

PROJECT MANUAL

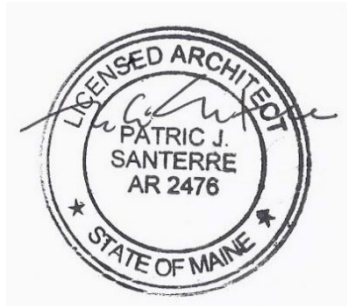
**COBSCOOK BAY STATE PARK – SHOWER BUILDING
& UTILITY IMPROVEMENTS – BGS #3473
Dennysville, Maine**



**MAINE DEPARTMENT OF AGRICULTURE,
CONSERVATION & FORESTRY**

March 2024

ARCADIA designworks LLC



22 Balsam Drive, Millinocket, Maine
199 Prospect Street, Suite A, Portland, Maine
U.S.A.

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DOCUMENT 000115 – LIST OF DRAWING SHEETS

1.1 LIST OF DRAWINGS

- A. Drawings: Drawings consist of the Contract Drawings and other drawings listed on the Table of Contents page of the separately bound drawing set titled COBSCOOK BAY STATE PARK, SHOWER BUILDING & UTILITY IMPROVEMENTS, DENNYSVILLE, MAINE, CONSTRUCTION DRAWINGS dated MARCH 2024, and as modified by subsequent Addenda and Contract modifications.
- B. List of Drawings: Drawings consist of the following Contract Drawings and other drawings of type indicated:

A00	COVER SHEET
A01	DRAWING STANDARDS & WALL ASSEMBLIES
A02	LIFE SAFETY PLAN & CODE REVIEW
A10	GROUND LEVEL PLAN
A11	ENLARGED PLANS & DETAILS
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6.5	FRONT AND REAR WALL FRAMING 5-BAY
7	END WALL FRAMING
8	BRACING DETAILS
9	ROOF DETAILS
10	GENERAL NOTES AND TIMBER SCHEDULE

END OF DOCUMENT 000115

**Bureau of General Services
Division of Planning, Design & Construction**

NOTICE TO CONTRACTORS
INVITATION FOR BIDS

The Maine Department of Agriculture, Conservation and Forestry, Parks and Lands is conducting a competitive bid process for a Shower Building & Utility Improvements at Cobscook Bay State Park in Dennysville, Maine. Bids will be opened and read aloud by the Bureau of General Services in Augusta at 2:00 p.m. June 27, 2024.

The project includes the construction of a new shower building with solar array, reuse of an existing bathhouse for water tank and general storage, construction of two pole barns, and installation of a heat pump in the existing gate house. Sitework includes a new well water system, septic field, RV dump station with gravel access road, overhead and underground power line and water service to the RV campsites, fiber optic communication service to the gate house and shower building, rework of the existing park water system and new playground equipment.

The detailed *Notice to Contractors* is on the Bureau of General Services website: <https://www.maine.gov/dafs/bgs/business-opportunities>.

00 11 13
Notice to Contractors

Cobscook Bay State Park, Shower Building & Utility Improvements BGS #3473

1. *The Work involves the construction of a new shower building with solar array system, reuse of an existing bath house for water tank storage, two (2) pole barns, RV dump station and septic leach field, and utility improvements at location indicated on Drawings. Site preparation includes demolition of existing free-standing outhouses, tree removal and earthwork, and limited discontinuation of existing site utilities. Site improvements include, paving, landscaping, and site lighting. Building includes concrete foundation, slab-on-grade, and concrete apron. Work also includes steel components, wood roof framing and deck, roof membrane, standing seam metal roof, and metal trim, masonry walls, wood stud partitions, wood and glass-mat sheathing, firestopping, and wire mesh ceilings. Carpentry includes timber benches and shelving. Finishes include CMU sealer, interior and exterior staining, painted metal doors, and frames and door hardware. Equipment includes toilet room accessories, signage, plumbing fixtures, electrical outlets, interior and exterior lighting with emergency battery powered lighting, exit signs, heat pump hot water heaters, propane hot water heater, and ventilation, complete and ready for use.*
2. *The Work involves the construction of a new electric power line to the RV campsites, water service to RV campsites and upgrade of water system throughout the park. New internet fiber service to the gate house and new shower building. Work also includes a heat pump for the gate house and playground equipment, complete and ready for use.*
3. *The Work involves the construction of two new pole barns on precast concrete piers, wood wall and roof frame systems, metal connections, wood wall sheathing, stained board and batten siding, roofing membrane, standing seam metal roof and sheet metal trim. Plywood upper storage level. Gravel floor to be level complete and ready for use.*

