharged. The thermostat shall be single-pole type on all models. Thermal cutout shall be self-hold (manual-reset) type designed to shut off heat in the event of overheating. The fan shall be four-bladed aluminum. A back-up (End of Life) thermal fuse shall be provided for additional safety.
 - G. Surface Mounting Frame: The surface mounting frame shall be of heavy gauge steel designed to mount around the back box for a finished surface installation. Slot knock outs shall be provided for power supply conduit.
 - H. Front Cover: The louvered front cover shall be of heavy gauge steel with a powder paint finish. A plug button will be provided to replace the thermostat knob and render the unit tamper-resistant.
- 2.2 Finish: All sheet metal parts, except the galvanized steel back box, shall be phosphatized, then completely painted by a powder paint process.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Mount units level.
- B. Provide flexible connectors for duct connections for ducted units.
- C. Support cabinet unit heaters with RIS vibration isolators.

END OF SECTION

SECTION 26 00 10 – BASIC ELECTRICAL REQUIREMENTS

PART 1 - GENERAL

1.1 SUMMARY

- A. Summary of Electrical Work: The electrical work includes, but is not limited to, the following:
 - 1. Underground duct bank for primary electric service and telecommunications and concrete foundation for pad mounted transformer.
 - 2. Site underground wiring.
 - 3. Underground secondary electric service and distribution.
 - 4. Grounding System.
 - 5. Roughing in and branch circuit wiring.
 - 6. Interior and Emergency Lighting System.
 - 7. Emergency generator automatic transfer equipment.
 - 8. Telecommunications Wiring System.
 - 9. Coordination with mechanical subcontractor including supervision of HVAC temperature control system wiring work.
 - 10. Other work as required to provide a complete and operating system.
- B. Site Inspection: Visit the site, before submitting bid, to become familiar with the procedural manner, materials, labor, quantities, and expenses involved in completing the work. No allowances for extra work will be granted to accomplish these ends if the need for which could have been foreseen or anticipated by such a visit.
- C. Allowance: Refer to SECTION 01 "Allowances".
 - 1. Allowance includes payment to Versant Power, and Consolidated Communications for installation of distribution conductors, service connections, and equipment to the building and site.
- D. Alternates
 - 1. Alternates quoted on Bid Forms will be reviewed and accepted or rejected at the Owner's option. Accepted Alternates will be identified in Owner-Contractor Agreement.
 - 2. Coordinate related work and modify surrounding work as required.
 - 3. Schedule of Alternates:
 - a. Under Alternate #2 the DMR Office vestibule is deleted. Under Alternate #2 relocate the electric strike and proximity card reader to exterior Door #3.
- E. Related Sections:
 - 1. Drawings, Division 00, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUBMITTALS

- A. Submit under procedures given in Section 01 33 00.
- B. Submit shop drawings in electronic form, with product data grouped in sets to include complete submittals of related systems, products, and accessories in a single submittal. Clearly indicate each submittal with appropriate specification section and paragraph reference.
- C. Mark dimensions and values in units to match those specified.

- D. Electrical submittals shall be reviewed by, and carry the approval stamp of, the electrical subcontractor.
- E. Submit certificate of final inspection and approval from authority having jurisdiction, and record electrical drawings.
- F. Upon request, provide samples for inspection. Samples will be returned after inspection is completed.
- G. Manual: Upon completion of this portion of the Work, and as a condition of its acceptance, deliver to the Engineer for the Owner two copies of a manual describing the system:
 - 1. Provide manuals in durable plastic ring binders, nominal 8½ x 11" size.
 - 2. Identification on, or readable through, the front cover stating general nature of the manual.
 - 3. A copy of all reviewed submittals and shop drawings.
 - 4. Complete instructions regarding operation and maintenance of all equipment involved.
 - 5. Complete name and address of nearest vendor of replaceable parts.
 - 6. Copy of all guarantees and warranties issued.
 - 7. Where contents of manuals include manufacturer's catalog pages, clearly indicate the precise items included in this installation.

1.3 QUALITY ASSURANCE

- A. Regulatory Requirements:
 - 1. Electrical: Conform to ANSI/NFPA 70, National Electrical Code.
 - 2. Utility: Conform to the standards of:
 - a. Versant Power
 - b. Consolidated Communications
 - 3. Obtain permits and request inspections from local building inspector.
- B. Electrical materials, devices, and equipment shall be new. Where standards have been established by the following, they shall conform to those standards as to quality, fabrication, application, and installation and be not less than further required under this specification.
 - 1. Underwriters Laboratories, Inc. (UL).
 - 2. National Electrical Manufacturers Association (NEMA).
 - 3. American National Standards Association (ANSI).
 - 4. National Fire Protection Association (NFPA).
 - 5. Occupational Safety and Health Administration (OSHA).
 - 6. National Electrical Contractors Association (NECA).
 - 7. Consolidated Communications.
 - 8. Versant Power; "utility company."
 - 9. Standards of local Building Codes, Electrical, and Fire Departments, Town of Lamoine.

1.4 WORK SEQUENCE & COORDINATION

- A. Install work under this section so as to conform to the progress of the work of other sections. Complete the electrical work as soon as conditions of the building will permit.
- B. Coordinate in advance with other trades the shape, size and position of all necessary openings, sleeves, supports and related and coordinate electrical installation with mechanical equipment, piping and ductwork to avoid conflicts and to provide electric service and wiring as required for a complete and operating system.

- C. Refer to Division 23 for electrical work required for mechanical. Prior to roughing in, verify that the electrical characteristics of the mechanical equipment being provided are compatible with the electric power circuits specified; if in doubt consult Engineer.
- D. Wiring for H&V temperature controls is specified under Division 23 but shall be supervised by and wired to the standards of this section. Coordinate electrical work with controls requirements to provide a complete and operating system.
- E. Supervise installation of wiring provided under Division 23 to ensure that such wiring is installed according to the standards of Division 26. Report discrepancies to Engineer.

1.5 WIRING STANDARD

- A. Follow wiring coding as indicated on the drawings. Use only the approved wiring methods for circuit applications as indicated in Table 1 (unmarked items are not permitted):
- B. Where specifically detailed on drawings, follow wiring method indicated.
- C. In the event an application location is encountered that is not listed in the wiring standards, consult Engineer for instructions.

TABLE 1

		Building Wire & Cables in Raceway							Cable	
	Application Location	RSC	EMT	PVC	Cable Tray	Surface Raceway	Liquidtight	Flex	MC	NM
1	Underground, 5' away from foundation - Primary, no concrete - Secondary, no concrete	SFBC		BC SFBC SF						
2	In/under concrete slab to 5' away from foundation	SFBC		SFBC						
3	In slab above grade	BC		BC						
4	Exposed outdoor	SFBC								
5	Wet Interior	SFBC	SFBC							
6	Concealed dry interior Wall stud spaces Ceiling void	FBC FBC	FBC FBC						BC BC	BC BC
7	Accessible dry interior Ceiling void Lighting fixture whip Casework	SFBC	FBC				BC BC	BC BC	BC BC BC	
8	Exposed dry interior Finished space Unfinished space	SFBC	BC			BC				
9	Motor/equipment connection						B	B	B	

Key: S=Secondary Service, F=Feeders, B=Branch Circuits, C=Control Circuits

1.6 SUBSTITUTIONS

- A. Any proposal for a substitution shall be made in writing, including full details for consideration by Engineer. Substitutions will be permitted only by written acceptance of the Engineer.
- B. Acceptance of a proposed substitution by the Engineer shall not relieve the Contractor from his responsibility to provide a satisfactory installation of the Work in accordance with the intent of the plans and specifications and shall not affect his guarantee covering all parts of the work.
- C. Any material or equipment submitted for acceptance which is arranged differently or of a different physical size from that shown or specified shall be accompanied by shop drawings indicating the different arrangements of size and the method of making the various connections to the equipment. The final results shall be compatible with the system as designed.
- D. Electrical materials and equipment have generally been specified by referencing one or more manufacturer's standard product. Materials of similar quality by listed "Acceptable Manufacturers" will generally not be considered a substitute and will be reviewed for conformance with these specifications. Materials not of similar quality, or by manufacturers not listed as acceptable, will be considered a substitute.
- E. In the event a proposed substitution for material or equipment has been rejected, Engineer will only review subsequent submittals for that material or equipment that are not substitutes.

1.7 ENGINEER/ARCHITECT

- A. The term "Engineer" shall refer to the electrical consulting engineer whose seal appears on the electrical drawings for this project and, for the purposes of contractual matters, shall be synonymous with the term "Architect" or "Architect/Engineer."

1.8 PROJECT/SITE CONDITIONS

- A. Install work in locations shown on drawings, unless prevented by project conditions.
- B. Prepare drawings showing proposed rearrangement of work to meet project conditions, including changes to Work specified in other sections. Obtain permission of Engineer before proceeding.

1.9 WORKMANSHIP

- A. Workmanship shall be by licensed electricians well skilled in the trade. A Master Electrician licensed in the State of Maine shall be on site and supervise all work.
- B. Install all work according to the best practices of the trade and in accordance with NECA -1-2000, "Standard Practices for Good Workmanship in Electrical Construction."
- C. In the event of a conflict with required codes or an obvious misapplication of equipment, material, wiring practice, or other installation, before proceeding, promptly notify the Engineer. In no event shall any work be installed that is contrary to applicable codes.

1.10 DEVIATIONS AND DISCREPANCIES

- A. The drawings are intended to indicate only diagrammatically the extent, general character, and approximate locations of the electrical work. Work indicated, but having minor details obviously omitted, shall be furnished complete to perform the functions intended without additional cost to the Owner. Follow the architectural, structural, and mechanical drawings so that work under this section is properly installed and coordinated with other sections.

- B. The drawings and specifications are complementary each to the other and what is called for in one shall be as binding as if called for by both. In the event of conflicting information on the electrical drawings, or between or within drawings and specifications, or between trades, that which is better, best, most stringent, or most expensive will govern, except as may otherwise be permitted by Engineer.
- C. Bidders shall study plans and specifications and in the event there are any apparent errors, omissions, conflicts, or ambiguities, shall contact Engineer for clarification prior to submitting their bid.

1.11 TEMPORARY LIGHT AND POWER

- A. Arrange for, obtain permits, and provide temporary lighting and power for the duration of the project. Electric energy consumed under this provision will be paid for by the Owner or General Contractor.
- B. Provide lighting stringers and lamps to provide reasonable general illumination (20 footcandles) in work areas, plus task lighting as needed, outlets for hand tools at accessible locations reasonably spaced (within 40 feet of all work areas), power for motors not larger than 1.5 hp each, and cooperate with trades in other sections to provide adequate temporary facilities.
- C. The use of electric heaters for temporary heating is prohibited.
- D. Conform to NFPA 70, OSHA regulations, and other codes and agencies having jurisdiction.
- E. Coordinate to provide wiring for welding and larger motors or unusual lighting under other sections as needed.
- F. Remove all temporary wiring as soon as possible after it is no longer needed.

1.12 CHANGE ORDERS

- A. No change shall be made from the work, equipment, or materials under this section except as directed in writing by Engineer.
- B. All requests for change in contract price and scope shall be accompanied by a breakdown list of materials with unit and extended prices and labor hours with unit and extended price, plus markups that have been applied.

1.13 RECORD DRAWINGS

- A. Keep in good condition at the job, apart from all other prints used in actual construction, one complete set of diazo blue-line or white print electrical drawings. Record on these drawings, completely and accurately, any and all differences between the work as actually installed and the design as shown on the drawings. Record all changes within one week of the time that the changes are authorized. Record drawings shall be maintained in site construction office and be available for inspection by Engineer. At the completion of the work, deliver Record Drawings in accordance with requirement for submittals.

1.14 TESTING AND TRAINING

- A. Conduct operating test for approval in presence of Engineer. The electrical work shall be demonstrated to operate as specified. Furnish instruments, materials, and personnel required for tests. Notify Engineer at least 10 days in advance of proposed test date.

END OF SECTION

SECTION 26 05 00 - BASIC ELECTRICAL MATERIALS AND METHODS

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Existing work
2. Grounding and bonding
3. Connection of utilization equipment
4. Supports
5. Identification
6. Conduit and fittings
7. Wireway
8. Underground electrical
9. Electrical boxes
10. Wire and cable
11. Cords and caps
12. Wiring devices
13. Electrical tape
14. Terminations
15. Firestopping

B. Related Sections:

1. Drawings, Division 00, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.
2. Section 26 00 10, Basic Electrical Requirements.
3. Section 31 23 00, Earthwork for Utilities.
4. Section 03 30 00, Cast-in-Place Concrete.

1.2 REFERENCES

- A. Conform to requirements of National Electrical Code (NEC) ANSI-C1/NFPA 70-2020
- B. Conform to requirements of National Electrical Safety Code (NESC) ANSI 2007.
- C. Furnish products listed by Underwriters Laboratories, Inc., or other testing firm acceptable to authority having jurisdiction.

1.3 SUBMITTALS

A. Product Data: Provide catalog data for the following:

1. Grounding and bonding devices
2. Supports
3. Anchors
4. Conduit and fittings
5. Wireway
6. Electrical boxes
7. Wire and cable
8. Wiring devices
9. Mounting brackets/ceiling channels

- 10. Firestop Materials
 - 11. Handholes and manholes, access frames and covers
 - 12. Concrete transformer foundation
 - B. Submit product data and shop drawings in electronic form with a separate sheet for each product. Indicate clearly on each sheet product manufacturer, catalog number, product description and other pertinent data.
 - C. Test reports.
 - 1. Grounding system continuity and resistance test.
 - 2. Conductor continuity and insulation resistance test.
- 1.4 PROJECT CONDITIONS
- A. Existing project conditions indicated on drawings are based on casual field observation and existing record documents.
 - B. Verify field measurements and circuiting arrangements are as shown on drawings.
 - C. Verify removal of existing electric work.
 - D. Report discrepancies to Engineer before disturbing existing installation.
- 1.5 COORDINATION
- A. Obtain and review shop drawings, product data, and manufacturer's instructions for equipment furnished under other sections to determine connection locations and requirements.
 - B. Sequence rough-in of electrical connections to coordinate with installation and start up of equipment furnished under other sections.

PART 2 - PRODUCTS

2.1 GROUNDING MATERIALS

- A. Ground Rod: Copper clad steel, 3/4" diameter x 10' length. Die-stamp each near the top with the name or trademark of the manufacturer and the length of the rod in feet. The rods shall have a hard, clean, smooth, continuous, surface throughout the length of the rod.
 - 1. Galvanized steel rods are permitted where required by Utility Company.
- B. Mechanical Connectors: Bronze.
- C. Compression set connectors and components: Burndy "Hyground" compression system, or approved equal.
- D. Thermit Welds: Cadweld.

2.2 BASIC MATERIALS

- A. Steel Channel: Galvanized or painted steel.
- B. Anchors:
 - 1. Masonry Anchors: Rawl-Stud, Lok-Bolt, Saber-Tooth, or equal by Arro, Diamond, or Redhead.
 - 2. Hollow-Wall Anchors: Toggle bolt by Rawl or equal by Arro, Diamond, or Redhead.
 - 3. Anchors shall have sufficient holding power for intended use.

4. Plastic anchors and powder actuated anchors are not permitted.
- C. Miscellaneous Hardware: Treat for corrosion resistance.
- D. Nameplates: Engraved three layer laminated plastic (lamicoid), white letters on black background. Embossed plastic adhesive tape labels, with 3/16" white letters on black background.
- E. Wire and Cable Markers: Cloth markers, split sleeve or tubing type.

2.3 UNDERGROUND STRUCTURES

- A. Handholes and Manholes:
 1. Cast in place or precast reinforced concrete, suitable for AASHTO H-20 wheel loading, construct in accordance with details on drawings. Precast units shall be the product of a manufacturer regularly engaged in the manufacture of these units.
 2. Provide access ladders, cable racks, and pulling-in eyes.
 3. Locate duct entrances at corners to facilitate cable routing. Locate pulling-in eyes on wall opposite each duct entrance.
 4. Metal Frames and Covers: Provide cast iron frames and covers as indicated, Neenah Foundry Co., R-1682 (21") with Type C lid Series heavy duty, or equal. Provide AASHTO H-20 wheel load rating for installation subject to vehicular traffic.
 5. The word "ELECTRIC" shall be embossed in all access covers.
- B. Concrete Transformer:
 1. Cast in place or precast reinforced concrete, construct in accordance with details on drawings. Precast units shall be the product of a manufacturer regularly engaged in the manufacture of these units.
 2. For precast unit, provide lifting lugs in the slab and base. Assemble slab to the base prior to shipping to the site to ensure proper fit with no rocking of the slab on the base.
 3. Locate duct entrances at corners to facilitate cable routing. Locate pulling-in eyes on wall opposite each duct entrance.
- C. Concrete:
 1. Provide in accordance with Section 03 33 00 for Underground Structures.
 2. Provide concrete with 4000 psi, 28 day compressive strength.
 3. Maximum size of coarse aggregate shall be 1".
- D. Reinforcing Steel:
 1. Provide in accordance with Section 03 33 00 for Underground Structures.
 2. Reinforcing bars shall be of 60,000 psi yield strength and conform to ASTM A615.

2.4 METAL CONDUIT

- A. Acceptable Manufacturers:
 1. Allied Tube and Conduit
 2. Wheatland Tube Company
 3. Jones and Laughlin
 4. Republic Steel
 5. Triangle PWC
- B. Conduit:
 1. Metal Conduit and Tubing: Hot dipped galvanized or sheradized steel.

2. Flexible Conduit: Galvanized steel.
3. Liquidtight Flexible Metallic Conduit: Flexible metal conduit with PVC jacket.

2.5 PLASTIC CONDUIT

A. Acceptable Manufacturers:

1. Carlon
2. National
3. American Pipe & Plastics, Inc.

B. Plastic Conduit:

1. Plastic Conduit: NEMA TC 2; PVC. Use Schedule 40 conduit.
2. Liquidtight Flexible Non-Metallic Conduit: Flexible conduit with hard PVC spiral and flexible jacket, Carlon Carflex or approved equal.

2.6 FITTINGS

A. Manufacturers:

1. Appleton
2. Bridgeport
3. O-Z/Gedney
4. Raco
5. Steel City
6. Thomas and Betts
7. Carlon
8. American Pipe & Plastics, Inc.

B. Conduit Fittings:

1. Metal Fittings and Conduit Bodies: NEMA FB 1.
2. Plastic Fittings and Conduit Bodies: NEMA TC 3.
3. Fittings and Conduit Bodies for RSC: Galvanized steel or malleable iron, couplings and fittings threaded.
4. Fittings for EMT: Watertight compression or set screw type as appropriate for the application.
5. Conduit Bodies for EMT: Cast aluminum, galvanized iron or malleable iron bodies.
6. Insulated Bushings: Appleton "BBU".
7. Grounding Bushings: O-Z/Gedney "BLG".
8. Conduit Sealing Bushings: OZ Gedney Type CSB, or approved equal.
9. Fittings for Liquidtight Flexible Metallic Conduit: Galvanized steel or malleable iron, couplings and fittings threaded.
10. Fittings for Liquidtight Flexible Non-Metallic Conduit: High strength, chemical resistant, glass filled thermoplastic compression nut & ferrule assembly, Carlon Carflex or approved equal.
11. Conduit Clamps: Galvanized malleable iron equivalent to O-Z/Gedney 14-G and 15-G Series with clamp back spacer for RSC, and single hole #15-75G malleable or #15-75S galvanized steel clips for EMT.

2.7 ELECTRICAL BOXES

A. Manufacturers:

1. Appleton
2. Crouse Hinds
3. Hoffman
4. Killark
5. Lee Products
6. Raco
7. Square D
8. Steel City

B. Boxes:

1. Sheet Metal: NEMA OS 1; galvanized steel, 4" x 4" x 2" with raised plaster ring and non-gangable 3" H x 3 1/2" D x 2" W per section masonry boxes. Gangable or sectionalizing boxes are not permitted.
2. Cast Metal: Aluminum or cast alloy, deep type "FD", gasket cover, threaded hubs, "Bell" boxes not permitted.
3. Nonmetallic: PVC meeting above size requirements for metal boxes, conforming to UL-514 and NEMA FB-1 and OS 1.

C. Mounting Brackets and Adjustable Ceiling Channels: Galvanized steel of substantial construction to support boxes by bridging between hollow wall studs or ceiling channels, like Caddy #SGB24 screw gun bracket, Caddy #H4 mounting bracket, and B-Line #BA-12 box hanger, or approved equal.

D. Pull Boxes: Code gauge galvanized steel, no prepunched knockouts.

E. Hinged Cover Enclosures: NEMA 250, Type 1, steel enclosure with manufacturer's standard enamel finish and continuous hinge cover, held closed by flush latch operable by screwdriver.

2.8 WIRE AND CABLE

A. Manufacturers:

1. Anaconda
2. Rome Cable
3. General Cable
4. Okonite
5. Phelps Dodge Cable
6. Southwire
7. Triangle PWC
8. Alcan Cable
9. AFC

B. Building Wire:

1. Feeders and Branch Circuits Larger Than 6 AWG: Stranded annealed copper conductor, 600 volt insulation, XHHW, or copper equivalent ampacity annealed Stabiloy compact stranded A.A. 8000 series aluminum alloy, XHHW-2, by Alcan, increase conduit size to accommodate.
2. Feeders and Branch Circuits 6 AWG and Smaller: Annealed copper conductor, 600 volt insulation, THHN/THWN or XHHW, stranded conductor; use compression set terminals.
3. Control Circuits: Copper, stranded conductor, 600 volt insulation, THHN/THWN.

C. Nonmetallic Sheathed Cable:

1. Nonmetallic Sheathed Cable, Size 12 through 4 AWG: Copper conductor, 600 volt insulation, rated 60E C, Type NM and NMC.
2. Underground Feeder and Branch Circuit Cable: Copper conductor, 600 volt insulation, rated 60E C, Type UF.
3. Service Entrance Cable: Copper conductor, 600 volt insulation, XHHW, Type SE and USE.

D. Metal Clad Cable:

1. Metal Clad Cable, Size 12 through 10 AWG: Interlocked galvanized steel armor, stranded annealed copper conductor, 600 volt insulation, rated 60E C, with separate green ground wire, NEC Type MC.

E. Remote Control and Signal Cable:

1. Control Cable for Class 1 Remote Control and Signal Circuits: Copper conductor, 600 volt insulation, rated 60E C, individual conductors twisted together, shielded, and covered with PVC jacket.
2. Control Cable for Class 2 or Class 3 Remote Control and Signal Circuits: Copper conductor, 300 volt insulation, rated 60E C, individual conductors twisted together, shielded, and covered with PVC jacket; UL listed.
3. Plenum Cable for Class 2 or Class 3 Remote Control and Signal Circuits: Copper conductor, 300 volt insulation, rated 60E C, individual conductors twisted together, shielded, and covered with nonmetallic jacket; UL listed for use in air handling ducts, hollow spaces used as ducts, and plenums.

2.9 TAPE AND TERMINATIONS

A. Manufacturers, Tape:

1. 3M Co., Scotch #33 and #88

B. Manufacturers, Terminations:

1. Dossert
2. Ideal
3. 3M Co.
4. Thomas and Betts

C. Wire Connection Devices/Terminations: Compression set or twist-on type with integral molded insulation and internal metallic compression ring or spiral screw-on connecting device. Twist-on type shall be like Ideal "Wing Nut" series. Push-on type wire terminals are not acceptable.

D. Wire Terminals, Butt Splices: Crimp set with integral insulated sleeve, electro tin plated, fully annealed copper.

2.10 WIRING DEVICES AND WALL PLATES

A. Manufacturers:

1. Bryant
2. Hubbell
3. Arrow-Hart
4. Pass and Seymour
5. General Electric

6. Leviton

- B. Wall Switch: AC general use, specification grade, quiet operating snap switch rated 20 amperes and 120/277 volts AC, with plastic toggle handle, ivory color, Hubbell Model 1221.
 - 1. Pilot Light Type: Lighted handle, Model 1221-1L manufactured by Hubbell, or strap mounted lamp in adjacent gang, Model 48071-R manufactured by Bryant.
- C. Receptacle:
 - 1. Provide straight blade receptacles to NEMA WD 1.
 - 2. Provide locking blade receptacles to NEMA WD 5.
 - 3. Convenience Receptacle Configuration, general use: Type 5-20 R, specification grade, plastic face, ivory color, Bryant Model 5352.
 - 4. USB Receptacle: Type A & C USB combination port charging, specification grade, white color, Hubbell Model USB20X2.
 - 5. GFCI Receptacle, general use: Specification grade duplex convenience receptacle with integral ground fault current interrupter, ivory color, Bryant Model GFR53FT.
 - 6. Specific Purpose Receptacle: Configuration indicated on drawings with ivory nylon face.
- D. Decorative Cover Plate: Ivory smooth rigid nylon or high impact plastic.
- E. Weatherproof Covers: Die cast aluminum, gasketed, duplex receptacle cover, weatherproof when attachment plug is inserted.

2.11 CORDS AND CAPS

- A. Straight-blade Attachment Plug: NEMA WD 1.
- B. Locking-blade Attachment Plug: NEMA WD 5.
- C. Attachment Plug Configuration: Match receptacle configuration at outlet provided for equipment.
- D. Cord Construction: Oil resistant thermoset insulated Type SJOW multiconductor flexible cord with identified equipment grounding conductor, suitable for extra hard usage in damp location.
- E. Cord Size: Suitable for connected load of equipment and rating of branch circuit overcurrent protection.

2.12 FIRESTOPPING MATERIALS

- A. Use only through-penetration firestop products that have been tested for specific fire resistance rated conditions conforming to construction assembly type, penetrating item type, annular space requirements, and fire rating required for the application:
 - 1. Latex Sealants: Single component latex formulations that when cured do not re-emulsify during exposure to moisture.
 - 2. Firestop Devices: Factory assemblies steel collars lined with intumescent material sized to fit a specific outside diameter of penetrating item.
 - 3. Firestop Putty: Intumescent, non-hardening, water resistant putties containing no solvents, inorganic fibers or silicone compounds.
 - 4. Wrap Strips: Single component intumescent elastomeric strips faced on both sides with a plastic film.
 - 5. Firestop Pillows: Re-useable, non-curing, mineral fiber core encapsulated with an intumescent coating contained in a flame retardant poly bag.

6. Silicone Sealants: Moisture curing, single component, silicone elastomeric sealant for horizontal surfaces (pourable or non-sag) or vertical surface (non-sag).
 7. Silicone Foam: Multi-component, silicone based, liquid elastomers that when mixed expand and cure in place to produce a flexible, non-shrinking foam.
- B. Firestop systems shall be UL classified and rated for the type of construction where it is applied.

PART 3 - EXECUTION

3.1 EXISTING ELECTRICAL WORK

- A. Verify that abandoned wiring and equipment serve only abandoned facilities.
- B. Disconnect existing electrical systems in walls, floors, and ceilings indicated for removal.
- C. Coordinate utility service outages and reconnections with Utility Company and Owner.
- D. In any area requiring the work of other trades, carefully remove, store and protect any electrical items in the path of the work and re-install and re-connect after the completion of the other trade's work.
- E. In areas where painting is required, remove all electrical items including, but not limited to, lighting fixtures, devices and cover plates, then reinstall after painting has been completed. In the event any electrical items that were not removed become painted, clean the items, or replace if cleaning cannot be suitably cleaned.
- F. Provide temporary wiring and connections to maintain existing systems in service during construction until replacement circuits and systems are ready for service, including circuits and systems that serve other areas.
 1. Existing electrical feeders and branch circuits.
 2. Existing telecommunications system.
- G. Remove, relocate, and repair existing installations to accommodate new construction.
 1. Remove abandoned wiring to source of supply, and/or back to the serving panelboard and turn off breaker and mark as spare in the panelboard directory.
 2. Remove exposed abandoned conduit and boxes, including abandoned conduit above accessible ceiling finishes.
 3. Disconnect abandoned outlets and remove devices.
 4. Provide blank cover for abandoned outlets which are not removed.
 5. Disconnect and remove abandoned panelboards and distribution equipment.
 6. Disconnect and remove electrical devices and equipment serving utilization equipment that has been removed.
 7. Disconnect and remove abandoned luminaires, brackets, stems, hangers, and other accessories.
 8. Disconnect and remove underfloor wiring, cut raceways flush with floor and patch and restore floor surfaces.
- H. Repair adjacent construction and finishes damaged during removal of existing electrical work.
- I. Maintain access to existing, active electrical installations.
- J. Existing wiring, the need for which remains, found in good condition, properly located, and conforming to the specified wiring standard, may continue in service.

- K. Clean and repair existing materials and equipment within limits of work which remain or are to be reused.
 - 1. Panelboards: Clean and check tightness of electrical connections. Replace damaged circuit breakers and provide closure plates for vacant positions. Revise circuit directory.
 - 2. Luminaires: Clean exterior and interior surfaces. Replace lamps and broken parts.
 - 3. Do not reuse conduit, wire, and other materials except as specifically noted on the drawings.
- L. Extend existing installations using materials and methods compatible with existing electrical installations, and as specified.

3.2 EXAMINATION AND PREPARATION

- A. Verify that the interior of the building has been physically protected from weather.
- B. Verify that supporting surfaces are ready to receive work.
- C. Electrical boxes are shown on drawings, locations are approximate unless dimensioned.
 - 1. Obtain verification from Engineer of floor box locations, and locations of outlets in office and work areas, prior to rough-in.
 - 2. Elevator System: Determine location of outlets for lights, cab circuits, machines, and equipment installed in elevator pit, shaft, and machine rooms with elevator system installer prior to rough-in.
- D. Make electrical connections to utilization equipment in accordance with equipment manufacturer's instructions.
 - 1. Verify that wiring and outlet rough-in work is complete and that utilization equipment is ready for electrical connection, wiring, and energization.
 - 2. Make wiring connections in control panel or in wiring compartment of prewired equipment. Provide interconnecting wiring where indicated.

3.3 GROUNDING

- A. Install grounding electrodes and conductors at locations indicated. Install additional rod electrodes as required to meet Regulatory Requirements.
- B. Provide ground bonding as indicated and to meet Regulatory Requirements. Include a separate green or bare for NM cable ground wire in each branch and feeder circuit and bond to grounding system.
- C. Maintain isolation between neutral and ground conductors in accordance with NEC.
- D. Install grounding system so all conductive materials operate at ground potential and there is a low impedance path to ground in the event of a fault.
- E. Test grounding system for resistance to earth using fall-to-potential method in accordance with IEEE Std. 81. Maximum ground to earth resistance shall not exceed 25 ohms.
- F. Test grounding system continuity resistance (megger); resistance shall not exceed 0.1 ohms.
- G. Submit test reports for ground/earth resistance and continuity resistance.

3.4 SUPPORT SYSTEMS

- A. Install support systems sized and fastened to accommodate weight of equipment and conduit, including wiring, which they carry.

1. Fasten hanger rods, conduit clamps, and outlet and junction boxes to building structure using expansion anchors, beam clamps, and spring steel clips as appropriate for the application.
2. Use toggle bolts or hollow wall fasteners in hollow masonry, plaster, or gypsum board partitions and walls; expansion anchors or preset inserts in solid masonry walls; self-drilling anchors or expansion anchor on concrete surfaces; sheet metal screws in sheet metal studs; and wood screws in wood construction.
3. Do not fasten supports to piping, ceiling support wires, ductwork, mechanical equipment, or conduit.
4. Do not use powder actuated anchors.
5. Do not drill structural wood or steel members.
6. Fabricate supports from structural steel or steel channel.
7. Install free standing electrical equipment on concrete pads.
8. Install surface mounted cabinets and panelboards with minimum of four anchors.
9. Provide steel channel supports to stand cabinets 1" off wall in wet locations.
10. Bridge studs top and bottom with channels to support flush mounted cabinets and panelboards in stud walls.

3.5 CONDUIT

- A. Size raceways for conductor type installed or for type THW conductors, whichever is larger.
 1. Minimum Size Conduit: 3/4".
 2. Maximum Size Conduit in Slabs Above Grade: 1"; for conduits larger than 3/4", route so they do not cross each other.
- B. Install all conduit concealed in walls or above finished ceilings except where specifically indicated to be surface mounted. Arrange conduit to maintain headroom and to present neat appearance. Install conduit in accordance with the following:
 1. Route exposed raceway parallel and perpendicular to walls and adjacent piping.
 2. Maintain minimum 6" clearance to piping and 12" clearance from parallel runs of flues, steam pipes, and heating appliances. Install horizontal raceway runs above water and steam piping.
 3. Complete raceway installation before installing conductors.
 4. Maintain required fire, acoustic, and vapor barrier rating when penetrating walls, floors, and ceilings. Where indicated on drawings, sleeve penetrations through concrete walls, floors, and ceilings.
 5. Route conduit through roof openings for piping and ductwork where possible; otherwise, route through roof with pitch pocket.
 6. Group in parallel runs where practical and install on steel channel support system. Maintain spacing between raceways or derate circuit ampacities to NFPA 70 requirements.
 7. Use conduit hangers and clamps; do not fasten with wire or perforated pipe straps.
 8. Use conduit bodies to make sharp changes in direction.
 9. Terminate conduit stubs and box connections with insulated bushings.
 10. Steel conduit joints shall be threaded; clamp on or set screw fittings are not permitted.
 11. Use suitable caps to protect installed raceway against entrance of dirt and moisture.
 12. Provide No. 12 AWG insulated conductor or suitable pull string in empty raceways, except sleeves and nipples.
 13. Install expansion joints where raceway crosses building expansion joints, and where necessary to compensate for thermal expansion.

14. Install plastic conduit and tubing in accordance with manufacturer's instructions; thermoweld or cement PVC joints..
15. Use flexible or liquidtight conduit, short as possible, maximum 72 inches, for motor and equipment hookup; always include a separate green ground wire.
16. Use liquidtight conduit for flexible connections in damp or wet locations.
17. Install conduit so condensation will drain and not be trapped.
18. Prevent lodgement of dirt, trash, and mortar; swab all raceways prior to installation of wire and cable.

3.6 BOXES

A. General:

1. Install electrical boxes where shown on the drawings, and as required for splices, taps, wire pulling, equipment connections, and regulatory requirements.
2. Locate and install electrical boxes to maintain headroom and to present neat mechanical appearance.
3. Align wall mounted outlet boxes for switches, thermostats, and similar devices.
4. Coordinate mounting heights and locations of outlets above counters, benches, and back splashes.
5. Install lighting outlets to locate luminaires as shown on reflected ceiling plan.
6. Use expansion anchors, shields, or toggle bolts to fasten boxes in place. Do not use explosive powder driven anchors, except where specifically permitted by Engineer. Do not use nails or wire for permanent support.
7. Secure boxes to interior wall and partition studs, accurately positioned to allow for surface finish thickness; select raised cover depth to assure proper fit.
8. Do not install boxes back-to-back in walls; provide 6" minimum separation, except provide 24" separation, in acoustic rated walls.
9. Use hinged cover enclosure for interior pull and junction boxes larger than 12 inches in any dimension. Install in an accessible location that will allow easy access.
10. Field punch openings in pull boxes using punch/dies of appropriate size. Provide knockout closures for unused openings.

B. Surface mounted applications:

1. Use cast "FD" outlet boxes for all surface mounted applications to 10 feet above finished floor, and for exterior and wet locations.
2. Where pull boxes must be installed in finished areas, consult Engineer to select location, style, and finish. The location shall always be as inconspicuous as possible.

C. Concealed above ceilings:

1. Install 4" x 4" x 2" or larger steel boxes for general wiring.
2. Octagon boxes, 3 ½" or 4" by 1 ½" or larger depth, are permitted for flush mounted lighting fixture outlets, use adjustable steel channel fasteners for support.
3. Locate and install electrical boxes to allow access. Provide access panels where required for practical access, and as required by the NEC.

D. Concealed in GWB or plaster walls:

1. Install 4" x 4" x 2" steel box; select raised plaster ring and set box so that outer edge is not less than 1/8" below finished wall surface.
2. Use stamped steel mounting bracket for flush outlet/device boxes in hollow stud wall.
3. Align wall mounted outlet boxes for switches, thermostats, and similar devices.

4. Coordinate mounting heights and locations of outlets above counters, benches, and back splashes.

3.7 INSTALLATION OF WIRES AND CABLES

- A. Verify that interior of building has been physically protected from weather, that mechanical work which is likely to injure conductors has been completed and completely and thoroughly swab raceway system before installing conductors.
- B. Use wire not smaller than 12 AWG for power and lighting circuits, and not smaller than 14 AWG for control wiring.
 1. Use 10 AWG conductor for 20 ampere, 120 volt branch circuit home runs longer than 75 feet; and for 20 ampere, 277 volt branch circuit home runs longer than 200 feet.
- C. Neatly train and secure wiring inside boxes, equipment, and panelboards.
- D. Use UL listed wire pulling lubricant for pulling 4 AWG and larger wires.
- E. Install wiring according to the Wiring Standard, Section 26 00 10, or in another Division 26 Section, or as directed in applicable section. Protect and support exposed cables (where allowed) above accessible ceilings to keep them from resting on ceiling tiles. Use channel, or running boards as necessary to provide support. Do not support wiring on ceiling support wires, unless ceiling installer has provided certification that ceiling support system is rated to carry the additional load of the cables. Install cables to run parallel and perpendicular to building lines; do not run diagonally, leave ample slack cable at turns.
- F. Make splices, taps, and terminations to carry full ampacity of conductors without perceptible temperature rise.
- G. Terminate spare conductors with electrical tape.
- H. Terminate aluminum wire in accordance with manufacturer's instructions.
 1. Use tin plated, aluminum body with copper pigtail compression connectors like Mac-Adapts. Fill with anti-oxidant compound prior to installation of conductor.
- I. Color code all service, feeder, branch, control, and signalling circuit conductors. Color shall be green for grounding conductors and white for neutrals, except where neutrals of more than one system are installed in same raceway or box, the other neutral shall be white with a colored (not green) stripe. Color code ungrounded conductors operating at 120 volts to ground black, red, and blue for Phases A, B, and C and at 277 volts, brown, orange, and yellow respectively.
- J. Terminate all wire joints #10 AWG or smaller with crimp set or twist-on wire terminating device. Use crimp set or bolted "Burndy" or suitable alternate bolted or crimp set device for conductors larger than #10 AWG.
- K. Cover all joints made with non-insulated connecting devices with electrical tape; use Type #88 at any time or #33 whenever the temperature of the joint or the room is above 60EF. Triple wrap joints, each wrap having a 50% overlay.

3.8 CORDS AND CAPS

- A. Install prefinished cord set where connection with attachment plug is indicated or specified, or use attachment plug with suitable strain relief clamps.
- B. Provide suitable strain relief clamps for cord connections to outlet boxes and equipment connection boxes.

- C. Make wiring connections in control panel or in wiring compartment of prewired equipment in accordance with manufacturer's instructions. Provide interconnecting wiring where indicated.
- D. Install disconnect switches, controllers, control stations, and control devices such as limit switches and temperature switches as indicated. Connect with conduit and wiring as indicated.

3.9 DEVICES

- A. Install wiring devices in accordance with manufacturer's instructions.
 - 1. Install wall switches 48" above floor, OFF position down.
 - 2. Install wall dimmers 48" above floor. Derate ganged dimmers as instructed by manufacturer. Do not use common neutral.
 - 3. Install convenience receptacles 18" above floor, 6" above counters and backsplash or as indicated, with grounding pole on top.
 - 4. Install specific purpose receptacles at heights shown on Drawings.
 - 5. Install cord and attachment plug caps on equipment. Size cord for connected load and rating of branch circuit overcurrent protection.
- B. Install wall plates flush and level.
 - 1. Install decorative plates on switch, receptacle, and blank outlets in finished areas, using oversized plates for outlets installed in masonry walls.
 - 2. Install galvanized steel plates on outlet boxes and junction boxes in unfinished areas, above accessible ceilings, and on surface mounted outlets.

3.10 FIRESTOPPING

- A. Install through penetration firestop systems in accordance with firestop system manufacturer's written installation instructions for products and applications indicated.
- B. Engage an experienced installer who is trained, certified, licensed, or otherwise qualified by the firestop system manufacturer to install the firestop products.
- C. Coordinate construction of openings and penetrating items to ensure that firestop systems are installed according to specified requirements.
- D. Provide firestop systems that are compatible with one another, with the substrates forming openings, with the items penetrating the firestop system, and under the conditions of service for the application being considered.
- E. Provide components for each firestop system that are needed to install fill materials. Use only components specified by the firestop system manufacturer and approved by the qualified testing agency for the designated system.
- F. Keep areas of work accessible until inspection by the AHJ has been completed.
- G. Inspecting Agency: Owner may engage a qualified independent inspecting agency to inspect the completed firestop system. The independent agency shall comply with ASTM E 2174 requirements including inspecting personnel qualifications, method of conducting inspections, and preparation of test reports.
- H. Where deficiencies are found, repair or replace the firestop systems so that they comply with requirements. Proceed with enclosing firestop systems with other construction only after inspection reports are issued and the firestop installations comply with requirements.
- I. Protect the firestop system during and after installation to insure that the systems do not deteriorate and are not damaged during the remaining period of construction. In the event

damage or deterioration occurs, remove affected firestop system and replace with new materials in compliance with this specification.]

3.11 IDENTIFICATION

- A. Identify electrical distribution and control equipment, and loads served, to meet regulatory requirements and as scheduled.
 - 1. Degrease and clean surfaces to receive nameplates and tape labels.
 - 2. Secure nameplates to equipment fronts using screws, rivets, or adhesive, with edges parallel to equipment lines. Secure nameplate to inside face of recessed panelboard doors in finished locations.
 - 3. Use embossed tape nameplates with 3/16" lettering to identify individual switches and circuit breakers, wall switches, receptacle circuits, and loads served.
 - 4. Use lamicoid nameplates with minimum 1/4" lettering to identify distribution and control equipment.
 - 5. Nameplate information shall suitably identify the device or circuit. Any nameplate that is not suitably descriptive in the opinion of the Engineer shall be replaced as directed.
- B. Install wire markers on each conductor in panelboard gutters, pull boxes, outlet and junction boxes, and at load connections.
 - 1. Use branch circuit or feeder number to identify power and lighting circuits.
 - 2. Use control wire number as indicated on schematic and interconnection diagrams and equipment manufacturer's shop drawings to identify control wiring.

3.12 UNDERGROUND ELECTRICAL

- A. Install ducts in trenches furnished under Section 31 23 00, minimum 30" below grade or as indicated and slope 3" minimum per 100 feet away from buildings toward drainage points. Run ducts in straight lines except where change in direction is necessary. Protect ducts and bedding material from damage and displacement until backfilling has been completed.
- B. Prior to installing conductors, clean ducts with bristle brush. Pull a test mandrel having a diameter 1/4" less than pipe diameter through duct to verify pipe is clear. Follow with a swab to clean out any remaining dirt or foreign matter.
- C. Install yellow plastic warning tape above ducts approximately 12" below finish grade.
- D. Cables shall be one piece unspliced between connections, except where distance exceeds available cable length, it may be spliced at accessible locations.
- E. Install transformer pad as indicated and set level within 1/4" in 10'-0".
- F. Coat metal conduit installed underground with two coats of Bitumastic allowing 24 hours drying time between coats. After installation is complete, coat joints and touch up nicks and scratches.

3.13 FIELD QUALITY CONTROL

- A. Perform field inspection and testing of wiring as follows:
 - 1. Inspect wire and cables for physical damage and proper connection.
 - 2. Torque test conductor connections and terminations to manufacturer's recommended values.

3. Perform continuity and insulation resistance (megger) test on all power and equipment feeder and branch circuit conductors. Submit test report tabulating the test performed and the results.
 4. Verify proper phasing connections; check rotation of all motors.
- B. Perform field inspection and testing of devices as follows:
1. Test for proper polarity and ground continuity.
 2. Test GFCI operation according to manufacturer's written instructions.
 3. Replace defective units and retest.
 4. Submit test report.