The cost of the work is approximately \$ 4,500,000. The contract shall designate the Substantial Completion Date on or before *20 March 2025*, and the Contract Final Completion Date on or before *3 April 2025*.

1. Submit bids on a completed Contractor Bid Form, plus bid security when required, all scanned and included as an attachment to an email with the subject line marked "**Bid for Cobscook Bay State Park, Shower Building & Utility Improvements, BGS Project #3473**" and addressed to the Bid Administrator at: BGS.Architect@Maine.gov, so as to be received no later than **2:00:00 p.m.** on **June 27, 2024**.

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. The Bid Administrator may require the Bidder to surrender a valid paper copy of the bid form or the bid security document in certain circumstances.

Questions on the bid opening process shall be addressed to the Bid Administrator: Joseph H. Ostwald, Director, 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. The bid shall be submitted on the Contractor Bid Form (section 00 41 13) provided in the Bid Documents. The Owner reserves the right to accept or reject any or all bids as may best serve the interest of the Owner.
3. Bid security *is required* on this project.
If noted above as required, the Bidder shall include a satisfactory Bid Bond (section 00 43 13) or a certified or cashier's check for 5% of the 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. There *are no* Pre-qualified General Contractors on this project.
If Pre-qualified General Contractors are identified for this project, the name of each company, with their city and state, are listed below.
7. An on-site pre-bid conference *will* be conducted for this project.
If a pre-bid conference is scheduled, it is *mandatory* for General Contractors and optional for Subcontractors and suppliers. Contractors who arrive late or leave early for a mandatory meeting may be prohibited from participating in this meeting and bidding. *insert details of time, date, location, et cetera, as needed.*
8. Bid Documents - full sets only - will be available on or about *31 May 2024* and may be obtained *in pdf format at no cost* from:
ARCADIA designworks LLC
199 Prospect Street, Suite A
Portland, Maine 04103
(207) 347-5252 email: ideate@arcadiadesignworks.com
9. Bid Documents may be examined at:

<i>AGC Maine</i> <i>188 Whitten Road</i> <i>Augusta, ME 04330</i> <i>Phone 207-622-4741 Fax 207-622-1625</i>	<i>Construction Summary</i> <i>734 Chestnut Street</i> <i>Manchester, NH 03104</i> <i>Phone 603-627-8856 Fax 603-627-4524</i>
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DOCUMENT 002113 - 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

COBSCOOK BAY STATE PARK – SHOWER BUILDING & UTILITY IMPROVEMENTS

of embezzlement, theft, forgery, bribery, falsification or destruction of records, making false statements, or receiving stolen property.

- 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.

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- 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 in 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.

END OF DOCUMENT 002113

COBSCOOK BAY STATE PARK – SHOWER BUILDING & UTILITY IMPROVEMENTS

DOCUMENT 003100 – AVAILABLE PROJECT INFORMATION

1.1 AVAILABLE PROJECT INFORMATION

A. The following information is attached to this section:

1. Owner’s Tax-Exempt Certificate.

B. The following information may be obtained by request from Architect:

1. Shower Building – Maine State Fire Marshal Construction Permit

2. State of Maine, Dept. of Agriculture, Conservation and Forestry, Maine Land Use Planning Commission, Amendment G to Development Permit DP 3557. [3-Pages] Full 27 page permit available upon request.