END OF SECTION

SECTION 26 20 00 - SERVICE AND DISTRIBUTION

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Service entrance and metering
2. Panelboards
3. Enclosed switches
4. Fuses
5. Enclosed circuit breakers
6. Motor starters

B. Related Sections:

1. Division 00, including General and Supplementary Conditions, Division 01 Sections, and the Drawings, apply to this Section.
2. Section 26 00 10, Basic Electrical Requirements.
3. Section 26 05 00, Basic Electrical Materials and Methods.

1.2 REFERENCES

A. Conform to the requirements of the local Utility Company:

1. Versant Power, Construction Standards Manual.

1.3 SYSTEM DESCRIPTION

A. Electric Service System: 240/120 volts, single phase, three wire, 60 Hz.

1.4 SUBMITTALS

A. Provide submittals in accordance with Section 26 00 10 for the following:

1. Panelboards
2. Overcurrent devices
3. Disconnects
4. Motor starters
5. Meter cabinets
6. Enclosed circuit breakers

B. Shop Drawings: Indicate relevant information on switchboards, panelboards, and busways. Indicate circuit breaker arrangement in panelboard, type, size, number of poles, interrupting rating, size of enclosures, and quantities.

C. Product Data: Provide data on enclosed switches and circuit breakers, fuses, panelboards, motor starters, and contactors.

D. Upon request, submit samples for inspection.

E. Test Reports: Submit for field inspection and testing. Include description of procedures, duration, instruments used, and test values obtained. Present information in table comparing acceptable values to actual values.

- F. Operating and Maintenance Instructions:
 - 1. Panelboard: Submit NEMA PB 2.1

PART 2 - PRODUCTS

2.1 METER CABINETS

- 1. Manufacturers: As approved by utility company.
- 2. Provide to meet utility company specification.

2.2 PANELBOARDS

- A. Manufacturers:
 - 1. General Electric
 - 2. ITE/Siemens
 - 3. Square D
 - 4. Cutler-Hammer/Westinghouse
- B. Main and Distribution Panelboards: NEMA PB 1; circuit breaker type.
 - 1. Enclosure: Type 1.
 - 2. Exterior: NEMA 3R
 - 3. Combination Service Entrance and waterproof meter mains and panelboard (CSEDs).
 - 4. Provide flush or surface cabinet front, as indicated, with screw cover and hinged lockable door, keyed alike, two keys per panelboard.
 - 5. Bus: Copper or tin plated aluminum.
 - 6. Ground Bus: Copper.
 - 7. Voltage: 240/120 volts, single phase.
 - 8. Minimum Integrated Equipment Rating: 30,000 amperes rms symmetrical for 240 volt panelboards; 25,000 amperes rms symmetrical for 480 volt panelboards, or as shown on drawings.
 - 9. Nameplate: Lamicoid, white letters on black background.
 - 10. Provide Arc Flash and Shock Hazard labels in accordance with NFPA 70.
- C. Lighting and Appliance Branch Circuit Panelboards: NEMA PB 1; circuit breaker type and similar to type referenced on drawings.
 - 1. Enclosure: NEMA PB 1; Type 1.
 - 2. Provide flush or surface cabinet front, as indicated, with screw cover and hinged lockable door, keyed alike, two keys per panelboard.
 - 3. Bus: Copper or tin plated aluminum.
 - 4. Ground Bus: Copper.
 - 5. Voltage: 240/120 volts, single phase, 4 wire.
 - 6. Minimum Integrated Equipment Rating: As shown on drawings.
 - 7. Provide Arc Flash and Shock Hazard labels in accordance with NFPA 70.
- D. Campground Load Centers: Circuit breaker load center.
 - 1. Enclosure: NEMA 3R.
 - 2. Provide surface box as indicated with lock on door.
 - 3. Provide load centers with tin plated aluminum bus; ratings as scheduled on drawings. Do not use tandem circuit breakers. Snap-in breakers
 - 4. Voltage: 240/120 volts, single phase.

5. Minimum Integrated Equipment Rating: 22,000 amperes rms symmetrical.

6.

- E. Panelboard design shall be such that individual circuit breakers can be removed without disturbing adjacent units or removing supplemental insulation installed to obtain clearances required by UL. Where space only is indicated, make provisions for future installation of breakers of size indicated.
- F. Circuit Breakers: Thermal and magnetic, bolt-on, trip free, trip elements in each pole and single common handle or factory applied handle tie. For GFCI breakers, provide push-to-test button, visible indication of tripped condition, and ability to detect and trip on current imbalance of approximately 6 milliamperes or greater per requirements of UL 943 for Class A GFCI devices. Tripping of GFCI breakers to occur instantaneously without delays.
 - 1. Provide fully rated circuit breakers; series ratings are not permitted unless specifically noted on the drawings
- G. Panelboard Tubs: Code gauge galvanized steel, prepunched knockouts not permitted.

2.3 ENCLOSED SWITCHES

- A. Manufacturers:
 - 1. General Electric
 - 2. ITE/Siemens
 - 3. Square D
 - 4. Cutler-Hammer/Westinghouse
- B. Enclosed Switch Assemblies: NEMA KS 12; Type HD.
 - 1. Fuse clips: Designed to accommodate Class R fuses.
- C. Enclosures: NEMA KS 12; Type 12 or as indicated on drawings.
- D. Motor Disconnect Switches: General duty for up to 240 volts and 1.5 HP, heavy duty for over 240 volts or 1.5 HP, quick make/break type, fused or nonfused (NF) as indicated. For 1/6 HP or less, motor rated toggle switches are permitted.

2.4 FUSES

- A. Manufacturers:
 - 1. Bussman
 - 2. Gould
- B. Fuses 600 Amperes and Less: Current limiting, time delay, one-time fuse, 250 volts, UL Class RK 1.
- C. Fuses Larger Than 600 Amperes: Current limiting, time delay, one-time fuse, 600 volt, UL Class L.
- D. Fuse Interrupting Rating: 200,000 rms amperes.

2.5 ENCLOSED CIRCUIT BREAKERS

- A. Manufacturers:
 - 1. General Electric
 - 2. ITE/Siemens
 - 3. Square D

4. Cutler-Hammer/Westinghouse
- B. Circuit Breaker: NEMA AB 12.
 1. Ratings: As indicated on the drawings.
 2. Enclosure: NEMA AB 12; as indicated on the drawings, NEMA 4X stainless steel for kitchen applications.
 3. Accessories: As indicated on the drawings.

2.6 MOTOR STARTERS

- A. Manufacturers:
 1. Allen-Bradley
 2. General Electric
 3. ITE/Siemens
 4. Square D
 5. Cutler-Hammer/Westinghouse
- B. Manual Motor Starter:
 1. NEMA ICS 2; AC general purpose Class A manually operated, full voltage controller with overload relay, red pilot light, NO and NC auxiliary contact, and push button or toggle operator.
 2. Fractional Horsepower Manual Starter: NEMA ICS 2; AC general purpose Class A manually operated, full voltage controller for fractional horsepower induction motors, with thermal overload unit, red pilot light, and toggle operator.
 3. Enclosure: NEMA ICS 6; Type 1.
- C. Magnetic Motor Starter: NEMA ICS 2.
 1. Full Voltage Motor Starters: AC general purpose Class A magnetic controller for induction motors rated in horsepower with integral thermal overload elements.
 2. Two Speed Starters: Include integral time delay transition between FAST and SLOW speeds.
 3. Coil Operating Voltage: 120 volts, 60 Hz.
 4. Extra Auxiliary Contacts: 2 normally open or closed, field convertible.
 5. Control Power Transformers: 120 volt secondary, or as required by ATC subcontractor, 100 VA or larger as needed.
 6. Enclosure: Type 12 lockable for indoor and NEMA 3R for outdoor applications.
- D. Provide as specified or indicated with unit packaged equipment provided under other sections.
- E. Combination Motor Starters: Provide motor starters with integral thermal overload and motor circuit protector (MCP) or non-fusible or fusible switch in single enclosure, as indicated. Size starter in accordance with manufacturer's ratings, or as indicated. Include control transformer, manual-off-automatic (MOA) switch, and red motor run pilot light.
- F. For all starters, provide thermal overload protection in each phase wire of motor circuit to automatically interrupt all phases upon activation of overload sensor in any phase, and manual reset mechanism.
- G. Overload protection for motors 1/4 HP and smaller may be integral with the motor.

PART 3 - EXECUTION

3.1 EXAMINATION AND PREPARATION

- A. Make arrangements with Utility Company to obtain permanent electric service to the Project.

3.2 INSTALLATION

- A. Install utility services in accordance with utility company instructions and as indicated.
 - 1. Install service entrance conduits and conductors to building service entrance equipment as indicated on the drawings.
 - 2. Utility company will provide primary conductors and make final connection of contractor furnished spades, left loose, on transformer secondary terminals.
- B. Install equipment in accordance with manufacturer's instructions.
- C. Install switchboard to NEMA PB 2.1.
- D. Install proper fuses in each fused switch.
- E. Install panelboards and load centers to NEMA PB 1.1.
- F. Mount panelboards, disconnects, starters, and enclosed circuit breakers 6'-6" AFF to top of cabinet on steel channel of sufficient length to bridge studs, except where indicated otherwise or approved by Engineer.
- G. Set flush mounted panelboards such that tub flanges extend within 1/8" of wall surface at all points, covers rest firmly against wall, and completely close all openings to interior of cabinet.
- H. Provide a minimum of three 3/4" spare capped conduits stubbed to accessible ceiling void for future use on all flush mounted panelboards.
- I. Panelboard circuiting has been worked out with breakers numbered and increasing in size and number of poles from top to bottom. If this is not retained, the Contractor shall be responsible for revising contract drawings and paying to have it done. This is not to prohibit an occasional revision approved by Engineer and properly marked on as-built drawings for correction by others.
- J. For each branch circuit panelboard, provide a typewritten tabulation indicating fixture outlets, devices, machines, or apparatus served by each breaker and their room location. This shall follow coding on the drawings with breakers numbered from top to bottom. Mount tabulation inside the door in a frame for the purpose with a transparent plastic cover.
- K. Install drives in accordance with manufacturers written instructions.
- L. Provide manufacturer's technician service assistance for drive set-up, start up, adjustment and field checking and testing.
- M. Coordinate installation with other sections. It is the responsibility of this section to ensure that mechanical ducts and piping maintain code required clearances around electrical equipment and that walls have sufficient thickness to accept recessed panelboards.

3.3 GROUNDING

- A. Bond system neutral and all ground conductors together at the service. Bond all feeder conduits to ground at the service and at the main distribution switchboard. Bond service to water and sprinkler mains on street side of water meter and to heating main.
- B. Bond separately derived systems such as dry transformers and generators to building steel and water main.

- C. Provide grounding and bonding to NFPA 70, include a separate green grounding conductor in each circuit. Bond all panelboards, cabinets, and equipment to service ground.
- D. On all but service equipment and separately derived systems, the neutral bus shall be isolated from ground except for the common bond at the main distribution.

3.4 FIELD QUALITY CONTROL

- A. Inspect grounding and bonding system conductors and connections for tightness and proper installation.
- B. Measure ground resistance from system neutral connection at service entrance to convenient ground reference point by passing minimum current of 10 amperes DC and measuring voltage drop. Maximum resistance: 10 ohms.

3.5 CLEANING

- A. Clean equipment finishes to remove paint and concrete splatters.

END OF SECTION

SECTION 26 51 00 - INTERIOR LIGHTING

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Luminaires
 - 2. LED Drivers
- B. Related Documents
 - 1. Drawings, Division 00, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.
 - 2. Section 26 00 10, Basic Electrical Requirements.
 - 3. Section 26 05 00, Basic Electrical Materials and Methods.

1.2 REFERENCES

- A. Furnish products listed by Underwriters Laboratories, Inc., ETL Testing Laboratories, or other testing firm acceptable to the Owner.
- B. Conform to requirements of IES LM-79 and LM 80.
- C. Conform to requirements of ANSI/NFPA 70.
- D. Conform to requirements of NFPA 101.
- E. Consortium for Energy Efficiency (CEE).
- F. DesignLights Consortium (DLC).

1.3 SUBMITTALS

- A. Submit shop drawings, product data, test data, warranties, and other information as appropriate for the following:
 - 1. Luminaires
 - 2. LED Drivers
- B. Shop Drawings: Indicate construction details for products which are not manufacturer's standard, when product data does not adequately describe fixture physical characteristics, or upon request by Engineer.
- C. Product Data: Provide product data for each luminaire and lighting unit.
- D. Submit written warranty for extended warranty items such as batteries and ballasts.
- E. Submit luminaire shop drawings in electronic form with a separate sheet for each luminaire type. Indicate clearly on each sheet the proposed luminaire "type" designation, manufacturer, luminaire, lamp, and ballast designation.
- F. Submittals shall indicate materials, finishes, metal gauges, overall and detail dimensions, sizes of electrical and mechanical connections, fasteners, welds, joints, end conditions, provisions for the work of others and similar information.

- G. The submittals shall state whether or not the fixture, as an assembly, has been UL tested and approved.
- H. Upon request, submit sample products for inspection. Provide luminaires identical with approved samples; retain approved samples at site for comparison until after all other luminaires have been shipped to site and installed. Transportation charges for samples shall be paid by Contractor. Unapproved samples will be returned at Contractor's expense. Upon notification of disapproval, immediately submit new samples that meet contract requirements.
- I. Upon request by Engineer, provide computerized illumination calculation data for specified interior or exterior areas in digital or isofootcandle format and in such detail as requested.
- J. Operating and Maintenance Instructions: Provide maintenance and operating instructions for battery powered lighting units. Include technical data sheets and parts ordering information for components used in all luminaires.

1.4 QUALITY ASSURANCE

- A. Warrant all lighting and components for one year after acceptance of the work and at no additional cost to the Owner, promptly provide and install replacements for luminaires or components which are defective in materials or workmanship; or repair installed equipment at the job site as necessary to restore first class operating condition. For any time during the warranty period that luminaires are not fully functional due to defects in materials or workmanship, provide, install, and remove suitable temporary lighting. Warrant replacement luminaires in a similar manner for a period of one year following replacement including replacement of defective replacements.
- B. Warrant drivers, batteries, and occupancy sensors as further specified herein.
- C. Provide products of firms regularly engaged in the manufacture of interior luminaires or components of similar types and ratings to those required. Such products shall have been in satisfactory use in similar applications for not less than two years.

1.5 DELIVERY, STORAGE AND HANDLING

- A. Deliver luminaires and their components to job site, factory assembled and wired to the greatest extent practical, in strict accordance with approved shop drawings, samples, certificates and catalog cuts.
- B. Protect exposed finishes during manufacture, transport, storage and handling; replace damaged materials.
- C. Luminaires shall be stored under cover, above the ground, in clean, dry areas, and be tagged and/or marked as to type and site destination.

PART 2 - PRODUCTS

2.1 GENERAL

- A. Provide lighting fixtures as listed on the Lighting, Lamping, and Fixture Schedule on the drawings and as specified herein that meet the physical, performance and quality standard exhibited by that fixture. Substitutes shall be equal in all respects including mechanical, electrical, physical, performance, photometric, and quality characteristics except minor variances in construction details which do not affect overall quality or performance are permitted.

- B. Accessories: Provide required accessories for mounting and operation of each luminaire as indicated.
 - 1. Recessed Luminaires: Provide trim type suitable for ceiling system in which luminaire is installed; design fixtures to operate in a 140° F environment.
 - 2. Thermal Protection: Provide thermal protection devices to meet NFPA 70 requirements.
 - 3. Disconnecting Means: Provide disconnecting means in fluorescent luminaires that utilize double-ended lamps and contain ballast(s) that can be serviced in place.
 - 4. Surface Luminaires: Provide spacers and brackets required for mounting; design for a minimum ambient temperature of 92° F.
 - 5. Pendant Luminaires: Provide swivel hangers, pendant rods, tubes, chains, and other hardware as required and/or indicated to install luminaire at appropriate height.

2.2 LED LUMINAIRES

- A. Exterior Housing: Diecast aluminum with five stage polyester powder paint finish, electrical components solidly heat-sink mounted to housing, type as described on the drawings.
- B. Shall be approved by DesignLights Consortium, if not, shall have LM-79 and LM-80 testing or shall have 5 year warranty that cover the product if light levels drop below 70% of the initial light output.
- C. Power Supply: 0 - 10v dimming capabilities.
- D. Reflector: Precision injection molded, high specular reflector, minimum photometric performance in accordance with fixtures listed on Lighting Fixture Schedule.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Examine adjacent surfaces to determine that surfaces are ready to receive work.
- B. Install wiring in accordance with Section 26 00 10.
- C. Install luminaires and accessories in accordance with manufacturer's instructions, as indicated, with equipment, materials, parts, attachments, devices, hardware, hangers, cables, supports, channels, frames and brackets necessary to make a safe, complete, and fully operative installation.
- D. Install luminaires plumb, square, and level with ceiling and walls, in alignment with adjacent luminaires, and secure in accordance with manufacturers' directions and approved shop drawings. Conform to the requirements of National Electrical Code ANSI/NFPA 70.
 - 1. Specified or indicated mounting heights are to be to the bottom of each luminaire for suspended and ceiling mounted luminaires, and to the center of each luminaire for wall mounted luminaires. Obtain approval of exact mounting for luminaires on the job before installation is commenced and, where applicable, after coordinating with type, style, and pattern of ceiling being installed.
 - 2. Support surface mounted luminaires from ceiling grid tee structure; provide auxiliary support laid across top of ceiling tees and fasten to prohibit movement.
 - 3. Install recessed luminaires to permit removal from below and install earthquake clips.
 - 4. For lighting fixtures mounted in or on suspended ceilings, provide two support hangers per fixture so that each is independently supported from the building structure.

5. Provide two support hangers for the minimum security fixtures so that each is independently supported from the building structure.
 6. Ground non current carrying parts of electrical equipment in accordance with UL and NEC provisions.
- E. Install lighting fixtures where indicated on the plans; plans may be scaled for approximate locations; minor adjustments are permitted to avoid conflicts. Fixture placement that does not conform to the layout indicated shall be corrected; if in doubt about correct placement consult Engineer prior to roughing in. Install all lighting so that it is securely fastened, rows are uniformly spaced and in alignment, and fixture rests flat on mounting surface.
 - F. Perform insulation resistance and ground continuity test.
- 3.2 ADJUSTING AND CLEANING
- A. Align luminaires and clean lenses and diffusers at completion of work.
 - B. Aim adjustable luminaires as indicated or as directed.
 - C. Adjust directional arrows on exit signs to meet approval of authority having jurisdiction.
 - D. Clean paint splatters, dirt, and debris from installed luminaires.
 - E. Touch up luminaire and pole finish at completion of work.
- 3.3 OWNER INSTRUCTION
- A. Provide on-site training of Owner's personnel in operation of controls systems by a factory trained manufacturer's representative. Include instruction in programming time controls to obtain required control functions. Provide one follow-up visit if necessary.

END OF SECTION

SECTION 27 10 00 – TELEPHONE AND DATA WIRING SYSTEM

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes, but is not limited to, the following:
 - 1. Coordinate backer board provided under Sections 06100 and 09900.
 - 2. Furnish underground duct from riser pole to backer board.
 - 3. Furnish a system of conduits and pull boxes for trunk cables.
 - 4. Furnish outlets and wiring for telephone and data distribution outlets.
 - 5. Test outlet wiring for circuit integrity.
 - 6. Cooperate with Owner's telephone equipment supplier.
- B. Related Documents:
 - 1. Drawings, Division 00, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.
 - 2. Section 06 10 00, Rough Carpentry.
 - 3. Section 09 91 00, Painting.
 - 4. Section 26 00 10, Basic Electrical Requirements.
- C. Work Not Included:
 - 1. Telephone equipment and its installation.
 - 2. Telephone service entrance cables.

1.2 REFERENCES

- A. Comply with the latest revisions of the following:
 - 1. ANSI/NFPA 70, National Electrical Code.
 - 2. ANSI/TIA/EIA-568-B, Commercial Building Telecommunications Standard.
 - 3. TIA/EIA-607, Commercial Building Grounding and Bonding Requirements for Telecommunications.
 - 4. BICSI Telecommunications Distribution Methods Manual.

1.3 SUBMITTALS

- A. Submit catalog cuts in accordance with Section 26 00 10 for the following:
 - 1. Telephone and Data Cable
 - 2. Fiber Optic Cable
 - 3. Telephone/Data Outlet and Cover Plate
 - 4. Patch Panels
 - 5. Relay Rack
- B. Submit factory certification that cable has been tested and meets the specified standards.
- C. Submit test report for installed cables and terminations.

PART 2 - PRODUCTS

2.1 GENERAL

- A. Telephone backer boards shall be 3/4 inch AB grade fir plywood with two coats black enamel paint. Backer board shall be minimum 48" x 96", or as indicated, install 6'-6" AFF to top of board.

2.2 TELEPHONE/DATA OUTLETS

- A. Acceptable Manufacturers:
 - 1. AT&T
 - 2. Hubbell
 - 3. Leviton
 - 4. Panduit
- B. Data Jacks: RJ-45, eight pin modular, UL verified and listed Category 6, UL 1863, meeting FCC Part 68.5, gold plating over nickel under plating (50 micro-inch) beryllium copper jack contacts, phosphor bronze (100 micro-inch) tin/lead plating over nickel under plating IDC 110 contacts, TIA/EIA-568-A configuration, Hubbell HXJ6 series, Blue color, or approved equal.
- C. Telephone Jacks: RJ-45, eight pin modular, UL verified and listed Category 6, similar to Data Jack, TIA/EIA-568-A configuration, gray color.
- D. Mounting Plate: High impact 94 V-O rated gray thermoplastic (Noryl) flush cover plate with labels stenciled by thermal ink transfer, Hubbell FPL series, or approved equal. Provide blank cover for unused openings. Note: System is sized for future expansion; do not use single or dual position plates with no blanks.

2.3 CABLE

- A. Acceptable Manufacturers:
 - 1. Alpha
 - 2. Belden
 - 3. Berk-Tek
 - 4. Commscope
 - 5. Mohawk/CDT
 - 6. West Penn
- B. Data and Telephone Horizontal Cables: Inside cable, non plenum applications, NEC Type CM, CMG; riser applications Type CMR; UL Listed Category 6, unshielded 4-twisted pair solid 24 AWG copper conductors with polyvinyl chloride or polyolefin insulation and polyvinyl chloride sheath, factory certified to conform with EIA/TIA-568-A and Addenda TSB-36 and TSB-40-A, 100 ohms characteristic impedance, designed to support Gigabit Ethernet Standard of 250 MHz with maximum insertion loss (attenuation) of 33db and NEXT minimum of 36db. For plenum applications provide cable with CMP (plenum) rating and FEP Teflon insulation for both jacket and individual conductors.

2.4 EQUIPMENT

- A. Data Patch Panels Category 6, "110" termination, Hubbell #P6XXU series, provide ports as required for installed cables, plus 10 percent spares, or approved equal. Use for terminating all Category 6 cables.
- B. Powered Data Patch Panels for POE components: Category 6, "110" termination, Hubbell #DTX24P series, provide ports as required for installed wireless ports, plus 10 percent spares, or approved equal. Provide power supply chassis Hubbell #DTXPS and Power supply Modules

Hubbell #DTXPM350, 2 per patch panel for full redundancy. Use for terminating all wireless Category 6 cables.

- C. Terminal Blocks: "66" blocks, Reliable Electric #R66MN-25DAF9, 25 and 50 pair as appropriate, with double clips and female connectors. Provide #R89-1-25 standoff bracket.
- D. Fiber Optic Terminations: Twelve port SC panel, rack mounted with swing out fiber management tray like Hubbell #FPR012SCM.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Install wiring in conduit as specified for branch circuits, Section 26 00 10, except use cable tray and underfloor raceway where indicated.
- B. All conduit installed for telephone wiring shall have no more than two 90° bends in any run unless one or more accessible, appropriately sized pull boxes are provided.
- C. Leave telephone service and feeder ducts with a pull string for use by others.
- D. Installers shall be well trained, experienced, and familiar with TIA/EIA-568-A and its application in the installation of communication wiring. Run Category 5e cables in strict compliance with TIA/EIA-568-A. Observe bending radius rules, do not staple cable, and do not exert excessive tension when installing in raceway.
- E. Fiber Optic Cable: Do not exceed cables minimum manufacturers specified bending radius and/or maximum tensile rating during installation. Install all fiber cable in inner duct, minimum 1 1/4" trade size, install duct to minimize bends and twists. Secure all exposed sections with cable ties; do not allow the cable ties to bear the cable's weight.
- F. Make up telephone jacks to cables in accordance with TIA/EIA-568-B standards and test for opens, shorts and grounds at each pin. Cooperate with Owner's telephone equipment installer, who will install trunk cables and telephone equipment, and aid in troubleshooting cable problems. Correct defects in circuits supplied under this section.

3.2 TERMINATIONS

- A. Voice Riser (trunks): Terminate on AT&T or equivalent 110 type insulation displacement connection (IDC) termination blocks, with the shield grounded. Maintain pair twists to within 1/2" of the termination points.
- B. Data Riser: Terminate fiber strands using the appropriate ST/SC connectors.
- C. Station Outlets: Flush mounted four position faceplate with unused positions covered with blank off insert. Terminate cables on jack inserts, install voice jack in top position, data jack(s) in bottom position(s).
- D. Station Terminal Fields:
 - 1. Terminate voice station cables on AT&T, or equivalent, 110 type insulation displacement connection (IDC) termination blocks. Maintain pair twists to within 1/2" of the termination points.
 - 2. Terminate data station cables on Category 6 modular patch panels having 110 type insulation displacement connection termination for the station cable, and RJ-45 style eight (8) position jacks wired in TIA-T-568-A pin configuration. maintain pair twists to within 1/2", or less, of the termination points.

- E. Ground patch panels via a bond connection to the appropriate telecommunications grounding busbar.

3.3 LABELING REQUIREMENTS

- A. Number both ends of each cable with labels of waterproof materials and indelible ink text information, using either mechanical or waterproof adhesive attachment.
- B. Wall Plate Marking:
 - 1. Wall Plate ID = FTNN Where F= Floor Designator
T= Terminal Identifier (i.e. "A", "B")
N= Sequential station placement drop number (Keyed to room number)
 - 2. Example: G-A-1024.3-3 = Ground floor, IDF A, Room 1024.3-Outlet number 3 in this room.
 - 3. This designation must be permanently and indelibly marked on the wall plate in a clear and legible manner. The designation must also be marked on the terminal block or patch panel of the associated distribution frame location (MDF/IDF).
 - 4. Record the wall plate number on the building floor plan record diagram.
- C. Riser (Trunk) Pair Marking:
 - 1. Riser Pair ID = NNN Where NNN= Sequential riser pair number.
 - 2. Example: (Riser) 245 = Riser pair number 245.
 - 3. The designation must be marked on the termination blocks at each end of the riser cables. Riser pair counts shall not be repeated. If riser pair 1-48 terminates at the first IDF, the next riser pair count in the following IDF shall start with pair number 49.]

3.4 GROUNDING REQUIREMENTS

- A. Extend service equipment ground to service backer board using min. #6 AWG copper. In exposed locations, install ground wire in EMT. Bond all telecommunications raceway to form a continuous path to ground.
- B. Ground patch panels, equipment racks and other telecommunications' equipment via a min. #6 AWG bond connection to the appropriate telecommunications grounding busbar.
- C. Provide appropriate grounding for the protection of personnel, materials and equipment conforming to all applicable regulations, codes and standards.

3.5 FIRE STOPPING

- A. Apply UL 1479 listed cementitious fire stop materials conforming to ASTM E-814 F and T ratings, in full hours, compatible with the rating of the penetrated fire barrier.

3.6 TESTING

- A. Voice Circuits: Test for opens, shorts, grounds, and pair compliance at each pin. Correct defects and retest as necessary to obtain error free circuits. No defective pairs are permitted in station cables. A pair is defective if:
 - 1. Either or both conductors are open.
 - 2. Either or both conductors are shorted to ground or another conductor.
 - 3. Tip and ring are reversed.
 - 4. Foreign voltages are present.

- B. Data Circuits: Test and certify all Category 6 cable runs to conform to TIA/EIA-568-B and UTP Addenda TSB-36, TSB-40A, 569, and 606. Runs shall support the Gigabit Ethernet Standard for 250 Mhz with maximum insertion loss (attenuation) of 33db and NEXT minimum of 36db. Perform bi-directional test using a network analyzer, Microtest Penta scanner, or approved equal. Defective pairs are not permitted; runs which do not meet this requirement shall be replaced or suitably repaired and retested. Submit a computer generated test report listing results for each run.
- C. Fiber Optic Riser: Test each strand in accordance with ANSI/TIA/EIA-526-7, Method A.1, one reference jumper. Test in one direction at 1310 and 1550 nm wavelengths; attenuation shall not exceed 1.0db/km at both wavelengths. Connector loss shall not exceed 1.5db per connector pair. No defective fiber strands, or splices of any type, are permitted in a riser cable. Replace any cable containing defective strands. Submit test report summarizing test results.
- D. Submit a typed test report indicating test results for each circuit, including station circuits and trunk cables.

END OF SECTION

SECTION 31 22 30 - CLEARING AND GRUBBING

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Clearing and protection of vegetation.
- B. Temporary removal and replacement of walkways, structures, fences, walls or other site structures that interfere with project installation.

1.02 RELATED REQUIREMENTS

- A. Section 01 1000 - Summary: Limitations on Contractor's use of site and premises.
- B. Section 01 5000 - Temporary Facilities and Controls: Site fences, security, protective barriers, and waste removal.
- C. Section 01 7000 - Execution Requirements: Project conditions; protection of bench marks, survey control points, and existing construction to remain; reinstallation of removed products.
- D. Section 31 2270 - Erosion Control
- E. Section 31 2315 - Excavation
- F. Section 31 2316 - Fill and Backfill: Fill material for filling holes, pits, and excavations generated as a result of removal operations.
- G. Section 31 2317 - Trenching for Site Utilities
- H. Section 32 2901 - Restoration of Surfaces
- I. It is the intent of this Section to limit the area of clearing and grubbing to the minimum area possible to allow for the proper installation of the Work and to preserve all plantings, trees, shrubs, grass and natural vegetation to the maximum possible extent.

1.03 SUBMITTALS

- A. Section 01 3000 - Administrative Requirements, for submittal procedures.
- B. Contractor's schedule indicating dates upon which Contractor and Engineer will traverse the site to allow Contractor to indicate the trees and plantings which he has determined to be necessary to remove and to obtain Engineer's approval.

1.04 QUALITY ASSURANCE

- A. Confine clearing and grubbing operations to within the following limits:
 - 1. All areas where work is required to be done, but, to the minimum extent possible to properly install the work.
 - 2. Within the Grading Limits when shown on the Drawings.
 - 3. Within the easements provided by Owner.
 - 4. Within the property lines of lands owned by Owner.
- B. No trees, plants, shrubs, flowers or vegetables shall be removed or trimmed without the prior permission of the Engineer, except where otherwise specified.
- C. Provide at least one person who shall be present at all times during clearing and grubbing

operations who shall be thoroughly familiar with the following:

1. The types of trees and plantings encountered.
2. The proper procedures and methods for taking-up and preserving trees and plantings.
3. The proper procedures and methods for felling, trimming, pruning and caring for trees and plants and their roots.

D. Clearing Firm: Company specializing in the type of work required.

1.05 DELIVERY, STORAGE, AND HANDLING

- A. Store trees, plants and shrubs in protected areas and give ample water to keep them in a thriving condition for subsequent replanting.
- B. Store slate and flagstone sidewalk sections, granite and stone curbs, fences, signs, guide rails and other items at approved locations for subsequent reinstallation.
- C. Obstruction of roads, driveways, sidewalks, gutters and drainage ditches, swales and channels with stored materials is not permitted.

1.06 PROJECT CONDITIONS

- A. Burning of materials at the site is not permitted without the proper authorization of the appropriate local and state agencies.
- B. Materials not specified to be stored or reused shall be promptly removed and disposed of off-site.
- C. The locations of trees, plantings, vegetation, sidewalks, curbs and other living and nonliving items, as shown on the Drawings, have been determined by actual surveys at the time surveys were made. Since that time, additional items may have been built, some items may have been removed, and the condition of things may have changed. Carefully examine the site prior to bidding and become fully acquainted with the existing conditions as the Contract Price includes the cost for removing and replacing all obstacles and obstructions, as required, whether shown on the Drawings or not.
- D. Use all means necessary to protect existing objects designated to remain and, in the event of damage, immediately make all necessary repairs and replacements.
- E. Minimize production of dust due to clearing operations; do not use water if that will result in ice, flooding, sedimentation of public waterways or storm sewers, or other pollution.
- F. Comply with other requirements specified in Section 01 7000.

1.07 SCHEDULING

- A. Avoid interference with the use of, and passage to and from, adjacent buildings, facilities, driveways, walks, drainage systems and road.
- B. Pavements which are required to be removed, including highways, driveways and walks, may be saw cut in advance, but do not remove until the work is ready to be installed.
- C. Do not remove highway signs, guide rails and all other control, safety and warning devices until just prior to the installation of the work.
- D. Do not remove fences until the property owners affected are notified at least four days in advance of such removal. Unless written permission from a fence owner is received, do

not remove a fence more than 48 hours in advance of the installation of the work affecting the fence.

- E. It is the intent of this Section that all items affecting traffic, safety, lives and the containment of humans and animals and all items essential to the protection of property or the operation of a business be left in place as long as possible and replaced as soon as possible when such items must be removed.

PART 2 PRODUCTS

2.01 MATERIALS

- A. Pruning Paint - Asphalt base paint specially formulated for horticultural application to cut or damaged plant tissue.
- B. Explosives - Explosives are not permitted for clearing and grubbing operations.
- C. Other Materials - All other materials, not specifically described but required for proper completion of the work of this Section, shall be as selected by Contractor subject to the approval of Engineer.

PART 3 EXECUTION

3.01 SITE CLEARING

- A. Comply with other requirements specified in Section 01 7000.
- B. Minimize production of dust due to clearing operations; do not use water if that will result in ice, flooding, sedimentation of public waterways or storm sewers, or other pollution.

3.02 EXAMINATION

- A. Verify that all limiting boundaries such as permanent and temporary easements, property lines, rights-of-way and grading limits have been accurately located and clearly marked.
- B. Verify that pipeline routings and other items of work have been accurately located and clearly marked.

3.03 PREPARATION

- A. Mark all trees, plantings and other objects which are deemed necessary to be removed, trimmed, cut or taken-up and preserved.
- B. Notify and accompany Engineer through the site to inspect the items marked under Paragraph A, above. Describe which are to be trimmed, removed, and replanted and secure Engineer's approval.

3.04 CLEARING AND GRUBBING

- A. Clearing consists of cutting and disposing of all trees, down timber, stubs, brush, bushes, snags, rubbish, debris, and other objectionable matter and materials and the removal and storage of fences, signs, walks, guide rails, curbs and other items to be restored.
- B. Grubbing consists of the removal and disposal of all stumps, roots, duff, foundations and other objectionable matter and materials.
- C. All operations shall be done in a manner so that present growth will blend with the limits of construction and a natural appearance will be attained.
- D. Employ whatever measures are necessary to avoid erosion.

3.05 VEGETATION

- A. In grassed, planted and open areas, do not remove or trim trees or plantings without the prior permission of Engineer. Take-up and preserve small trees, plantings, flowers and similar vegetation for reuse.
- B. In wooded areas, trees may be removed and/or trimmed, as required, for the proper installation of the work. Gross and unnecessary removal of trees is not permitted.
- C. If it is impractical to fall trees as a whole, remove them in sections according to standard practices of professional tree removal. Fall trees to the center of the area being cleared to minimize damage to trees that are to be left standing.
- D. Immediately after falling a tree, remove branches, cut trunk and limbs and remove all materials from the site.
- E. All trees to remain shall not come in contact with any machine or appliance that will in any manner injure, sear or kill them.
- F. Property owners shall have the right to cut and remove any wood in advance of the Contractor's operations. All other timber and wood which is removed shall become the property of the Contractor.
- G. All trees left standing which have been trimmed or become scarred by Contractor's operations shall be promptly repaired by properly cutting, smoothing and painting.
- H. Trees to be trimmed shall be evenly cut to achieve neat severance with the least possible damage to the tree.
- I. Where roots are cut or damaged, apply wet burlap to prevent drying out.

3.06 DISPOSAL

- A. Burning at the site is not permitted without the proper authorization of the appropriate local and state agencies.
- B. Burial of materials at the site is not permitted.
- C. All materials shall be promptly removed and disposed of away from the site.
- D. Methods of disposal shall conform to the requirements of all Federal, State and Local Laws and Ordinances.
- E. Leave Site in a neat and orderly condition.

3.07 PAVEMENTS, WALKS, CURBS AND RAILS

- A. Remove existing pavements, walks and curbs to the limits shown on the Drawings, or if not shown, to the minimum extent possible.
- B. Saw cut asphalt and concrete paved surfaces before removal. Use a saw that will cut a neat, straight joint line.
- C. Carefully remove slate and flag stone walks, granite and stone curbs and guide rails to the minimum extent possible. Terminate removals at a joint or post. Store and protect for reuse.

3.08 WALLS, FENCES, STRUCTURES AND OTHER CONSTRUCTIONS

- A. All walls, fences, signs, sheds and other obstructions encountered shall be carefully taken up and stored for subsequent replacement.

- B. Do not disturb property markers unless absolutely necessary. If it becomes necessary to disturb or remove a property marker, have a qualified surveyor provide four ties to the marker. The qualified surveyor shall replace the marker as soon as possible.
- C. Remove and dispose of all other obstructions which will affect the work or which are specifically designated to be removed.

3.09 PROTECTION

- A. Carefully protect and guard all trees, shrubs and vegetation and take every precaution to avoid damage to utilities, buildings and other property.
- B. Injured or damaged trees shall be repaired in accordance with EXTERIOIR PLANTS.
- C. All trees, shrubs or plantings which are taken up for subsequent reuse, and die, shall be replaced with first class balled and burlap.

3.10 REPLANTING AND RESTORATION OF SURFACES

- A. The requirements for replanting and restoration of surfaces are contained in specification section 32 2901 RESTORATION OF SURFACES.

END OF SECTION

SECTION 31 22 50 - SOIL COMPACTION

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Requirements for soil compaction.

1.02 RELATED SECTIONS

- A. Division 31 - Earth Work

1.03 SUBMITTALS

- A. Section 01 3000 - Administrative Requirements, for submittal procedures.
- B. List and description of proposed compaction equipment.
- C. Copies of the results of the laboratory sieve analyses and moisture density tests, certified by the Testing Laboratory.

1.04 QUALITY ASSURANCE

- A. The taking of samples and the performing of field compaction density tests shall be done by an independent testing laboratory.
- B. Provide at least one person who shall be present at all times during the soil compaction operations and who shall be thoroughly familiar with the various types of compaction equipment, proper compacting techniques and method, and soils behavior, and who shall direct the compaction operations.

1.05 PROJECT CONDITIONS

- A. Compaction shall not take place in freezing weather or when materials to be compacted are frozen, too wet or moist, or too dry.
- B. Schedule the Work to allow ample time for laboratory tests and to permit the collecting of samples and the performing of field density tests during the backfilling and compaction operations.
- C. Protect pipes, structures and all other subsurface work from displacement or injury during compaction operations.

PART 2 PRODUCTS

2.01 COMPACTION

- A. Utilize the proper compaction methods and equipment to suit the soils and conditions encountered.

2.02 LABORATORY TEST REPORTS

- A. As a minimum, the laboratory moisture-density testing reports shall contain the following:
 - 1. Name.
 - 2. Date, time and specified location from which sample was taken and name of person who collected the sample.

3. Moisture - Density Curve plotted on graph paper to as larger as scale as practical with all points used to derive the curve being clearly visible.
 4. Designation of the test method used.
 5. The optimum density and moisture content.
 6. A description of the sample.
 7. The date the test was performed and the person who performed the test.
 8. The Project name, identification and Contractor's name.
 9. The signature of a responsible officer of the Testing Laboratory certifying to the information contained in the report.
- B. As a minimum, the field compaction density testing reports shall contain the following:
1. Name.
 2. Date, time, depth and specified lo action from which sample was taken and name of person who collected the sample.
 3. Designation of the test method used.
 4. Designation of the material being tested.
 5. Test number.
 6. In place dry density and moisture content.
 7. Optimum density and moisture content.
 8. Percentage of optimum density achieved.
 9. The Project name, identification and Contractor's name.
 10. The signature of a responsible officer of the Testing Laboratory certifying to the information contained in the report.

2.03 OTHER MATERIALS

- A. All other materials which are required to achieve adequate compaction shall be as selected by Contractor subject to approval of Engineer.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify that layers of material are no thicker than the maximum thickness specified in other Sections.
- B. Verify that moisture content is nearly optimum.
- C. Do not begin compaction operations until conditions are satisfactory.

3.02 PERFORMANCE

- A. Compaction densities shown are percentage of the maximum density obtainable at optimum moisture content as determined by ASTM D1557, Method C (Modified Proctor).
- B. Moisten or dry each layer of material to achieve optimum moisture content. Unless

otherwise specified or directed by Engineer, compact each layer of material to the following required densities:

<u>Location</u>	<u>Density</u>
Under concrete slabs, foundations and footings	95%
Backfill around Structures	90%
Embankments	90%
Paved Areas	95%
All Other Areas	
Select Fill*	95%
Remainder of Trench	90% **

* Bedding, around pipes, over pipes and over sand encasements.

** Or density consistent with existing conditions.

3.03 FIELD QUALITY CONTROL

- A. Perform a laboratory moisture density test for each type of soil proposed for use or encountered in the Work. Determine optimum moisture content in accordance with ASTM D1557, Method C.
- B. Engineer will designate the time, date and exact location of all field compaction density tests. Field density test may be ordered by Engineer in accordance with the following average frequencies:
 1. Under Structures - One test for every 400 square foot area of each layer of compacted granular fill.
 2. Outside of Structures - One test for each foot of backfill at intervals of approximately 50 feet around the structure.
 3. Trenches - One test for each foot of backfill at intervals of approximately 200 feet along the trench.
 4. Embankment - Six tests for each foot of compacted fill.
 5. Roads - One test for each layer of compacted fill and base material at intervals of approximately 200 feet along the roadway.
 6. Parking Areas and Sidewalks - One test for every 750 square foot area at parking areas and one test at intervals of 100 feet along sidewalks.
- C. Testing frequency indicated in Paragraph 3.03.B is at the discretion of the Engineer, and

may be decreased as the Project progresses.

- D. Field density and moisture testing shall conform to the requirements of ASTM D1556 or D2922 and ASTM D3017. Soils shall be described in accordance with ASTM D2488, Visual-Manual Procedure.

3.04 COORDINATION

- A. Provide all assistance and cooperation during testing and coordination operations to allow ample time for the required sampling and testing.
- B. Perform field inspection and testing in accordance with Section 01400 - Quality Requirements.

3.05 ADJUST AND CLEAN

- A. Replace or repair any pipe, structure or other Work which has been displaced, damaged, or injured.
- B. Compacted soils not meeting compaction densities shall be re-excavated, re-compacted and retested at the Contractor's expense until all requirements are met.

END OF SECTION

SECTION 31 22 70 - EROSION CONTROL

PART 1 GENERAL

1.01 SECTION INCLUDES

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

1.02 RELATED SECTIONS

- A. Section 31 2230 - Clearing and Grubbing: Limits of clearing; disposition of vegetative clearing debris.
- B. Section 31 2310 - Site Grading: Temporary and permanent grade changes for erosion control.
- C. Section 31 2373 - Riprap and Stone Protection: Temporary and permanent stabilization using riprap and stone.
- D. Section 32 2921 - Topsoil and Seeding: Permanent turf for erosion control.