3. Geotech Report.

END OF DOCUMENT 003100



Maine Revenue Services
Augusta, Maine

PERMANENT EXEMPTION CERTIFICATE

This Exemption Certificate
is issued under the provisions of Title 36, Part 3 MRSA

MAINE STATE OF
d/b/a DEPT OF AGRICULTURE, CONSERVATION
22 STATE HOUSE STATION
18 ELKINS LANE
AUGUSTA, ME 04333-0022

Registration Number : E82579
Date Effective: March 1, 2013
Date Issued: April 11, 2013

Form ST-2
1035861130410

This certifies that the organization named above is an agency, branch, or instrumentality of the federal government, the State of Maine or a political subdivision of the State of Maine, and is therefore entitled to purchase tangible personal property or taxable services that will be used exclusively by the organization for the purposes for which it is organized without payment of the Maine sales or use tax.

Note to the Organization: This certificate is not to be used in activities that are mainly commercial enterprises including, but not limited to, purchases of items which will be resold by the organization. A copy of this certificate with the certification completed below, must be provided to your vendors in order to purchase goods exempt from tax. It is only necessary to provide one copy to the vendor. Subsequent purchases should indicate that the purchase is exempt from tax. In order to be exempt, the sale must be billed directly to and paid for directly by the organization named on the exemption certificate. This certificate cannot be used for purchases when payments are made with cash, personal checks, or personal credit cards.

Note to the Vendor: This certificate must be taken in good faith from the taxpayer named above. Your good faith may be questioned if you have knowledge of facts which give rise to a reasonable inference that the purchaser is not the holder of the exemption certificate or that the merchandise is not to be used exclusively by the organization. This certificate is valid only if the following certification is completed.

PERMANENT EXEMPTION CERTIFICATE

I HEREBY CERTIFY: That the above exemption certificate is valid, that the tangible personal property described herein which I shall purchase from _____ will be used exclusively by the organization named above for purposes for which it is organized.

Description of property to be purchased:

[Handwritten Signature]
Authorized Signature

4-18-13
Date

**00 41 13
Contractor Bid Form**

Cobscook Bay State Park, Shower Building & Utility Improvements BGS #3473

Bid Form submitted by: *email only to email address below*

Bid Administrator:

Joseph H. Ostwald
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: _____

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 if required by the Owner, and to sign the designated Construction Contract within twelve calendar days after the date of notification of such acceptance, except if the twelfth 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.

As a guarantee thereof, the Bidder submits, together with this bid, a bid bond or other acceptable instrument as and if required by the Bid Documents.

00 41 13
Contractor Bid Form

1. The Bidder, having carefully examined the *Cobscook Bay State Park, Shower Building & Utility Improvements* Project Manual dated *March 2024*, prepared by *ARCADIA designworks*, 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 **Base Bid** amount of:

\$ _____ .00

2. Allowances *are not included* on this project.
No Allowances

\$.00

3. Alternate Bids *are not included* on this project.
No Alternate Bids

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

1 Not used \$ _____ .00

2 Not used \$ _____ .00

3 Not used \$ _____ .00

4 Not used \$ _____ .00

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

If noted above as required, or if the Base Bid amount exceeds \$125,000.00, the Bidder shall include with this bid form a satisfactory Bid Bond (section 00 43 13) or a certified or cashier's check for 5% of the bid amount with this completed bid form submitted to the Owner.

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

If noted above as required, the Bidder shall include with this bid form a list of each Filed Sub-bidder selected by the Bidder on the form provided (section 00 41 13F).

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

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

Signature *Date*
name and title

name of contracting entity
address

name of contractor company
address

telephone
email 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:	
_____ <i>Signature</i>	_____ <i>Date</i>	_____ <i>Signature</i>	_____ <i>Date</i>
<i>insert name</i>		<i>Joseph H. Ostwald</i>	
<i>Project Manager/ Contract Administrator</i>		<i>Director, Planning, Design & Construction</i>	

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.

**State of Maine
CONSTRUCTION CONTRACT
Application for Payment**

Project name
location / school / campus

Application Number: **1**

Contractor Company name
address
city state zip code

Period Start Date: **1-Jul-2020**
Period End Date: **31-Jul-2020**
BGS Project No.: **n**
Other Project No.: **x**

1	Original Contract Amount		\$0
2	Net of Change Orders to Date	(from table below)	\$0
3	Contract Sum to Date	(line 1 plus or minus line 2)	\$0
4	Total Completed and Stored to Date	(column G on Continuation Sheet)	\$0
5a	5% Retainage of Completed Work	(columns D + E x 5%)	\$0
5b	5% Retainage of Stored Materials	(column F x 5%)	\$0
5c	Total Retainage	(column I)	\$0
6	Total Earned Less Retainage	(line 4 minus line 5c)	\$0
7	Less Previous Approved Applications for Payment	(line 6 from previous Application)	\$0
8	Current Payment Due	(line 6 minus line 7)	\$0
9	Balance to Finish, Including Retainage	(line 3 minus line 6)	\$0

Change Order Summary	Additions	Deductions
Total Changes Approved in Previous Months	\$0	\$0
Total Changes Approved this Month	\$0	\$0
Subtotals	\$0	\$0
Net of Change Orders to Date		\$0

The undersigned Contractor certifies that to the best of the Contractor's knowledge, information, and belief the Work covered by this Application for Payment has been completed in accordance with the Contract Documents, that all amounts have been paid by the Contractor for Work for which the previous Certificates for Payment were issued and payments received from the Owner, and that current payment shown herein is now due.

Contractor

Type company name here
Type person's name, title here

signature date

In accordance with the Contract Documents, based on on-site observations and the data comprising this Application, the Consultant certifies to the Owner that to the best of the Consultant's knowledge, information, and belief the Work has progressed as indicated, the quality of the Work is in accordance with the Contract Documents, and the Contractor is entitled to payment of the Amount Certified. **Amount Certified:** _____

Consultant (Architect or Engineer)

Type firm name here
Type person's name, title here

signature date

Owner

Type contracting entity name here
Type person's name, title here

signature date

Owner's Rep / other - clear this text if not used

Type entity name here
Type person's name, title here

signature date

Bureau of General Services

Type person's name, title here

signature date

**State of Maine
CONSTRUCTION CONTRACT
Construction Change Directive**

Project name
location / school / campus

C. C. D. Number: **1**
CP (Change Proposal) Number **1**
Issue Date of this Document: **31-Oct-2021**

Contractor Company name
address
city state zip code

BGS Project No.: **n**
Other Project No.: **x**

CCD Item	Type name of CCD item here		
Description of Work	Type brief description here of work scope here.		
Reason or Necessity of Work	Type brief justification for change here.		
Method of Compensation	Select from drop down box...	Projected Total Cost	\$0
Supporting Documentation	is attached	Projected Calendar Days*	0

* Calendar Days refers to Contract Final Completion Date only.

Fully describe the scope of work of the CCD item in the table above and on attached drawings and specifications as necessary.

Indicate the reason for the work, and the estimated schedule and cost impacts.

This CCD records the order to do the work. The documented actual final time and cost changes are subject to approval in a subsequent Change Order process.

Consultant
(Architect or Engineer) Type firm name here
Type person's name, title here

signature date

Contractor Type company name here
Type person's name, title here

signature date

Owner Type contracting entity name here
Type person's name, title here

signature date

Owner's Rep Type entity name here
Type person's name, title here

signature date

Bureau of General Services Division of Planning, Design & Construction
Type person's name, title here

signature date

**State of Maine
CONSTRUCTION CONTRACT
Change Order**

Project name
location / school / campus

Change Order Number: **1**

Contractor Company name
address
city state zip code

Issue Date of this Document: **31-Dec-2022**

BGS Project No.: **n**
Other Project No.: **x**

Cost Change

Show Deduct as a negative number, e.g.: "\$850".