1.03 PERFORMANCE REQUIREMENTS

- A. The Contractor shall be responsible for implementing all conditions of the General Permit 3-9020 for Construction Activities. Refer to Special Conditions for further information.
- B. Comply with all requirements of Maine Erosion & Sediment Control Best Management Practices, 2016, from the Maine Department of Environmental Protection.
- C. Do not begin clearing, grading, or other work involving disturbance of ground surface cover until applicable permits have been obtained; furnish all documentation required to obtain applicable permits.
- D. Owner will withhold payment to Contractor equivalent to all fines resulting from non-compliance with applicable regulations.
- E. Timing: Put preventive measures in place as soon as possible after disturbance of surface cover and before precipitation occurs.
- F. Prevent runoff into storm and sanitary sewer systems, including open drainage channels, in excess of actual capacity or amount allowed by authorities having jurisdiction, whichever is less.
- G. Erosion On Site: Minimize wind, water, and vehicular erosion of soil on project site due to construction activities for this project.
 - 1. Control movement of sediment and soil from temporary stockpiles of soil.
 - 2. Prevent development of ruts due to equipment and vehicular traffic.
 - 3. If erosion occurs due to non-compliance with their requirements, restore eroded areas at no cost to Owner.

- H. Erosion Off Site: Prevent erosion of soil and deposition of sediment on other properties caused by water leaving the project site due to construction activities for this project.
 - 1. Prevent windblown soil from leaving the project site.
 - 2. Prevent tracking of mud onto public roads outside site.
 - 3. Prevent mud and sediment from flowing onto sidewalks and pavement.
 - 4. If erosion occurs due to non-compliance with these requirements, restore eroded areas at no cost to Owner.
- I. Sedimentation of Waterways Off Site: Prevent sedimentation of waterways off the project site, including river, streams, lakes, ponds, open drainage ways, storm sewers, sanitary sewers.
 - 1. If sedimentation occurs, install or correct preventative measures immediately at no cost to Owner; remove deposited sediments; comply with requirements of authorities having jurisdiction.
- J. Maintenance: Maintain temporary preventive measures until permanent measures have been established.

1.04 PROJECT REQUIREMENTS

- A. Take every reasonable precaution and do whatever is necessary to avoid any erosion and to prevent silting of rivers, streams, lakes, reservoirs, impoundments, and drainage ditches and swales.
- B. The exposure of uncompleted cut slopes, embankments, trench excavations, and site graded areas shall be kept as short as possible. Initiate seeding and other erosion control measured on each segment as soon as reasonably possible.
- C. Should it become necessary to suspend construction for any length of time, shape all excavated and graded areas in such a manner that runoff will be intercepted and diverted to points where minimal erosion will occur. Provide and maintain temporary erosion and sediment control measures, such as berms, dikes, slope drains, silt stops, and sedimentation basins, until permanent drainage facilities or erosion control features have been completed and are operative.
- D. Fine material placed or exposed during the work shall be so handled and treated as to minimize the possibility of its reaching any surface waters. Use diversion channels, dikes, sediment traps, or any other effective control measures.
- E. Provide silt stops wherever erosion control measures may not be totally capable of controlling erosion, such as in drainage channels and where steep slopes may exist.
- F. Before water is allowed to flow in any ditch, swale or channel, install the permanent erosion control measures in the waterway so that the waterway will be safe against erosion.
- G. Take special precautions in the use of construction equipment to minimize erosion. Do not leave wheel tracks where erosion might begin.
- H. Unless specifically required in the Contract Documents, the operation of mechanized equipment in watercourses is not permitted. Where work is required in watercourses, minimize the movement of equipment in the waters and remove falsework, pilings, debris, and other temporary work as soon as construction will allow.

- I. Wherever crossing of live streams are necessary, provide temporary culverts or bridges to allow equipment to cross them without fording them. Disturbance of lands and waters outside the limits of construction is prohibited, except as may be found necessary and approved by Engineer.
- J. The requirements of this Section also apply to Project related construction activities away from the Project site, such as at borrow pits, off-site storage areas, and haul and work roads.
- K. Mulching shall follow the seeding operation by not more than 24 hours.
- L. Should any protective measures employed indicate any deficiencies or erosion taking place, immediately provide additional materials or employ different techniques to correct the situation and to prevent subsequent erosion.
- M. Continue erosion control measures until the permanent measures have been sufficiently established and are capable of controlling erosion on their own.
- N. Comply with all Federal, State, and Local laws, ordinances, rules and regulations.
- O. Provide the Resident Engineer with a written plan of erosion control for the entire contract area.

1.05 SUBMITTALS

- A. Section 01 3000 - Administrative Requirements, for submittal procedures.
- B. Certificate: Mill certificate for silt fence fabric attesting that fabric and factory seams comply with specified requirements, signed by legally authorized official of manufacturer; indicate actual minimum average roll values; identify fabric by roll identification numbers.
- C. Inspection Reports: Submit report of each inspection; identify each preventive measure, indicate condition, and specify maintenance or repair required and accomplished.

1.06 QUALITY ASSURANCE

- A. Provide at least one person who shall be present at all times during erosion control operations and who shall be thoroughly familiar with the types of materials being installed and the best methods for their installation and who shall direct all work performed under this Section.
- B. Material manufacturers and vendors shall be reputable, qualified firms regularly engaged in producing the required types of materials.
- C. Protect and maintain all areas disturbed by the Work, such that erosion is adequately controlled and silt and sediments are not allowed to flow into any watercourse, onto adjacent property, or into storm drains.

PART 2 PRODUCTS

2.01 HAY AND STRAW MULCH

- A. General - Hay and straw mulches shall be reasonably free from swamp grass, weeds, twigs, debris and other deleterious material, and free from rot, mold, primary noxious weed seeds, and rough or woody materials. Mulches containing mature seed of species which would volunteer and be detrimental to the permanent seeding, or would result in over seeding, or would produce growth which is aesthetically displeasing, is not permitted.

- B. Hay Mulch - Properly aired native hay, Sudan grass hay, broomsedge hay, legume hay, or similar hay or grass mowings. When air-dried in the loose state, the contents of the representative bale shall lose not more than fifteen (15) percent of the resulting air-dry weight of the bale.
- C. Straw Mulch - Threshed plant residue of oats, wheat, barley, rye or rice from which grain has been removed.
- D. Mulch Stabilizers - "Curasol" applied at a rate of 40 gal/Ac, Dow "Mulch Binder" applied at a rate of 45 gal/Ac, or asphalt binder, AASHTO M140, Type SS-1 or RS-1 as applicable, applied at the rate of 4000 gal/Ac.
- E. Temporary Type Mulch Nets - Paper yarn, approximately 0.05 inches in diameter, woven into a net with approximately openings of 7/8 inches by 1/2 inches and weighing about 0.20 lbs/sy.
- F. Permanent Type Mulch Nets - "Vexar" or "Erosion-Net" plastic or nylon mesh netting with approximately openings of 3/8 inches or 3/4 inches.

2.02 MATTING/BLANKETS

- A. Nomenclature - The various materials under this Paragraph are sometimes referred to as "matting" and "blankets". These words are interchangeably used throughout this Section, but the meanings shall be the same.
- B. Jute Matting - Undyed and unbleached jute yarn woven into a uniform open, plain weave mesh, furnished in rolled strips conforming to the following physical requirements:
 - Width -48 inches, plus or minus 1 inch
 - 78 warp ends per width of cloth
 - 41 weft ends per yard
 - Weight -1.22-1.80 lbs/ly, plus or minus 5%
- C. Excelsior Matting - Uniform web of interlocking wood excelsior fibers with a backing of mulchnet fabric on one side only. The mulchnet shall be woven of either twisted paper chord or cotton cord. Excelsior matting shall be furnished in rolled strips and shall conform to the following physical requirements.
 - Width -36 inches, plus or minus 1 inch
 - Weight -0.80 lbs/sy, plus or minus 5%
- D. Soil Erosion Matting - "Enkamat Type 7020" by American Enka Company, or approved equal.
- E. Erosion Control Mulching Blanket - "Hold/Gro" by Gulf States Paper Corp., or approved equal.
- F. Staples - No. 11 (or heavier) plain iron wire, made from at least 12 inch lengths of wire bent to form a "U" of 1-1/2 inches to 2 inches in width. Use longer staples for loose soils or where otherwise required.

2.03 SEED AND SOD FOR EROSION CONTROL

- A. Select a species appropriate to climate, planting season, and intended purpose. If same area will later be planted with permanent vegetation, so not use species known to be excessively competitive or prone to volunteer in subsequent seasons.
- B. For Temporary Control Use - annual or perennial ryegrass.

C. For Permanent Control - See Section TOPSOIL AND SEEDING.

2.04 SILT FENCES

- A. Polypropylene geotextile resistant to common soil chemicals, mildew, and insects; non-biodegradable; in longest lengths possible; fabric including seams with the following minimum average roll lengths.
- B. Manufacturers as shown in detail on Drawings.
- C. Approved equivalent shall meet the following:
 - 1. Average Opening Size: 30 U.S. Std. Sieve (0.600 mm), maximum, when tested in accordance with ASTM D 4751.
 - 2. Permittivity: 0.05 sec^{-1} , minimum, when tested in accordance with ASTM D 4491.
 - 3. Ultraviolet Resistance: Retaining at least 70 percent of tensile strength, when tested in accordance with ASTM D 4355 after 500 hours exposure.
 - 4. Tensile Strength: 100 lb-f (450 N), minimum, in cross-machine direction; 124 lb-f (550 N), minimum, in machine direction; when tested in accordance with ASTM D 4632.
 - 5. Elongation: 15 to 30 percent, when tested in accordance with ASTM D 4632.
 - 6. Tear Strength: 55 lb-f (245 N), minimum, when tested in accordance with ASTM D 4533.
- C. Silt Fence Posts: One of the following, minimum 5 feet (1500 mm) long.
 - 1. Hardwood, 2 by 2 inches (50 by 50 mm) in cross section.

2.05 RIPRAP

- A. See Section 31 2373.

2.06 CHECK DAMS AND SEDIMENT BASINS

- A. Reference drawings.

PART 3 EXECUTION

3.01 EXAMINATION

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

3.02 PREPARATION

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

3.03 SCOPE OF PREVENTATIVE MEASURES

- A. In all cases, if permanent erosion resistant measures have been installed temporary preventive measures are not required.
- B. Construction Entrances: Traffic-bearing aggregate surface.
 - 1. Provide at each construction entrance from public right-of-way.
 - 2. Where necessary to prevent tracking of mud onto right-of-way, provide wheel

washing area out of direct traffic land, with drain into sediment trap or basin.

3. See detail on Drawings for dimensions and construction specifications.

C. Linear Sediment Barriers: Made of silt fences.

1. Provide linear sediment barriers:
 - a. Along downhill perimeter edge of disturbed areas, including soil stockpiles.
 - b. Along the top of the slope or top bank of drainage channels and swales that transverse disturbed areas.
 - c. Along the toe of cut slopes and fill slopes.
2. Space sediment barriers with the following maximum slope length upslope from barriers:
 - a. Slope of less than 2 percent: 100 feet (30 m).
 - b. Slope between 2 and 5 percent: 75 feet (23 m).
 - c. Slope between 5 and 10 percent: 50 feet (15 m).
 - d. Slope between 10 and 20 percent: 25 feet (7.5 m).
 - e. Slope over 20 percent: 15 feet (4.5 m).

D. Storm Drain Curb Inlet Sediment Trap: See details on Drawings.

E. Temporary Splash Pads: Stone aggregate over filter fabric; size to suit application; provide at downspout outlets and stormwater outlets.

F. Soil Stockpiles: Protect using one of the following measures:

1. Cover with polyethylene film, secured by placing soil or other anchoring devices on outer edges.

G. Mulching: Use only for areas that may be subjected to erosion for less than 6 months.

H. Temporary Seeding: Use where temporary vegetated cover is required.

3.04 INSTALLATION

A. HAY AND STRAW MULCHING

1. Install hay or straw mulch immediately after each area has been properly prepared. When permanent seed or seed for temporary erosion control is sown prior to placing the mulch, place mulch on seeded areas within 24 hours after seeding. Engineer may authorize the blowing of chapped mulch provided that 95% of the mulch fibers will be 6 inches or more in length and that it can be applied in such a manner that there will be a minimum amount of matting that would retard the growth of plants. Hay mulch should cover the ground enough to shade it, but the mulch should not be so thick that a person standing cannot see the ground through the mulch. Remove matted mulch or branches.
2. Where mild winds may blow the mulch, or when ground slopes exceed 15%, or when otherwise required to maintain the mulch firmly in place, apply a system of pegs and strings, a chemical stabilizer, or temporary type netting to the mulch. Unless otherwise directed, remove the stings and netting prior to the acceptance

of the Work.

3. Where high winds exist, or heavy rainstorms are likely, or where ground surfaces are steep, or where other conditions require, apply temporary type netting over the mulch and take whatever measures are necessary to maintain the mulch firmly in place.
4. Unless otherwise specified, the use of permanent type netting is not permitted without the prior approval of Engineer.

B. MATTING/BLANKETS - GENERAL

1. The use of mulch with matting is not permitted, however, a 4 to 6 inch overlap of mulch over the edge of matting is permissible.
2. Prepare surfaces of ditches and slopes to conform to the grades, contours and cross sections shown on the Drawings and finish to a smooth and even condition with all debris, roots, stone, and lumps raked out and removed. Loosen the soil surface to permit bedding of the matting. Unless otherwise noted, place seed prior to the placement of the matting.
3. Unroll matting parallel to the direction of flow of water and loosely drape, without folds or stretching, so that continuous ground contact is maintained.
4. In ditches and swales, and on slopes, each upslope and each downslope end of each piece of matting shall be placed in a 6 inch trench, stapled at 12 inches on center, backfilled, and tamped. Similarly, bury edges of matting along the edges of catch basins and other structures. Engineer may require that any other edge, exposed to more than normal flow of water, be buried in a similar fashion.
5. Tightly secure matting to the soil by staples driven approximately vertically into the ground, flush with the surface of the matting. In driving the staples, take care not to form depressions or bulges in the surface of the matting.
6. Decrease the specified spacing of staples when varying factors, such as the season of the year or the amount of water encountered or anticipated, requires additional anchoring.
7. Refer to the following paragraphs for additional requirements on the placement of matting and stapling.

C. JUTE MATTING

1. Where strips are laid parallel or meet, as in a tee, they shall be overlapped at least 4 inches. Overlap ends at least 6 inches, shingle fashion.
2. Space check slots, built at right angles to the direction of flow of water, so that one check slot or one end occurs within each 50 feet of length of slope. Construct check slots by placing a tight fold of matting at least 6 inches vertically into the ground. These shall be tamped the same as the upslope ends.
3. Press jute matting onto the ground with a light lawn roller or other satisfactory means.
4. On slopes flatter than 4:1, place staples not more than 3 feet apart in three rows, for each strip, with one row along each edge and one row alternately spaced down the center. On grades 4:1 or steeper, place staples in the same three rows, but spaced 2 feet. On lapping edges, double the number of staples, with the

spacing halved. Ends of matting and all required check slots shall have staples placed every foot. Matting placed adjacent to boulders or other obstructions shall be stapled with no spaces between the staples.

5. Spread additional seed over jute matting, particularly those locations disturbed by the building of slots.

D. EXCELSIOR MATTING

1. Where strips of excelsior matting are laid end to end, abut the adjoining ends.
2. When adjoining rolls of excelsior matting are laid parallel to one another, abut the matting snugly.
3. One slopes flatter than 4:1, place staples not more than 3 feet apart in three rows, for each strip, with one row along each edge and one row alternately spaced down the center. One grades 4:1 or steeper, place staples in the same three rows, but spaced 2 feet. Ends of matting shall have staples placed every foot. Matting placed adjacent to boulders or other obstructions shall be stapled with no spaces between the staples.

E. EROSION CONTROL MULCHING BLANKET

1. Where one roll ends and a second roll begins, the upslope piece shall be brought over the end of the downslope roll so that there is a 12 inch overlap, placed in a 4 inch deep trench, stapled at 12 inches on center, backfilled and tamped.
2. On slopes where two or more widths of blankets are applied, the two edges shall be overlapped 4 inches and stapled at 12 inch intervals along the exposed edge of the lap joint.
3. Staple the body of the blanket in a grid pattern with staples 3 feet on center, each way.

F. SEED FOR EROSION CONTROL

1. Seeding for permanent erosion control shall be carried out in accordance with Section TOPSOIL AND SEEDING.
2. Areas which will be regraded or otherwise disturbed later during construction may be ordered to be seeded with rye grass to obtain temporary control. The seed shall be sown at the rate of approximately one pound per 1,000 square feet, on the pure live seed basis.

G. SILT FENCES

1. Provide silt fences, as required, for the temporary control of erosion and to stop silt and sediment from reaching surface waters, adjacent properties, or entering catch basins, or damaging the Work.
2. Erect silt fences and bury bottom edge in accordance with the manufacturer's recommended installation instructions. Provide a sufficient length of fence to accommodate runoff without causing any flooding and to adequately store any silt, sediment, and debris reaching it.
3. Leave silt fences in place until permanent erosion control measures have stopped all erosion and siltation.

3.05 MAINTENANCE

- A. If any staples become loosened or raised, or if any matting becomes loose, torn or undermined, or if any temporary erosion and sediment control measures are disturbed, repair them immediately.
- B. If seed is washed out before germination, repair any damage, refertilize, and reseed.
- C. Maintain mulched and matted areas, silt stops, and other temporary control measures until permanent control measures are established and no further erosion is likely.

END OF SECTION

SECTION 31 23 10 - SITE GRADING

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Removal and storage of topsoil.
- B. Rough grading the site.
- C. Finish grading.
- D. Filling
- E. Riprapping
- F. Construction of embankments.

1.02 RELATED REQUIREMENTS

- A. Section 01 4000 - Quality Requirements.
- B. Section 31 2230 - Clearing and Grubbing.
- C. Section 31 2250 - Soil Compaction.
- D. Section 31 2270 - Erosion control.
- E. Section 31 2315 - Excavation.
- F. Section 31 2316 - Fill and Backfill: Filling and compaction.
- G. Section 31 2317 - Trenching for Site Utilities: Trenching and backfilling for utilities.
- H. Section 31 2318 - Rock Removal.
- I. Section 32 2901 - Restoration of Surfaces.
- J. Section 32 2921 - Topsoil and Seeding: Finish ground cover.

1.03 SUBMITTALS

- A. Section 01 3000 - Administrative Requirements
- B. Certified copies of all results of maximum density tests and field compaction density tests.
- C. Gradations of stone, gravel, and other materials proposed for use.
- D. Project Record Documents: Accurately record actual locations of utilities remaining by horizontal dimensions, elevations or inverts, and slope gradients.

1.04 QUALITY ASSURANCE

- A. All finished grades shall be as shown on the Drawings. Use a qualified surveyor to set all grade stakes and to ensure that the resulting final grades are those which are required.
- B. When placing fill or constructing embankments, moisten or dry fill material to the proper moisture content as determined by ASTM D1557, Method C.

1.05 DELIVERY, STORAGE AND HANDLING

- A. Delivery of borrow materials to the site or removal of spoil from the site shall be done in a manner which will not cause any nuisance or allow spillage of materials from the transporting vehicle.

- B. Store topsoil separately from all other excavated materials and preserve for reuse.
- C. Materials which are required to be stored shall be stored in an orderly manner and at a sufficient distance away from banks of excavations and trenches to avoid overloading and percent slides or cave-ins. Do not store materials on, over or adjacent to structures or utilities which may collapse due to the added weight.
- D. Promptly remove materials not specified to be stored or reused.
- E. Obstruction of roads, driveways, sidewalks or interference with drainage along gutters, ditches or drainage channels with stored material is not permitted. If materials cannot be stored at the site to avoid such obstructions and interferences, they shall be stored away from the site and brought back when and as needed.

1.06 PROJECT CONDITIONS

- A. Protect above- and below-grade utilities that remain.
- B. Protect plants, lawns, rock outcroppings, and other features to remain as a portion of final landscaping. These features are shown on Contract Drawings.
- C. Protect bench marks, survey control points, existing structures, fences, sidewalks, paving, and curbs from grading equipment and vehicular traffic.
- D. Keep ground surfaces well drained, but avoid erosion. Do not place fill in water or over ice or snow.
- E. Filling with frozen materials or when materials already in place are frozen, is not permitted.

1.07 SCHEDULING AND SEQUENCING

- A. Schedule the Work with Engineer and afford her/him adequate time and space to make all required inspections.
- B. Schedule work and coordinate operations with the approved testing laboratory. If the laboratory cannot be available to perform required tests, grading and filling operations may have to be delayed in order to accomplish certain field tests.

PART 2 PRODUCTS

2.01 FILL MATERIAL

- A. Topsoil: See Section 32 2921.
- B. Other Fill Materials: See Section 31 2316.

2.02 RIPRAP

- A. See Section 31 2373
- B. Stone for riprap shall be approved, rough, unhewn quarry stone, as nearly rectangular in section as practicable. The stones shall be hard, sound and resistant to the action of water and weathering. They shall be of a rock type other than serpentine rock containing the fibrous variety chrysotile (asbestos) and suitable in every respect for the purpose intended.
 - 1. Plain Riprap (MDOT 703.26) - Stone for riprap shall consist of hard, sound durable rock that will not disintegrate by exposure to water or weather. Stone for riprap shall be angular and rough. Rounded, sub-rounded or long thin stones will not be allowed. The maximum allowable length to width ratio will be 3:1. Stone for riprap may be obtained from quarries or by screening oversized rock from earth

borrow pits. The minimum stone size (10 lbs) shall have an average dimension of 5 inches. The maximum stone size (200 lbs) shall have an average dimension of approximately 12 inches. Larger stones may be used if approved by the Resident. Fifty percent of the stones by volume shall have an average dimension greater than 9 inches (50 lbs).

2. Stone Ditch Protection (MDOT 703.29) - Rock used for ditch protection shall consist of sound, durable rock that will not disintegrate by exposure to water or weather. Fieldstone, rough quarry stone, blasted ledge rock or tailings may be used. The rock shall be graded within the following limits or as otherwise approved

Sieve Designation	Percentage by Weight Passing Square Mesh Sieves
12 inch	90-100
4 inch	0-15

The size of any stone shall not exceed 18 inches when measured along its longest axis.

3. Heavy Riprap (MDOT 703.28) - Stone for heavy riprap shall consist of hard, sound, durable rock that will not disintegrate by exposure to water or weather. Stone for heavy riprap shall be angular and rough. Rounded, subrounded, or thin, flat stones will not be allowed. The maximum allowable length to width ratio will be 3:1. Stone for heavy riprap may be obtained from quarries or by screening oversized rock from earth borrow pits. The minimum stone size (500 lbs) shall have minimum dimension of 15 inches, and at least fifty percent of the stones by volume shall have an average dimension greater than 24 inches (1000 lbs)

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify that all boundaries of temporary and permanent easements and property lines are clearly marked in the field and that the Work will not violate these boundaries.
- B. Verify that the clearing and grubbing operations have been completed.
- C. Ascertain and verify the locations and character of structures, underground lines and subsurface conditions and verify that the Work will not adversely affect them.
- D. Verify that grade stakes have been properly and accurately set.
- E. Do not begin operations until conditions are satisfactory.

3.02 STRIP AND STOCKPILE TOPSOIL

- A. Strip topsoil to its full depth within all areas to be excavated or graded and in areas to receive pavements, fills or embankments except where existing ground is to be left undisturbed.
- B. Store topsoil on-site, in storage piles. Keep topsoil separated from all other excavated materials and store free of roots or other desirable materials.

3.03 DISPOSAL OF MATERIALS

- A. Use approved on-site materials to the extent they are available. Promptly dispose of any excess materials, off-site.
- B. Remove from the site all unsuitable material. Do not store or stockpile unsuitable materials at the Project site and do not incorporate into the Work.

3.04 SITE GRADING

- A. Rough grade the portions of the site which must be raised or lowered in order to properly execute the work under other Sections.
- B. Uniformly grade the site to the lines, grades and elevations shown on the Drawings. Finished surfaces shall be reasonably smooth, compacted and free from irregular surface changes. Unless otherwise specified, the finish shall be equivalent to the ordinarily obtainable from either blade grader or scraper operations.
- C. In unpaved areas, except those to be riprapped, lined or specially treated, smooth the surface sufficiently for application of topsoil. The finished topsoil subgrade shall not be more than 1 inch above or below the established grade or cross section.
- D. In unpaved areas, the finished grades shown on the Drawings include a layer of topsoil. The thickness of the topsoil is specified on the Drawings.

3.05 ROUGH GRADING

- A. Remove topsoil from areas to be excavated for sanitary sewer alignments, without mixing with foreign materials.
- B. Do not remove topsoil when wet.
- C. Remove subsoil from areas to be further excavated, re-landscaped, or re-graded.
- D. Do not remove wet subsoil, unless it is subsequently processed to obtain optimum moisture content.
- E. When excavating through roots, perform work by hand and cut roots with sharp axe.
- F. Benching Slopes: Horizontally bench existing slopes greater than 1:4 to key fill material to slope for firm bearing.
- G. Stability: Replace damaged or displaced subsoil to same requirements as for specified fill.

3.06 EMBANKMENT CONSTRUCTION

- A. Level off surfaces upon which embankments are to be constructed. Where existing ground is left undisturbed, plow or disk the Surface and mix it in with the first layer of embankment material to provide a satisfactory bond.
- B. Ground surfaces sloped steeper than 1 vertical to 4 horizontal shall be plowed, stepped or broken up to permit bonding of the embankment with the existing surface.
- C. Uniformly place and spread fill in successive horizontal layers not more than 1 foot in compacted depth.
- D. Compact each layer of fill to a minimum density of 90%.

3.07 PREPARATION OF PAVEMENT SUBBASES

- A. Shape the entire subbase to the required line, grade and cross section. Remove and dispose of all soft and unsuitable material and replace with an approved material. Remove and dispose of all boulders and ledge rock. Break off to a depth of not less than 6 inch below

the subbase. Fill resulting depressions with an approved material.

- B. Roll subbase to achieve the required compaction densities specified in Section 31 2250. Reshape, wet and aerate subbase, as required. Compact the entire width of the area to receive pavement, plus the areas within 5 feet of and parallel and adjacent to the edges of the pavement. Compact the full depth of embankments to the required density. Where cuts are encountered, thoroughly roll and compact until no further consolidation is apparent.
- C. When pavements cannot be placed immediately after the preparation of the subbase, the entire subbase shall be reshaped and compacted to the required line, grade and cross section.
- D. After rolling, the surface of the subbase shall not show any deviation in excess of 3/4 inch when tested with a 10 foot straightedge applied both parallel to and at right angles to the centerline of the area. The elevation of the finished subbase shall not vary more than 0.50 feet from the established grade and cross section.
- E. Do not disturb the finished subbase by traffic or other operations and protect and maintain in a satisfactory condition until the overlaying pavement is placed.

3.08 SUBBASE AND EMBANKMENT PROTECTION

- A. Keep the embankments and excavations shaped and well drained. Where ruts or erosion occur, add additional fill and reshape and recompact before placing paving materials.
- B. The storage or stockpiling of material on prepared subbases is not permitted.
- C. All subbases will be inspected by Engineer and paving materials shall not be placed prior to receipt of Engineer's approval. The placing of pavement materials on a muddy, spongy, weaving or frozen subbase is not permitted.

3.09 DITCHES - SWALES

- A. Accurately cut ditches and swales to the required cross sections and grades. Cut off all roots, stumps, rock and foreign matter, in the sides and bottoms of ditches and swales, to conform to the required slope, grade and shape.
- B. Maintain ditches and swales at all times so that they effectively drain. Refill, reshape and recompact where ruts or erosion occurs.

3.10 DUMPED RIPRAP

- A. Place riprap in a manner so as to produce a reasonably well graded mass of rock with the minimum practicable percentage of voids. The finished stone surface shall be free from objectionable pockets of smaller stones and clusters of larger stones.
- B. Placing stones in layers or dumping by methods likely to cause segregation of the various sizes is not permitted. Obtain the desired distribution of the various sized stones by selective loading, controlled dumping of successive loads or by other approved means.
- C. Completely fill voids with fine stone or gravel. Rearrange stones by mechanical equipment or by hand to the extent necessary to obtain a reasonably well graded distribution.
- D. The final stone surface shall not exceed 3 inches, plus or minus, from the required grades and elevations. Leave riprap in a stable mass.

3.11 STONE SLOPE PROTECTION

- A. Place stone to the depth, grade, line and cross section shown on the Drawings. The finished stone surface shall be free from objectionable pockets smaller stones and clusters of larger ones.
- B. Carefully dump and grade stone to the extent necessary to obtain a reasonably smooth, stable and well graded distribution with the minimum practicable percentage of voids.

3.12 FIELD QUALITY CONTROL

- A. Soils testing shall be performed by the approved independent testing laboratory in accordance with Section 02250 - Soil Compaction
- B. Engineer will establish the date, time, location, number, and types of soils tests required.

END OF SECTION

SECTION 31 23 15 - EXCAVATION

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Excavating for the installation of underground lines, structures and foundations.

1.02 RELATED REQUIREMENTS

- A. Section 01 7000 - Execution Requirements: General requirements for dewatering of excavations and water control.
- B. Section 31 2230 - Clearing and Grubbing
- C. Section 31 2250 - Soil Compaction
- D. Section 31 2310 - Site Grading: Soil removal from surface of site.
- E. Section 31 2316 - Fill and Backfill: Fill materials, filling, and compacting.
- F. Section 31 2317 - Trenching for Site Utilities: Excavating for utility trenches outside the building.
- G. Section 31 2318 - Rock Removal: Removal of rock during excavating.
- H. Section 31 2501 - Dewatering
- I. Section 32 2901 - Restoration of Surfaces

1.03 DEFINITIONS

- A. Solid Rock, Loose Rock, Common Excavation and Rock Excavation - Defined in Section 31 2318.
- B. Common Excavations - Removal and disposition of all materials, except solid rock, which are encountered within the required widths and depths of excavation.

1.04 SUBMITTALS

- A. Section 01 3000 - Administrative Requirements

1.05 QUALITY ASSURANCE

- A. Unless otherwise specified, or approved by Engineer in writing, tunneling is not permitted.
- B. Do not restrict access to any private road or driveway for more than one hour. Provide and maintain suitable temporary crossing over open ditches where required to meet this condition.
- C. When excavating in or adjacent to roads or existing facilities, take whatever measures are necessary to protect the road surfaces and/or from becoming undermined.

1.06 DELIVERY, STORAGE AND HANDLING

- A. Store topsoil separately from all other excavated materials on the site and preserve for reuse.
- B. Store excavated materials meeting the requirements for backfill in an orderly manner at a sufficient distance away from banks of excavations and trenches to avoid overloading and to prevent slides or cave-ins. Do not store materials on, over or adjacent to structures or

utilities which may collapse or become damaged due to promptly and dispose of away from the site.

- C. Promptly remove materials not specified to be stored or reused.
- D. Obstruction of roads, driveways, sidewalks or interferences with drainage along gutters, ditches or drainage channels with stored material is not permitted. If materials cannot be stored at the site to avoid such obstructions and interferences, they shall be stored away from the site and brought back when and as needed.
- E. No construction activity, access, storage or other use shall take place beyond the construction easement boundaries. Engineer may require Contractor to install and maintain snow fences along the boundaries, where such boundaries could be violated.

1.07 PROJECT CONDITIONS

- A. Verify that survey bench mark and intended elevations for the Work are as indicated.
- B. Protect plants, lawns, and other features to remain.
- C. Protect bench marks, survey control points, existing structures, fences, sidewalks, paving, curbs, and utilities from excavating equipment and vehicular traffic.
- D. Maintain excavations free of groundwater, sewage, stormwater, ice and snow during the progress of the Work and until the finished work is safe from injury.
- E. Protect subgrades against freezing by means of insulated blankets, salt hay or other methods.

PART 2 PRODUCTS

2.01 MATERIALS

- A. Wood Sheeting and Bracing - Sound timber, free from defects which might impair its strength and effectiveness.
- B. Steel Sheeting and Bracing - ASTM A328.

PART 3 EXECUTION

3.01 EXCAVATING

- A. Excavate for structures to the elevations indicated on the Drawings and extend a sufficient distance from foundation walls, piers and footings to provide adequate clearances for construction operations, including sheeting and bracing, if required, and for inspection purposes.
- B. Trim approximately the last four inches of foundation subgrades, in earth, by hand just prior to the placement of concrete or concrete reinforcement.

3.02 SHEETING AND BRACING

- A. Provide and maintain adequate sheeting and bracing as required for the safety and protection of the Work, persons and adjacent property and structures in accordance with Federal, State, and Local laws, codes, ordinances, and standards.
- B. Engineer may, at his discretion, order sheeting and bracing to be cut-off and left-in-place. Where, in the opinion of Contractor, damage may result from withdrawing sheeting, he shall immediately notify Engineer for verification. Sheeting ordered left-in- place adjacent to piping shall be cut off not less than 12" over the top sheeting and bracing.

- C. Contractor is fully responsible for the design and construction of all sheeting and bracing used and for all damages resulting from improper quality, strength, placing, maintenance or removal of sheeting and bracing.

3.03 UNSTABLE MATERIALS

- A. Remove unstable materials in excavations and trench bottoms, which are incapable of supporting pipes or structures, to the extent and depths directed by Engineer, and properly dispose of off-site. Refill and compact the excavation or trench as required, with Granular Fill, Stone Fill or concrete, as directed by Engineer.
- B. Whenever the material encountered is, in Contractor's opinion, incapable of providing adequate support, he shall immediately notify the Engineer for verification. Make measurements, for payment purposes, in Engineer's presence.

3.04 DISPOSAL OF EXCAVATED MATERIALS

- A. Excavated materials which meet the requirements for embankment fill or backfill may be used for constructing embankments and backfilling, as applicable. Remove excess excavated materials and dispose off-site.
- B. Load and remove unsuitable materials and dispose off-site. The storing or stockpiling of unsuitable material is not permitted and such material shall be loaded directly from the excavation onto trucks.
- C. The Contractor shall be responsible for all costs of loading, hauling, dumping, and otherwise transporting and disposal of all excess excavated/unsuitable materials, including the requirement to identify appropriate disposal areas, and obtaining any permits associated with disposal. It is noted that the Owner may be interested in receiving clean excess excavated materials at the site of the Town Landfill.

3.05 PROTECTION

- A. Prevent displacement of banks and keep loose soil from falling into excavation; maintain soil stability.
- B. Protect bottom of excavations and soil adjacent to and beneath foundation from freezing.

END OF SECTION

SECTION 31 23 16 - AGGREGATES, FILL AND BACKFILL

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Filling, backfilling, and compacting for paving, site structures, and utilities.
- B. Backfilling and compacting for utilities outside the building to utility main connections.
- C. Filling holes, pits, and excavations generated as a result of removal (demolition) operations.

1.02 RELATED REQUIREMENTS

- A. Section 31 2310 - Site Grading
- B. Section 31 2315 - Excavation: Removal and handling of soil to be re-used.
- C. Section 31 2317 - Trenching for Site Utilities: Excavating for utility trenches outside the building.
- D. Section 32 2901 - Restoration of Surfaces
- K. Paved Areas - The area which lies directly under a paved surface, whether it be asphalt, concrete, or other paving materials.

1.03 REFERENCE STANDARDS

- A. AASHTO T 180 - Standard Specification for Moisture-Density Relations of Soils Using a 4.54 kg (10-lb) Rammer and a 457 mm (18 in.) Drop; American Association of State Highway and Transportation Officials; 2010.
- B. ASTM C 136 - Standard Test Method for Sieve Analysis of Fine and Coarse Aggregates; 2006.
- C. ASTM D 698 - Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Standard Effort (12,400 ft-lbf/ft³ (600 kN-m/m³)); 2007.
- D. ASTM D 1556 - Standard Test Method for Density and Unit Weight of Soil in Place by the Sand-Cone Method; 2007.
- E. ASTM D 1557 - Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Modified Effort (56,000 ft-lbf/ft³ (2,700 kN m/m³)); 2009.
- F. ASTM D 2167 - Standard Test Method for Density and Unit Weight of Soil in Place by the Rubber Balloon Method; 2008.
- G. ASTM D 2487 - Standard Practice for Classification of Soils for Engineering Purposes (Unified Soil Classification System); 2006.
- H. ASTM D 2922 - Standard Test Methods for Density of Soil and Soil-Aggregate in Place by Nuclear Methods (Shallow Depth); 2005.
- I. ASTM D 3017 - Standard Test Method for Water Content of Soil and Rock in Place by Nuclear Methods (Shallow Depth); 2005.
- J. ASTM D 4318 - Standard Test Methods for Liquid Limit, Plastic Limit, and Plasticity Index of Soils; 2005.

1.04 SUBMITTALS

- A. See Section 01 3000 - Administrative Requirements, for submittal procedures.
- B. Certified copies of all results of moisture-density tests and field compaction density tests.
- C. Gradations of Stone Bedding, Stone Fill, Sand Bedding, Bank Run Gravel, Screened Gravel, and Crushed Gravel/Granular Fill.
- D. Gradations of other material proposed for use in the work.
- E. Copies of measurements and computed volumes of unstable material removed.
- F. Certification from testing laboratory that crushed gravel under-drain material meets permeability requirements at required compaction.
- G. Compaction Density Test Reports.

1.05 QUALITY ASSURANCE

- A. Moisten or dry backfill to the proper moisture content as determined in accordance with ASTM D1557, Method C.
- B. All subgrades shall be approved by Engineer before pipes or structures are installed or concrete is placed.

1.06 DELIVERY, STORAGE AND HANDLING

- A. Store topsoil separately from all other excavated materials on the site and preserve for reuse.
- B. Promptly remove materials not specified to be stored or reused.
- C. Obstruction of roads, driveways, sidewalks or interferences with drainage along gutters, ditches or drainage channels with stored material is not permitted. If materials cannot be stored at the site to avoid such obstructions and interferences, they shall be stored away from the site and brought back when and as needed.
- D. No construction activity, access, storage or other use shall take place beyond the construction easement boundaries. Engineer may require Contractor to install and maintain snow fences along the boundaries, where such boundaries could be violated.

1.07 DELIVERY, STORAGE, AND HANDLING

- A. When necessary, store materials on site in advance of need.
- B. Verify that survey bench marks and intended elevations for the Work are as indicated.
- C. Backfilling with frozen materials or when materials already in place are frozen is not permitted.

1.08 SCHEDULING AND SEQUENCING

- A. Do not backfill until the following conditions are met:
 - 1. Concrete - See Division 3 for the time required after the placement of concrete.
 - 2. Manholes - See Section 33 2601 which requires that specific manholes be given and pass leakage tests prior to backfilling.
 - 3. Mortar Plaster and Masonry - Mortar has set, but no sooner than three days after the mortar was applied.

4. Dampproofed, Waterproofed, and Coated Surfaces - Only after materials have properly cured.
 5. Work in General - Engineer and testing laboratory have completed all inspections and tests.
- B. Except as noted above, or required by other Sections, or when approved or directed by Engineer, backfill pipe and cable excavations within one day after installation. Backfill other excavations as soon as possible after all inspections and tests have been completed.

PART 2 PRODUCTS

2.01 MATERIALS

- A. General Backfill - To the extent suitable materials are available, backfill shall consist of excavated material. Where excavation does not provide sufficient approved material, import additional materials from off site.
- B. Granular Borrow - Fill to raise grades in building areas and backfill for over-excavations, or to repair soft areas, should be sand or silty sand meeting the requirements of 2020 MaineDOT Standard Specification 703.19 Granular Borrow.
- C. Structural Fill - Fill to raise grades in building areas and backfill for foundations, over-excavated areas and slab base material should be clean, non-frost susceptible sand and gravel meeting the gradation requirements for Structural Fill as given below:

Structural Fill	
Sieve Size	Percent Finer by Weight
4 inch	100
3 inch	90 to 100
¾ inch	25 to 90
No. 40	0 to 30
No. 200	0 to 6

- D. Crushed Stone - Crushed Stone, used for underdrain aggregate and below foundations on native glaciomarine soils, should be washed ¾-inch crushed stone meeting the requirements of 2020 MaineDOT Standard Specification 703.13 Crushed Stone ¾-Inch.
- E. Aggregate for Gravel Drives and Campsites - Aggregates shall conform to the requirements of 2020 MaineDOT Standard Specification 703.10 Aggregate for Untreated Surface Course and Leveling Course Type A. Aggregate for untreated surface course and leveling course shall be screened or crushed gravel consisting of hard durable particles which are free from vegetable matter, lumps or balls of clay and other deleterious substances. If this item is to be used underneath pavement, it must have a Micro-Deval value of 20.0 or less as determined by AASHTO T 327. If the Micro-Deval value exceeds 20.0, 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. The aggregate shall meet the grading requirements of the following table:

Sieve Designation	Percentage by Weight Passing Square Mesh Sieves	
	Untreated Aggregate Surface Course	
	Type A	Type B
1 inch	95-100	95-100
¾ inch	90-100	90-100
No. 4	40-65	10-45
No. 10	10-45	10-35
No. 200	0-7.0	0-6.0

- F. Aggregates for Base - Aggregates shall conform to the requirements of 2020 MaineDOT Standard Specification 703.06 Aggregate for Base and Subbase Type A. The material shall have a Micro-Deval value of 25.0 or less as determined by AASHTO T327. 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.

Recycled Asphalt Pavement (RAP) shall not be used for or blended with aggregate base or subbase. Aggregate for base, Type A and B shall be crushed ledge or crushed gravel of hard durable particles free from vegetable matter, lumps or balls of clay and other deleterious substances. The gradation of the part that passes a 3 inch sieve shall meet the grading requirements of the following table:

Sieve Designation	Percentage by Weight Passing Square Mesh Sieves	
	Type A	Type B
½ inch	45-70	35-75
¼ inch	30-55	25-60
No. 40	0-20	0-25
No. 200	0-6.0	0-6.0

At least 50 percent by weight of the material retained on the No. 4 sieve shall have at least one fractured face as tested by AASHTO T 335.

Type A aggregate for base shall only contain particles of rock that will pass the 2 inch square mesh sieve.

Type B aggregate for base shall only contain particles of rock that will pass the 4 inch square mesh sieve.

- G. Aggregates for Subbase - Aggregates shall conform to the requirements of 2020 MaineDOT Standard Specification 703.06 Aggregate for Base and Subbase Type D. The material shall have a Micro-Deval value of 25.0 or less as determined by AASHTO T327. 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.

Recycled Asphalt Pavement (RAP) shall not be used for or blended with aggregate base or subbase. Aggregate for subbase shall be sand or gravel of hard durable particles free from vegetable matter, lumps or balls of clay and other deleterious substances. The gradation of

the part that passes a 3 inch sieve shall meet the grading requirements of the following table:

Sieve Designation	Percentage by Weight Passing Square Mesh Sieves	
	Type D	Type E
½ in	35-80	
¼ inch	25-65	25-100
No. 40	0-30	0-50
No. 200	0-7.0	0-7.0

Type D aggregate for subbase gravel may contain up to 50 percent by weight Recycled Concrete Aggregate (RCA). When RCA is used, the portion of the resulting blend of gravel and RCA retained on a ½" square mesh sieve shall contain a total of no more than 5 percent by weight of other recycled materials such as brick, concrete masonry block, or asphalt pavement as determined by visual inspection.