	Add	Deduct	Total
Net Amount of this Change Order	\$0	\$0	
Net Amount of Previous Change Orders	\$0	\$0	
Net of Change Orders to Date	\$0	\$0	\$0
Original Contract Amount			\$0
Revised Contract Amount			\$0

Time Change

Show Deduct as a negative number, e.g.: "-8".

	Add	Deduct	Total
Net Calendar Days Adjusted by this Change Order	0	0	
Net Calendar Days Adjusted by Previous Change Orders	0	0	
Net of Change Orders to Date	0	0	0
Original Contract Final Completion Date			31-Dec-2023
Revised Contract Final Completion Date*			31-Dec-2023

Consultant (Architect or Engineer)

Type firm name here
Type person's name, title here

signature date

Contractor

Type company name here
Type person's name, title here

signature date

Owner

Type contracting entity name here
Type person's name, title here

signature date

Type Entity, such as "Owner's Rep", or "not used"

Type entity name here
Type person's name, title here

signature date

Bureau of General Services

Division of Planning, Design & Construction
Type person's name, title here

signature date

Attach the "List of Change Order Items" sheet, plus all supporting documentation for each Change Order Item.

Substantial Completion Date: the deadline for first beneficial use by Owner, as certified by Consultant.

* **Contract Final Completion Date** : the Contractor's final completion deadline for contract work.

Contract Expiration Date: the Owner's deadline for internal management of contract accounts;

Contract Expiration Date does not directly relate to any contract obligation of the Contractor.

1-Dec-2023
31-Dec-2023
29-Feb-2024

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.

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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*.

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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

00 71 00
Definitions

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;

00 71 00
Definitions

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.

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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.
- 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

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- 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;
 - v. An authorized official of the Department of Justice or other law enforcement agency;
 - vi. A court or grand jury; or

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- 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).
- 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

Supplemental General Conditions

- 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. 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;

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- 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. 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

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-stater-evolving-fund-national-information-management-system-reports>.

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.

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- 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 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)

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- 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 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;

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- 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.

COBSCOOK BAY STATE PARK – SHOWER BUILDING & UTILITY IMPROVEMENTS

DOCUMENT 007346 – WAGE DETERMINATION SCHEDULE

1.1 GENERAL

A. Related Documents:

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

B. Summary:

1. 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.

C. Requirements:

1. Conform to the wage determination schedule for this project which is shown on the following page. [Wage Determination – In accordance with 26 MRS 1301. 2024 Fair Minimum Wage Rates – Building 2 Washington County.

END OF SECTION 007346

**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 Washington County (other than 1 or 2 family homes)

<u>Occupational Title</u>	<u>Minimum Wage</u>	<u>Minimum Benefit</u>	<u>Total</u>
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	\$17.38	\$4.70	\$22.08
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	\$30.08	\$5.49	\$35.57
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 Pumps	\$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	\$3.13	\$26.13
Screed/Wheelman	\$29.25	\$4.94	\$34.19
Sheet Metal Workers	\$26.00	\$6.39	\$32.39
Structural Iron And Steel Workers	\$30.00	\$7.46	\$37.46
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**

**Bureau of General Services
Division of Planning, Design & Construction**

PRE-BID CONFERENCE AGENDA

Cobscook Bay State Park – Shower Building & Utility Improvements

Date: June 14, 2024

Meeting Location: Park Gate House, South Edmunds Road, Dennysville, Maine

A. Attendees

- Record names of each individual and their entity
 - Owner (Maine State Parks and Lands)
 - Owner's Representative
 - Consultant (Architect)
 - General Contractors
 - Subcontractors
 - Bureau of General Services (BGS)
 -

B. General Information on the Bid Process

- Note requirement, if any, for attendance at this conference for eligibility to bid
- State bid submission time, date, and location, or method of submission
- Note method and deadline for questions, in writing, to Consultant
- Note bid security and bond requirements
- Address means of access to bidding documents, including Addenda
- Note bidder's responsibility to review all project requirements
-