RCA shall be substantially free of wood, metal, plaster, and gypsum board as defined in Note 9 in Section 7.4 of AASHTO M 319. RCA shall also be free of all substances that fall under the category of solid waste or hazardous materials.

Aggregate for subbase shall not contain particles of rock which will not pass the 6 inch square mesh sieve.

- H. Sand Bedding - Sand conforming to ASTM C33, Fine aggregate.

Gradation: Passing #4 Sieve = 100%

Passing #200 Sieve = 0-20%

- I. Earth - Clay, loam, sand, gravel, topsoil and other materials not classified as solid rock or loose rock.
- J. Common Earth - Clay, loam, sand, gravel, topsoil and similar materials which may contain some stones, pebbles, lumps and rock fragments up to 6" in largest dimension, but does not contain debris and frozen material.
- K. Select Earth - Sand, gravel and similar materials which may contain small amounts of stones, pebbles or lumps over 1" in largest dimension, but none over 2" in largest dimension, but does not contain clay, loam, organic material, debris and frozen material.
- L. Select Fill - Consists of Select Earth, imported sand or other granular materials as approved by Engineer.
- M. Earth Overburden - Earth overlying solid rock and in place during blasting operations or earth not classified as Select or Common Earth.
- N. Unstable Material - Debris, frozen materials, topsoil, quicksand and all wet, soft or loose material which does not provide sufficient bearing capacity to satisfactorily support pipes or other work.
- O. Unsuitable Material - Excavated material which does not meet requirements for backfilling purposes and includes solid and loose rock, earth overburden and unstable material.
- P. Topsoil - Surface layer of soil and sod suitable for use in seeding and planting and not containing debris, subsoil, stumps, roots, brush, stones, clay lumps and similar objects greater than 2" in largest dimension and material toxic to plant growth.

2.02 SOURCE QUALITY CONTROL

- A. Where fill materials are specified by reference to a specific standard, test and analyze samples for compliance before delivery to site.
- B. If tests indicate materials do not meet specified requirements, change material and retest.
- C. Provide materials of each type from same source throughout the Work.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Identify required lines, levels, contours, and datum locations.
- B. See Section 31 2310 for additional requirements.
- C. Verify subdrainage, dampproofing, or waterproofing installation has been inspected.
- D. Verify structural ability of unsupported walls to support imposed loads by the fill.
- E. Verify underground tanks are anchored to their own foundations to avoid flotation after backfilling.

3.02 PREPARATION FOR BACKFILLING

- A. Immediately prior to backfilling, remove all rubbish, debris, forms and similar materials from the excavation.
- B. Do not backfill until the conditions of Paragraph 1.08 are met.

3.03 BACKFILLING – GENERAL

- A. Fill shall be placed in horizontal lifts and compacted such that the desired density is achieved throughout the lift thickness with 3 to 5 passes of the compaction equipment. Loose lift thickness for grading, fill, and backfill activities shall not exceed 12 inches.

3.03 BACKFILLING TRENCHES

- A. 12 inches Over Pipes - Provide 12 inches of Select Fill over the top of the pipe as detailed on the Drawings. Place fill by hand in not greater than 6 inch layers. Bring Select Fill up evenly on both sides of pipes and carefully and thoroughly compact under the pipe haunches. Do not displace pipe.
- B. 12" Over Sand Encasement - Provide 12" of Select Fill over the top of the sand. Place fill by hand in not greater than 6" compacted layers.
- C. Remainder of Trench - Paved Areas - Select Fill, Select Earth, or Common Earth, placed in not greater than 6" compacted layers.
- D. Remainder of Trench - Other Areas - Select Earth, or Common Earth, placed in not greater than 12" compacted layers.

3.04 BACKFILLING AROUND STRUCTURES

- A. Uniformly spread and deposit Structural Fill in horizontal layers, not over 8" in compacted thickness. Take special precautions to prevent wedging actions against the walls.

3.05 STRUCTURAL FILL UNDER SLABS & FOOTINGS

- A. Prior to placing Structural Fill, all organic material, topsoil, debris and any other deleterious material shall be removed.

- B. Place material in maximum 8" lifts and compacted to 95% of maximum density at optimum moisture content as determined by ASTM D1557, Modified Proctor.
- C. If the materials density tests less than 95%, corrective action and additional testing will be required. The additional testing and corrective action will be paid for by the Contractor.
- D. Place materials in such a way as not to damage concrete foundations and footings.

3.06 TOP OF BACKFILL

- A. Paved Areas - Carry backfill up to pavement subgrade, ready to receive pavement. If paving is to be done at a later date, carry backfill up so as to provide slightly mounded surface with edges flush with the existing pavement surface.
- B. Unpaved & Ungraveled Areas - Carry backfill up to adjacent finished grade, minus the depth of any required topsoil or topsoil and sod finish, and so as to provide a finished surface slightly mounded over the trench.

3.07 COMPACTION REQUIREMENTS

- A. See Section 31 2250.

3.08 FIELD QUALITY CONTROL

- A. Soils testing shall be performed by the approved independent testing laboratory in accordance with Section 31 2250 - Soil Compaction.
- B. Engineer will establish the date, time, location, number, and types of soils tests required.

3.09 ADJUST AND CLEAN

- A. Any trenches or excavations which have been backfilled and show any evidence of settlement or being improperly backfilled, or have been tested and failed, shall be re-excavated to the depth required for proper compaction and then properly refilled and compacted.
- B. Replace or repair any pipe or structure which has been damaged or displaced.

END OF SECTION

SECTION 32 27 41 - PAVEMENT REPLACEMENT

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Replacement of pavement and subbase materials removed or damages during installation of utility trenches.

1.02 RELATED REQUIREMENTS

- A. Division 32 – Exterior Improvements

1.03 REFERENCE STANDARDS

- A. MDOT – Maine Department of Transportation "Standard Specifications", 2020 Edition, including all addenda.
- B. Highway Department – Maine Department of Transportation, Augusta, Maine

1.04 SUBMITTALS

- A. See Section 01 3000 - Administrative Requirements, for submittal procedures.
- B. Name, address and telephone number of asphalt plant proposed for use and certification that the plant conforms to the requirements of these specifications.
- C. Names and descriptions of pavers, rollers and other equipment proposed for use.

1.05 PERFORMANCE REQUIREMENTS

- A. Paving replacement under this work item is limited to replacement of pavement over utility trenches. Pavement on all secondary roads will be installed to match existing thickness and as specified herein.

1.06 QUALITY ASSURANCE

- A. Provide at least one person who shall be present at all times during the excavation of this portion of the Work and who shall be thoroughly trained and experienced in the placing of the type of pavement specified and who shall direct all work performed under this Section.
- B. Use only personnel thoroughly trained and experienced in the skills required for installing and finishing, and in operating the required equipment.
- C. Perform Work in accordance with State of Maine Highways standard.
- D. All testing shall be performed by the approved testing laboratory. Engineer may use the testing laboratory for inspection services.

1.07 SCHEDULING

- A. Coordinate work with the work of other Sections to avoid delays and damage.
- B. Notify Engineer at least 24 hours in advance of the placing of any materials under this Section.
- C. Schedule work and operations to allow ample time for testing and inspection. Cooperate with Engineer and the testing laboratory and provide access to all phases of the Work.

- D. Place temporary pavement as specified or directed within 2 days after backfilling and compaction has been completed.
- E. Do not construct permanent pavement until after trenches have set a minimum of thirty (30) days. If it is not possible to schedule operations so this may be accomplished prior to the completion date, as stated in the Contract, an extension of time will be granted to complete this Work.

1.08 PROJECT CONDITIONS

- A. Remove any pavement, pavement foundation, or appurtenances damaged by construction operations to the extent ordered by the Engineer so that the whole roadway will have a true and uniform surface and will conform to the proper grade and cross sections.
- B. Neatly saw cut all pavements to be removed, creating as little damage as possible to the adjoining pavement.
- C. Comply with the requirements concerning weather limitations as specified in MDOT Standard Specifications.
- D. Install permanent pavements between April 15th and November 15th, and then only when environmental conditions are satisfactory.
- E. Restore all disturbed gutters and curbs to a condition at least equal to that in which they were found immediately prior to beginning of operations.

1.09 REPLACING STATE HIGHWAY PAVEMENTS

Nothing contained herein shall relieve the Contractor from carrying out all orders given by the State Highway Officials in connection with the replacement of pavement which is part of the State Highway System or State Aid Roads. Prior to doing any work which will affect a State Highway, a permit shall be obtained from the State of Maine Department of Transportation.

PART 2 PRODUCTS

2.01 MATERIALS

- A. Temporary Pavement - Minimum 1-inch thickness of Bituminous Concrete, 12.5mm Superpave.
- B. Bituminous Concrete Surface Pavement - Conforming to materials and construction of Bituminous Concrete, 12.5mm Superpave.
- C. Bituminous Concrete Binder Pavement - Conforming to materials and construction of Bituminous Concrete, 19.0mm Superpave.
- D. Aggregate Base and Subbase – See Specification 31 2316 Fill and Backfill

PART 3 EXECUTION

3.01 EXAMINATION

- A. Prior to the work of the Section, carefully inspect the installed work of all other trades and verify that all such work is complete, tested and approved by Engineer and to the point where this installation may be properly performed. Particulate attention shall be given to items such as pipelines so as to avoid excavating pavements at a later date.

3.02 PREPARATION FOR PAVEMENT REPLACEMENT

- A. Verify that utility trench has been backfilled and compacted to proper degree of compaction as specified in Section 31 2316.
- B. Gravel base and subbase course to have a thickness equal to the existing base course of a minimum of 18-inches thick, whichever is greater, after compaction to a minimum density of 95%.
- C. Place base course in maximum 6-inch lifts and compact per specification section 31 2250.
- D. Remove all loose or damaged material in the existing pavement and trim back existing surface course as directed by the Engineer.

3.03 INTALLATION OF TEMPORARY PAVEMENT

- A. Install temporary pavement in areas specifically designated by the Engineer in writing.

3.04 INSTALLATION OF BITUMINOUS CONCRETE PAVEMENT

- A. Remove and dispose of Temporary Pavement if utilized.
- B. New bituminous concrete pavement installed for this project per plan. Refer to details on the drawings.

3.05 MAINTENANCE OF PAVEMENT

- A. Temporary Pavements - Maintain in a satisfactory condition until permanent pavement is constructed by repairing any damaged or deteriorated sections promptly as directed by the Engineer.
- B. Permanent Pavements - Maintain in a satisfactory condition until the expiration of the guarantee period by filling all depressions and holes with similar materials and keeping the pavement in a safe and satisfactory condition for traffic.

END OF SECTION

SECTION 32 29 01 - RESTORATION OF SURFACES

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Restoration of surfaces damaged or disturbed as a result of Contractor's operations.

1.02 RELATED SECTIONS

- A. Division 32 – Exterior Improvements

1.03 QUALITY ASSURANCE

- A. Provide at least one person who shall be present at all times during this portion of Work and who is thoroughly familiar with the types of materials being installed and the best methods for their installation and who shall direct all work performed under this Section.
- B. Grades and surfaces shall be restored so as to be equal to or better than the original conditions which existed at the time they were damaged or disturbed, except as otherwise specified or shown on the Drawings.
- C. Restoration of surfaces under the jurisdiction of Village, Town, County, State or other public authorities or public utilities shall be in accordance with the requirements of such authorities. Ascertain these requirements, procure necessary permits, arrange for required inspections, and pay all fees, deposits and other charges which may be required by the authorities.
- D. Existing pavements and walks to be restored shall be replaced with new pavement equivalent to or superior to the existing in quality, thickness, bearing capacity and surface finish, except where otherwise specified.
- E. Slate and flagstone sidewalk sections shall not move or rock when pressure is applied on any portion.
- F. Replacement curbs shall have the same dimensions and cross-section as the existing adjoining curbs and the same texture, finish, and appearance.
- G. Replaced pavements shall be free from all noticeable sags, settlements, bumps, humps, cracks or other defects. Other than possibly color, the replaced pavement shall be unnoticeable from the existing pavement.

1.04 SCHEDULING

- A. It is the intent of this Section to restore all surfaces as soon as possible so as to cause the least amount of inconvenience to all people and animals, to provide an aesthetically pleasing construction site, to protect lives, to ensure safety, to avoid property damage and to provide for orderly and safe traffic conditions.
- B. Rough grade all areas to be seeded or planted within 48 hours after installation of the work; finish grade within one week after installation of the work, topsoil within three weeks after installation of the work and seed as soon as conditions are satisfactory. Replant trees, shrubs and other vegetation as soon as possible.
- C. Replace traffic and business signs as soon as possible, but no later than 24 hours after installation of the work.
- D. Replace guide rails as soon as possible, but no later than 72 hours after installation of the work.

- E. Replace all items as soon as possible, with special attention directed at those which control traffic, protect property and lives, are essential to a persons livelihood, create hazards when not in place, or are otherwise deemed essential.
- F. The phrase "after installation of the work" means after the installation of the work which necessitated the removal of an item or items.

PART 2 PRODUCTS

2.01 REUSE OF EXISTING MATERIALS

- A. Curbs, walks, fences, walls, signs and other items which have been removed, knocked down, or displaced shall be replaced with existing materials when, in the opinion of Engineer, such materials are in acceptable condition. Where such materials have been damaged, marred, broken, or are otherwise in an unacceptable condition, provide replacements of equal or better quality, appearance, size and type.

PART 3 EXECUTION

3.01 SCHEDULING

- A. Carefully inspect the work installed under other Sections and verify that all such work is complete to the point where restoration of surfaces may properly commence and to insure against the unnecessary disturbance of restored surfaces at a later date.
- B. Verify schedule of work for conformance to allowable planting times.
- C. Do not begin restoration work until conditions are satisfactory.

3.02 GRASS AND LAWNS

- A. Comply with Section 32 2921 - TOPSOIL AND SEEDING.

3.03 PLANTING AND REPLANTING

- A. Comply with Section 32 2930 - EXTERIOR PLANTS.

3.04 BITUMINOUS CONCRETE PAVEMENT

- A. Comply with Section 32 2740 - PAVEMENT REPLACEMENT

3.05 SIDEWALKS

- A. Concrete - Extend replacement sections to the nearest contraction or expansion joints. Thoroughly compact subgrade and provide a 12" minimum base course of granular material under sidewalk. Compact base course and place concrete in accordance with Division 3 - CONCRETE. The minimum slab thickness shall be 5".
- B. Slate and Flagstone - Replace walks after backfill has been brought up to proper subgrade elevation and compacted. Place stones on a 2" bed of sand and adjust them to the proper line and grade, and to provide uniform bearing. Fill area between stones with mortar.
- C. Asphalt - Cut back undisturbed pavement as required in Section 32 2741. Thoroughly compact subgrade, install asphalt concrete and roll finished surfaces to match existing adjacent surfaces, as nearly as practicable.

3.06 CURBS

- A. Extend curb replacement sections to the nearest joint. Replace all damaged joint fillers.
- B. Granite and Stone - Reinstall curbs to line and grade.

- C. Concrete and Asphalt - Replace curbs in an approved manner so that the finished product is of the same size, shape and appearance as the existing curbs.

3.07 GUIDERAILS

- A. If, in the opinion of the Engineer, guide rails are carefully removed and protected and are in acceptable condition, they may be reused and reset in accordance with the requirements of Highway Department.
- B. If, in the opinion of the Highway Department, guide rails are not carefully removed and protected and are damaged or destroyed by Contractor, replace the guide railing in accordance with the requirements of the Highway Department.
- C. Prior to performing work in the vicinity of guide railing, carefully examine all guide railing components and immediately report to Engineer and Highway Department any existing damage or deterioration. If the Highway Department determines that any component is not adequate for reuse, they will dispose of such component, after it has been removed by Contractor, and will furnish replacement parts to be used by Contractor when he replaces the railing, or, Engineer will direct Contractor to furnish all required replacement parts and a Change Order will be issued to cover the additional costs.

END OF SECTION

SECTION 32 29 21 - TOPSOIL AND SEEDING

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Preparation of subsoil for unpaved areas.
- B. Placing topsoil.
- C. Seeding, mulching and fertilizer, fertilizer and liming unpaved areas within approved limits as directed by the Engineer or as shown on Drawings.

1.02 RELATED REQUIREMENTS

- A. Section 31 2310 - Site Grading: Preparation of subsoil and placement of topsoil in preparation for the work of this section.
- B. Section 31 2316 - Fill and Backfill: Topsoil material.

1.03 SUBMITTALS

- A. Section 01 3000 - Administrative Requirements, for submittal procedures.
- B. Proposed seed mixtures and manufacturer's recommended rate of application.
- C. Seed labels containing vendor's name, seed name, lot number, percentage of germination, percentage of purity, percentage of weed seed and percentage of inerts.
- D. Fertilize and lime labels containing manufacturer's name, brand name, type, weight and guaranteed analysis

1.04 QUALITY ASSURANCE

- A. Provide at least one person who shall be present at all times during the topsoiling and seeding operations and who shall be thoroughly familiar with the types of materials being installed and the best methods for their installation and who shall direct all work performed under this Section.
- B. Establish a good stand of grass of uniform color and density.
- C. Sod may be used in lieu of seed, and shall be provided where specified, where shown on the Drawings, in areas where the establishment of grass may be difficult due to steep slopes or drainage flows, and where required to prevent erosion.
- D. Protect, maintain and care for all grassed areas.

1.05 DELIVERY, STORAGE, AND HANDLING

- A. Deliver grass seed mixture in sealed containers. Seed in damaged packaging is not acceptable. Deliver seed mixture in containers showing percentage of seed mix, year of production, net weight, date of packaging, and location of packaging.
- B. Deliver fertilizer in waterproof bags showing weight, chemical analysis, and name of manufacturer.
- C. Maintain seeded areas immediately after placement until grass is well established and exhibits a vigorous growing condition.

1.06 ENVIRONMENTAL REQUIREMENTS

- A. Seeding shall be done when the ground becomes workable in the Spring to June 1st, and

between August 15th and October 1st. Ground and weather conditions must be satisfactory to seed and fertilize.

- B. Sodding shall be done between May 1st and October 15th.

1.07 GUARANTEE

- A. All work shall be guaranteed for a minimum of one year from the date of first acceptance of the Work or from the date when Engineer determines that Contractor has established a good, vigorous and healthy stand of grass of uniform color and density, whichever date is later.
- B. Final acceptance will be given by Owner after established grassed and sodded areas have been in place for one year in a vigorous and healthy condition.

PART 2 PRODUCTS

2.01 SEED MIXTURE

- A. Grade A quality, fresh and re-cleaned and proven to produce satisfactory growth in the locality of the Project.
- B. In existing grass areas, mixtures shall be comparable to existing grasses and, when established, shall match as nearly as practical, the existing undisturbed grass.
- C. Use seed mixture identified on the Drawings

2.02 TOPSOIL

- A. Type as specified in Section 31 2316. Obtained from excavation and grading work or, if insufficient material is available, it shall be imported.

2.03 LIME

- A. Calcic or dolomitic ground limestone.
- B. Total carbonates - 85% minimum content.
- C. Magnesium oxide - 10% minimum content for dolomitic and high magnesium limes.

2.04 FERTILIZER

- A. Standard Commercial Grade dry, free-flowing type suitable for common spreader application - or - finely-ground, water soluble type suitable for power spray application - or - granular or pellet type suitable for application by blower equipment.
- B. Minimum content:
 - 10% total nitrogen
 - 6% available phosphoric acid
 - 10% water-soluble potash

2.05 SOD

- A. Firm, dense, even textured and showing good root development. Grasses shall be of the type required for the intended use, suitable for the climatic conditions at the Project site, and as approved by the Engineer.
- B. Sod shall have a compact growth and shall be reasonably free from weeds, plants, large stones and other objectionable or detrimental materials.

- C. All sod shall be living, healthy and showing signs of vigorous growth.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify that all underground and above ground work has been completed to the point where topsoiling and/or seeding operations may properly commence without unnecessary disturbances at a later date.
- B. Do not commence work under this Section until conditions are satisfactory.
- C. Loosen all ground surfaces to a minimum depth of 2 inches to facilitate bonding of the topsoil to the subgrade. Use discs, spike-tooth harrows, or other approved means.
- D. Clean surface of subgrade of all stones, sticks and rubbish larger than 2 inches in size and all litter and detrimental materials.
- E. After spreading, break up large, stiff clods and hard lumps, and rake off all stones and rocks larger than 1 inch in size, roots, litter, foreign matter, poisonous materials, and other materials which may be detrimental to the work. Dispose of all such materials off-site.
- F. Remove all topsoil spilled on highways, shoulders, sidewalks, driveways and other surfaces for which topsoil is not specified or required.

3.02 FERTILIZING

- A. Uniformly spread fertilizer at a rate identified on the plans with a cyclone or broadcasting type spreader.

3.03 LIMING

- A. Apply separately at the rate identified on the plans prior to fertilizing, seeding, and sodding. Lime may be applied dry spreader or as an aqueous solution by spraying.
- B. After application, work lime into top 3 inches of topsoil and redress surface to smooth finish.

3.04 SEEDING

- A. Sow seed uniformly with a cyclone or broadcasting type spreader at a rate recommended by the seed vendor and as approved by Engineer. The rate shall be based upon "new lawn" requirements and shall not be less than 5 pounds per 1,000 square feet.
- B. Sow seed when soils are moderately dry and when wind does not exceed five miles per hour.
- C. Following germination, immediately re-seed areas without germinated seeds that are larger than 4 by 4 inches.

3.05 ROLLING

- A. Where rolling is required, compact soil lightly with a lawn roller, immediately after seed is sown.

3.06 MULCHING - GENERAL

- A. In grass areas, use a mulch, matting, or a blanket to protect the seeded areas. Apply within 24 hours after the seeding operation is completed.
- B. In open and wooded areas, mulching is optional, except where it is required for erosion

control.

3.07 MAINTENANCE

- A. Properly maintain all turfed areas by watering, cultivation, wedding, mowing, reseeding, filling eroded areas and other repairs and replacements until final acceptance of the Work.
- B. Reseed all areas where seed has failed to germinate and where seeded areas have been damaged by erosion, people, vehicular traffic or other causes.
- C. After sod has started to grow, resod any areas or portions failing to show life. Resod as often as necessary in order to establish a healthy, growing sod.