C. Specific Information on the Project

- Bidders to note all insurance requirements, including Builder's Risk insurance
- Review the overall scope of work
- Note parking requirements
- Note lay-down areas, location for trailers
- Address access to the facility, if needed
- Define work hour restrictions
- Note the project schedule
- State the roles of each entity
- Tour the site and facility; note other pre-bid possibilities for access, if any
- Conclude the tour

- Record questions and answers from this conference in the next Addendum

**Bureau of General Services
Division of Planning, Design & Construction**

PRE-CONSTRUCTION CONFERENCE AGENDA

Cobscook Bay State Park – Shower Building & Utility Improvements

Date: TBD

Meeting Location: Park Gate House, South Edmunds Road, Dennysville, Maine

A. Participants in the Project

- Owner (Maine State Parks and Lands)
 - Owner's Representative
- Consultant (Architect)
- General Contractor
 - Superintendent
 - Subcontractors
- Bureau of General Services (BGS)
-

B. General Contractor's Role

- Contracts, bonds and insurance
- Project Schedule
- Schedule of Values
- List of Subcontractors and suppliers
- Progress schedules
- Submittal schedule
- Requests For Information
- Full time Superintendent
- Responsibility for Subcontractors
- Responsibility for coordination
- Record drawings
- Permits
-

C. Consultant's Role

- Authorized agent of Owner
- Directs administration of the Contract
- Interpreter of content of plans and specifications
- Issues clarifications or revisions as necessary
- Directs Changes to the Work
- Reviews test results with Subconsultants
- Reviews shop drawings
-

D. Owner's Role

- Clearly communicate intent and details of project
- Overall responsibility and accounting of funds
- Discuss and approve Change Orders in a timely manner

**Bureau of General Services
Division of Planning, Design & Construction**

PRE-CONSTRUCTION CONFERENCE AGENDA

E. Owner's Representative Role

- Authorized agent of Owner
- Observes construction of all phases of work
- Monitors progress against Contractors schedule
- Maintains project diary and daily reports of work and workforce
- Maintains record of changes
- Orders and coordinates quality control testing
-

F. BGS Role

- Authorized agent of Owner
- Observes construction of all phases of work
- Monitors progress against Contractors schedule
- Monitors project diary and daily reports of work and workforce
-

G. General Issues

- Jobsite safety
- Visitors to jobsite
- Temporary utilities
- Pre-installation and pre-construction meetings by trade
- Testing, Commissioning and Special Inspections
-

H. Project-specific Issues

- Scope of work
- Parking
- Access
- Lay-down areas
-

I. Monthly Meetings

- Establish a regular date of month, time of day, and location
- Review work progress against project schedule
- Review Requests for Information (RFIs)
- Review Change Requests
- Review Change Proposals
- Review Change Orders
- Review Requisitions
- Approve documents as needed
-

J. Submittals

- Maximum time frame for review by Consultant
- Long-lead items
- Approval of finish/color packages
- Substitutions

**Bureau of General Services
Division of Planning, Design & Construction**

PRE-CONSTRUCTION CONFERENCE AGENDA

K. Payment Process

- Cash flow projection
- Requisitions
- Lien waivers
- Stored materials
- Retainage
-

L. Change Order Process

- Proposal Request
- Change Proposal
- Change Order
- Written authorization to proceed
- Delays, damages and time extensions
-

M. Close-out Procedures

- Punch list (inspect only after work is completed!)
- Certificate of Substantial Completion
- O & M (operations and maintenance) manuals and training
- Commissioning report
- Special Inspections report
- As-built documents
- Warranty documents and claim process
- Certificate of Occupancy
- Lien releases, Consent of surety

COBSCOOK BAY STATE PARK – SHOWER BUILDING & UTILITY IMPROVEMENTS

SECTION 011000 - SUMMARY

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Project information.
2. Work covered by Contract Documents.
3. Work performed by Owner.
4. Contractor's use of site and premises.
5. Coordination with occupants.
6. Work restrictions.
7. Specification and Drawing conventions.
8. Miscellaneous provisions.