END OF SECTION

SECTION 33 25 10 - WATER DISTRIBUTION

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Pipe and fittings for site water lines including domestic water lines, fire water lines, and relocated municipal water lines.
- B. Valves, Fire hydrants, and water main connections.

1.02 RELATED REQUIREMENTS

- A. Section 31 2315 - Excavation: Excavating of trenches.
- B. Section 31 2316 - Fill and Backfill: Bedding and backfilling.
- C. Section 33 2515 - Disinfection of Water Distribution System: Disinfection of site service utility water piping.
- D. Section 03 3000 - Cast-in-Place Concrete: Concrete for thrust restraints.

1.03 REFERENCES

- A. ASME B16.18 - Cast Copper Alloy Solder Joint Pressure Fittings; The American Society of Mechanical Engineers; 2001 (R2005) (ANSI B16.18).
- B. ASME B16.22 - Wrought Copper and Copper Alloy Solder-Joint Pressure Fittings; The American Society of Mechanical Engineers; 2001 (R2005).
- C. ASTM B 88 - Standard Specification for Seamless Copper Water Tube; 2009.
- D. ASTM D 3139 - Standard Specification for Joints for Plastic Pressure Pipes using Flexible Elastomeric Seals; 1998 (Reapproved 2005).
- E. AWS A5.8/A5.8M - Specification for Filler Metals for Brazing and Braze Welding; American Welding Society; 2004 and errata.
- F. AWWA C500 - Metal-Seated Gate Valves for Water Supply Service; American Water Works Association; 2009.
- G. AWWA C509 - Resilient-Seated Gate Valves for Water Supply Service; American Water Works Association; 2009 (ANSI/AWWA C509).
- H. AWWA C900 - Polyvinyl Chloride (PVC) Pressure Pipe, 4 In. Through 12 In. (100 mm Through 300 mm), for Water Distribution; American Water Works Association; 2007 (ANSI/AWWA C900/C900a).
- I. UL 246 - Hydrants for Fire-Protection Service; Underwriters Laboratories Inc.; Current Edition, Including All Revisions.

1.04 SUBMITTALS

- A. See Section 01 3000 - Administrative Requirements, for submittal procedures.
- B. Product Data: Provide data on pipe materials, pipe fittings, valves and accessories.
- C. Manufacturer's Certificate: Certify that products meet or exceed specified requirements.
- D. Project Record Documents: Record actual locations of piping mains, valves, connections,

thrust restraints, and invert elevations. Identify and describe unexpected variations to subsoil conditions or discovery of uncharted utilities.

1.05 QUALITY ASSURANCE

- A. Perform Work in accordance with municipality requirements.

1.06 DELIVERY, STORAGE, AND HANDLING

- A. Deliver and store valves in shipping containers with labeling in place.

PART 2 PRODUCTS

2.01 WATER PIPE

- A. Polyethylene Pipe (PE)
 - 1. Tubing
 - a. AWWA C901: Polyethylene (PE) pressure pipe and tubing for water service.
 - b. ASTM-D-1248: Polyethylene Plastic Molding and Extrusion Material; material meets requirements of Type III Class C, Category 5, Grade P34.
 - c. ASTM-D-2737: Polyethylene (PE) Plastic Tubing (SDR-PR).
 - d. Pressure Rating – 200 psi.
 - e. SDR-9.
 - 2. Fittings
 - a. No Lead Brass fittings shall be Cambridge Brass No Lead, Red Head Manufacturing or approved equal.
 - b. Any part of the service line valve, fitting, corporation, curb stop and elbow in contact with potable water shall be No Lead Brass containing 0.10 percent total lead content by weight or less.
 - 3. Joints: Compression.
- B. Warning Tape: Magnetic detectable conductor, clear plastic covering, imprinted with “Water Service” in large letters.

2.02 CORPORATION STOPS AND CURB STOPS

- A. As specified in Section 33 2641 - Buried Valves and Stops.

2.03 BEDDING AND COVER MATERIALS

- A. Bedding: As specified in Section 31 2317.
- B. Cover: As specified in Section 31 2317.

2.04 ACCESSORIES

- A. Provide other miscellaneous fittings including saddles, service clamps, adaptors or other fittings required to provide service connections in accordance with AWWA requirements.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify that building service connection and municipal utility water main size, location, and invert are as indicated.

3.02 PREPARATION

- A. Cut pipe ends square, ream pipe and tube ends to full pipe diameter, remove burrs.
- B. Remove scale and dirt on inside and outside before assembly.

- C. Prepare pipe connections to equipment with flanges or unions.

3.03 TRENCHING

- A. See the sections on excavation and fill for additional requirements.
- B. Backfill around sides and to top of pipe with cover fill, tamp in place and compact, then complete backfilling.

3.04 INSTALLATION - PIPE

- A. Maintain a 6' horizontal separation and a 12" vertical separation, face-to-face, between water main / water service lines and underground electrical services. Underground electrical services shall be installed above water mains / water services where they cross.
- B. Route pipe in straight line.
- C. Install pipe to allow for expansion and contraction without stressing pipe or joints.
- D. Install warning tape 24 inches above top of pipe; coordinate with Section 31 2317.
- E. Anchor all tees, dead ends, hydrants and bends deflecting 11-1/2 degrees or more by means of one of the following.
 - 1. Concrete reaction blocking as shown on the in the Drawings.
 - 2. Mechanical joint retainer at fittings and all pipe joints within three pipe lengths on each side of fitting.
 - 3. Locked mechanical joints at fittings and all pipe joints within three pipe lengths on each side of fitting. In addition, the class of pipe shall be increased so that the required class of pipe specified is achieved under the groove.
 - 4. Metal harness and tie rods at fittings and all pipe joints within three pipe lengths on each side of fitting. Complete harness assembly shall be given two brush coats of approved bituminous paint after assembly and testing.

3.05 INSTALLATION - VALVES AND HYDRANTS

- A. Set valves on solid bearing.
- B. Center and plumb valve box over valve. Set box cover flush with finished grade.
- C. Set hydrants plumb; locate pumper nozzle perpendicular to and facing roadway.
- D. Set hydrants to grade, with nozzles at least 20 inches above ground.

3.06 FIELD QUALITY CONTROL

- A. Perform field inspection and testing in accordance with Section 01 4000.
- B. Disinfect all installed water piping in accordance with Specification 33 2515.
- C. If tests indicate Work does not meet specified requirements, remove Work, replace and retest at no cost to Owner.

END OF SECTION

SECTION 33 25 15 - DISINFECTION OF WATER DISTRIBUTION

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Disinfection of site domestic water lines, site fire water lines, and relocated municipal water mains specified in Section 33 2510.
- B. Testing and reporting results.

1.02 RELATED REQUIREMENTS

- A. Section 33 2510 - Water Distribution.

1.03 REFERENCE STANDARDS

- A. AWWA B300 - Hypochlorites; American Water Works Association; 2010 (ANSI/AWWA B300).
- B. AWWA B301 - Liquid Chlorine; American Water Works Association; 2004 (ANSI/AWWA B301).
- C. AWWA C651 - Disinfecting Water Mains; American Water Works Association; 2005 (ANSI/AWWA C651).

1.04 SUBMITTALS

- A. See Section 01 3000 - Administrative Requirements, for submittal procedures.
- B. Test Reports: Indicate results comparative to specified requirements.
- C. Disinfection report:
 - 1. Type and form of disinfectant used.
 - 2. Date and time of disinfectant injection start and time of completion.
 - 3. Test locations.
 - 4. Initial and 24 hour disinfectant residuals (quantity in treated water) in ppm for each outlet tested.
 - 5. Date and time of flushing start and completion.
 - 6. Disinfectant residual after flushing in ppm for each outlet tested.
- D. Bacteriological report:
 - 1. Date issued, project name, and testing laboratory name, address, and telephone number.
 - 2. Time and date of water sample collection.
 - 3. Name of person collecting samples.
 - 4. Test locations.
 - 5. Initial and 24 hour disinfectant residuals in ppm for each outlet tested.
 - 6. Coliform bacteria test results for each outlet tested.
 - 7. Certification that water conforms, or fails to conform, to bacterial standards of the Maine Drinking Water Program.

1.05 QUALITY ASSURANCE

- A. Perform Work in accordance with AWWA C651. Note: the TABLET METHOD is NOT ACCEPTABLE.
- B. Testing Firm: Company specializing in testing potable water systems, certified by governing authorities of the State of Maine.

1.06 REGULATORY REQUIREMENTS

- A. Conform to applicable code or regulation for performing the work of this Section.
- B. Provide certificate of compliance indicating approval of water system after all modification, flushing and cleaning, and disinfection are complete.

PART 2 PRODUCTS

2.01 DISINFECTION CHEMICALS

- A. Chemicals: AWWA B300, Hypochlorite and AWWA B301, Liquid Chlorine.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify that piping system has been cleaned, inspected.
- B. Schedule disinfecting activity to coordinate with start-up, testing, adjusting and balancing, demonstration procedures, including related systems.

3.02 DISINFECTION

- A. Provide and attach equipment required to perform the work.
- B. Inject treatment disinfectant into piping system.
- C. Flush, circulate and clean until required cleanliness is achieved; use municipal domestic water.
- D. Replace permanent system devices removed for disinfection.

3.03 FIELD QUALITY CONTROL

- A. Perform field inspection and testing in accordance with Section 01 4000.
- B. Test samples in accordance with AWWA C651.

END OF SECTION

SECTION 33 2641 - BURIED VALVES AND STOPS

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Work covered by this Section includes the furnishings and installation of underground corporation stops, curb stops, gate and other valves, valve and service boxes, where shown on the Drawings and specified herein.
- B. Provide all valves and auxiliary equipment required for complete and proper operation of all systems, whether or not they are specifically described.
- C. Definitions: Valve - For purposes of this Section, valve means curb stop, corporation stop, and any other valve specified in Part 2.

1.02 RELATED SECTIONS

- A. Division 32 – Exterior Improvements.

1.03 QUALITY ASSURANCE

- A. Similar types of valves shall each be the product of a single manufacturer and the same models shall be identical, with all parts interchangeable.
- B. Acceptable products are specified in Part 2. Equivalent products of other manufacturers will be acceptable.
- C. Valves shall be of ample strength to withstand and operate satisfactorily under the specified pressures.
- D. Unless otherwise specified, perform shop tests with a hydrostatic water pressure equal to twice the rated pressure. Any valve which leaks or shows sign of defects is not permitted.

1.04 SUBMITTALS

- A. See Section 01 3000.
- B. Annotate submissions with the valve designations assigned in this Section and on the Drawings.
- C. Catalog cuts, with cut-aways, and technical data.
- D. Manufacturer's Certification of Compliance.
- E. Certification of compliance with Buy American requirements.
- F. Manufacturer's installation instructions, including any limitations on installation.
- G. Operation, maintenance, and spare parts data.

1.05 DELIVERY, STORAGE, AND HANDLING

- A. During delivery, storage and handling, keep valves tightly closed to prevent foreign matter from damaging seat faces.
- B. Store valves in dry, enclosed areas, off the ground. If there is a likelihood of freezing, move materials to a warm area, or remove potentially dangerous moisture.

- C. Verify compliance with Specifications at time of delivery.

1.06 GUARANTEE

- A. For a period of 10 years from date of Substantial Completion, manufacturer shall repair or replace any resilient wedge gate valve which has been found defective in materials of workmanship under normal conditions of use and maintenance. Guarantee need not cover alterations made by Owner, damage from accidents, abuse, and vandalism, nor Acts of God. Manufacturer's liability shall be limited to the initial cost of valves and installation.

PART 2 PRODUCTS

2.01 VALVES - GENERAL

- A. Products - The types, sizes, acceptable manufacturers, and catalog numbers of required valves are specified in this Part. Where valves are required for proper operation or control, or where required by pertinent codes, regulations or ordinances, or where shown on the Drawings, yet not included, they shall be furnished and installed and shall be of the proper type, size, and construction, and of a quality equivalent to that established by the valves which are specified.
- B. End Connections - Conform to the following:
 - 1. Bell & Spigot - ANSI A21.10
 - 2. Mechanical Joint - ANSI A21.11
 - 3. Flanged Cast Iron - ANSI B16.1
 - 4. Flanged Ductile Iron - ANSI B16.42
 - 5. Fire Hose Threads - ANSI B16.42
 - 6. Hose Threads - ANSI B2.4
- C. Pressure Rating - 150 psig (min.), non-shock W.O.G., unless otherwise noted.

2.02 CORPORATION STOPS

- A. Construction - Corporation stops shall conform to AWWA C800 and shall be of solid brass or bronze construction suitable for compression type connections. Corporation stops shall be Mueller Company Type H-15008, Red Hed Mfg. Co., Fig. 226, or approved equal.
- B. Tap Size Limitations - Do not drill taps larger than those permissible for the size, material, and thickness of pipe being tapped. Permissible size shall be those established by the appropriate pipe standard, or by the pipe manufacturer in the absence of a standard. The appropriate standard for ductile iron pipe is AWWA C151. Where a required tap size exceeds a pipe's capabilities, use one of the following:
 - 1. A tapped tee.
 - 2. Ford Meter Box Co. Style 101N or 202N; Powerseal Model 3417DI; or approved equal.

2.03 CURB STOPS

- A. Curb stops shall be brass, ball valve, type with a PTFE coated brass ball and double o-ring seal. Inlet and outlet shall have compression type pack connections with gripper band (or grip joint) for copper pipe. The curb stops shall open left in accordance with Owner standards, shall not have a drain, and shall be manufactured by Mueller Company, A.Y. McDonald Mfg. Company, or approved equal.

2.04 GATE VALVES

- A. Construction - Non-rising stem, iron body, bronze mounted gate valves conforming to AWWA C509-87, standard for Resilient Seated Gate Valves. Valves shall be 150 pound unless the pipe to which the valve is attached has a higher class rating. Waterous Series 500 with cast ductile iron wedge encased in a bonded styrene butadiene elastomer covering which forms the sealing surface; Clow Valve Company AWWA C509; or approved equal. Coat valve body, inside and outside with epoxy coating.
- B. Operators:
 - 1. Provide 2-inch by 2-inch operating nuts.
 - 2. Unless those presently in service in the Community open clockwise, operating nuts shall be turned counterclockwise to open valves.
 - 3. Provide extension rods to bring the operating nut to within one foot of finish grade.
- C. Valve Boxes - Provide each buried valve with a valve box unless otherwise specified or required.
- D. Indicators -
 - 1. General - Buried valves with post indicators are specified or shown on the Drawings, they shall be post indicator type valves and shall conform to the general requirements as listed above.
 - 2. Valves - Post indicator valves shall be figure #27MP as manufactured by American Valve Co., the equivalent as manufactured by Stockham Valves & Fitting Co., or approved equal.
 - 3. Indicator Posts - Posts shall be as manufactured by Kennedy, Stockham, Clow, or approved equal. The indicator post shall be supplied with handwheel operator.
- E. Packing - Valves shall be capable of being repacked under pressure.

2.05 YARD HYDRANTS

- A. Yard hydrants shall be comprised of 1" NPT inlet with drain below the frost line. Hydrants shall have 1" NPT inlet, 3/4" brass hose thread outlet, stainless steel operating rod through Teflon Packing, 1" galvanized pipe, heavy-duty cast iron head, heavy cast brass valve body with two flow ways, and molded rubber plunger constructed of self-lubricating material. Hydrant flow rate shall be 40 GPM at 60 psi. Hydrant shall be Merrill R-6000 Series Frost Proof Yard Hydrant or approved equal.

2.06 TAPPING VALVES

- A. Use - For tapping existing pressure mains which are in service.
- B. Ratings - Tapping valves and sleeves for valve sizes two through twelve inches shall be rated for 200 psi; and for sizes fourteen through twenty-four inches shall be rated 150 psi.
- C. Ductile Iron - Kennedy Valve Mfg. Co. "Squareseal" tapping sleeve. Kennedy Valve Mfg. Co. Fig. 950X cast iron, double disc gate valve (F-MJ) with operating nut, conforming to AWWA C500. Open counter-clockwise. Also, equivalent by Clow Corporation, Mueller Co., or other approved equal.
- D. Polyvinyl Chloride - Branch lines and service connections 1-inch or smaller shall be made using bronze tapping saddles made for use with PVC pipe and having stops to prevent over-tightening of the clamp saddles. Connections larger than 1-inch shall be made using the appropriate tee, wye and/or reducer.

2.07 VALVE BOXES

- A. Valve boxes are required on all buried valves.
- B. Box - Two-piece, cast iron, slide type with at least 4½" shafts, recessed cover, upper section and lower section, Clow F-2452 or F-2450 (greater than 10"), Tyler Series 6855 and 6865 (greater than 12"), or approved equal.
- C. Cover - Cast in the cover the words, "WATER", "SEWER" or "GAS", as applicable for water lines, lines carrying sanitary sewage or sludge and gas lines, respectively. In addition, where a valve designation is shown on the Drawings, (eg. SV-1), stamp the valve designation on the top surface of the cover.
- D. Seals - Seal valve box covers and each slide section to exclude surface water and the entrance of dirt. Use rubber "O" ring gaskets or a " rope impregnated with a non-hardening tar compound equal to E-Z Rise Seal Pack.
- E. Spare Seals - Furnish spare seals in a quantity equal to 5% of the total number, or footage, used in the Work.
- F. Coatings - Two coats of asphaltic varnish, inside and outside, applied by manufacturer.

2.08 SERVICE/CURB STOP BOXES

- A. Box - Boxes including stationary rods and pins shall be the approved equal of those furnished by Mueller Company, Decatur, Illinois, or Clow Valve Company or approved equal. Boxes shall be adjustable and shall be installed as indicated on the drawings and as directed by the Engineer.
- B. Coatings - Two coats of asphaltic varnish, inside and outside, applied by manufacturer.

2.09 T-HANDLE WRENCHES

- A. For underground valves, provide two T-handle socket wrenches of 5-foot length.
- B. Apply two coats of asphaltic varnish to all wrenches.

2.10 SHUTOFF KEYS

- A. General - Furnish shutoff keys for underground curb stops, meter valves, service valves and the like. The number of keys required equals 2% of the number of valves provided, but not less than 3 nor more than 10.
- B. Length - Length shall be such that the top of the key shall be from 3' - 4' above grade.
- C. Coatings - Two coats of asphaltic varnish.

2.11 MISCELLANEOUS FITTINGS

- A. Miscellaneous fittings include saddles, service clamps adapters, or other fittings required to provide an adequate service connection. Saddles or service clamps shall be used on all distribution piping requiring such fittings and shall have a minimum working pressure of 250 psi. A single or double strap shall be used as manufactured by Mueller, Red Hed Manufacturing Company or approved equal.
- B. All adapters and miscellaneous fittings shall provide an adequate seal at the working pressure of the water main and shall be for commercial use.

PART 3 EXECUTION

3.01 INSPECTION

- A. Verify that all valves may be installed at the locations indicated on the Drawings, or where required, and that proper operation of the valves will be possible after installation.
- B. In the event of interferences, immediately notify Engineer.
- C. Do not proceed with installation until conditions are satisfactory.

3.02 PREPARATION

- A. Clean all valves of foreign material, inside and out, with emphasis placed on bearing, machined and sliding surfaces.
- B. Operate valves several times over the full range from wide open to completely closed. Make adjustments, as required, to attain smooth, easy and proper operation.
- C. Adjust packings where required to insure a tight seal and proper operation. Replace defective packings.
- D. Replace defective and poorly operating valves.

3.03 VALVE INSTALLATION

- A. General - Install valves where shown on the Drawings, where required, or where directed by Engineer. Install in accordance with manufacturer's recommendations.
- B. Underground Installations - Install valves in pipelines with operating nuts pointed vertically upward. Install valve and service boxes plumb and straight, taking extra care in maintaining alignment during backfilling. Install seals in each box joint and cover to exclude surface water and infiltration of dirt, silt, and other debris. Boxes which are out of plumb by more than 1" in 6' in any direction, or are misaligned, or make it difficult or impossible to operate a valve, are not permitted.

3.04 TAPPING

- A. General - Where the size of the connection exceeds that allowed by Part II for the pipe in question, a boss shall be provided on the pipe barrel, the tap shall be made in the flat part of the intersection of the run and branch of a tee or cross, or the connection shall be made by means of a tapped tee, branch fitting and tapped plug or reducing flange, or tapping valve, all as indicated or approved.
- B. Ductile Iron - All drilling and tapping of ductile iron pipe shall be done normal to the longitudinal axis of the pipe; fittings shall be drilled and tapped similarly, as appropriate. Drilling and tapping shall be done only by skilled mechanics. Tools shall be adapted to the work and in good condition so as to produce good, clean-cut threads of the correct size, pitch, and taper.

3.05 CLEAN AND ADJUST

- A. After systems are pressurized, operate valves several times over the full range from wide open to completely closed. Make adjustments, as required, to attain smooth, easy, and proper operation.
- B. Adjust packings where required to stop leakage and to secure proper operation.
- C. Replace valves which are defective or do not operate properly, easily, and smoothly.
- D. Lubricate valves, operators, and appurtenances which require lubrication.

3.06 FIELD TESTING

- A. Upon completion of installation, all valves shall be tested in the presence of the Engineer and in accordance with the requirements of local or applicable plumbing or building code.
- B. All materials, equipment, tools, and labor for testing shall be furnished by the Contractor.
- C. Valves which carry water or liquid under pressure shall be filled with water and subjected to a pressure of 100 psig or 1½" the normal working pressure, whichever is greater, for a period of two hours or longer as may be necessary to examine the valve for leaks.
- D. Should leaks be found, faulty joints shall be repaired, even to the extent of disassembling and remaking the joint. Caulking of threads or the use of chemical compounds to correct leaks will not be permitted. Defective valves shall be replaced by the Contractor and the tests shall be repeated until test requirements are met to the satisfaction of the Engineer.

END OF SECTION