B. Related Requirements:

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

1.2 PROJECT INFORMATION

A. Project Identification: Cobscook Bay State Park – Shower Building & Utility Improvements, BGS #3473

1. Project Location: South Edmunds Road, Dennysville, Washington County, Maine.

B. Owner: Maine State Department of Agriculture, Conservation & Forestry.

1. Owner's Representative: Ryan Kerr, Senior Planner, Maine Parks & Historic Sites, 106 Hogan Road, Suite 7, Bangor, Maine 04401. Ryan.Kerr@maine.gov. (207) 974-6467.

C. Architect: Patric Santerre, Licensed Architect.

1. Architect's Representative: ARCADIA designworks LLC, 199 Prospect Street, Suite A, Portland, Maine 04103. patric@arcadiadesignworks.com (207) 347-5252.

1.3 WORK COVERED BY CONTRACT DOCUMENTS

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

1. The Work involves the construction of a new shower building with solar array system, reuse of an existing bath house for water tank storage, RV dump station and septic leach

COBSCOOK BAY STATE PARK – SHOWER BUILDING & UTILITY IMPROVEMENTS

field, and utility improvements at location indicated on Drawings. Site preparation includes demolition of existing free-standing outhouses, tree removal and earthwork, and limited discontinuation of existing site utilities. Site improvements include, paving, landscaping, and site lighting. Building includes concrete foundation, slab-on-grade, and concrete apron. Work also includes steel components, wood roof framing and deck, roof membrane, standing seam metal roof, and metal trim, masonry walls, wood stud partitions, wood and glass-mat sheathing, firestopping, and wire mesh ceilings. Carpentry includes timber benches and shelving. Finishes include CMU sealer, interior and exterior staining, painted metal doors, and frames and door hardware. Equipment includes toilet room accessories, signage, plumbing fixtures, electrical outlets, interior and exterior lighting with emergency battery powered lighting, heat pump hot water heaters, propane hot water heater, and ventilation, complete and ready for use.

2. The Work involves the construction of a new electric power line to the RV campsites starting from a new pole line provided by Versant Power, water service to RV campsites and upgrade of well water system to the entire park. New internet fiber service to the gatehouse and new shower building. Work also includes a heat pump for the gate house and playground equipment, complete and ready for use.
3. The Work involves the construction of two new pole barns on precast concrete piers, wood wall and roof frame systems, metal connections, wood wall sheathing, stained board and batten siding, roofing membrane, standing seam metal roof and sheet metal trim. Plywood upper storage level. Gravel floor to be level complete and ready for use.

A. Type of Contract:

1. Project will be constructed under a single prime contract.

B. Contract Type: State of Maine, Construction Contract, Large Construction Project, revised 11 August 2023.

1.4 CONTRACTOR'S USE OF SITE AND PREMISES

A. Limits on Use of Site: Limit use of Project site to areas within the Contract limits indicated. Do not disturb portions of the Project site beyond areas in which the Work is indicated.

1. Limits on Use of Site: Confine construction operations to the following locations.
 - a. Gravel pit area for construction of pole barn and access to gravel pit media.
 - b. South side of entrance parking area for construction of new septic field and piping.
 - c. West end of loop road for construction of new shower building.
 - d. Existing bath house for interior demolition, renovation, and installation of well water tank storage and pump equipment. [Coordinated with park director]
 - e. South side of main road for installation of new dump station, holding tanks, lift station, and gravel access road. [Coordinated with park director]
 - f. RV camp sites during power and water utility installation.
 - g. Playground area during equipment installation.
 - h. Gate house during heat pump installation.
 - i. Limited areas associated with new water pipe system installation.

COBSCOOK BAY STATE PARK – SHOWER BUILDING & UTILITY IMPROVEMENTS

2. Driveways, Walkways and Entrances: Keep driveways, parking areas, and entrances serving premises clear and available to Owner, Owner's employees, park patrons, and emergency vehicles at all times. Do not use these areas for parking or for storage of materials.
 - a. Schedule deliveries to minimize use of driveways and entrances by construction operations.
 - b. Schedule deliveries to minimize space and time requirements for storage of materials and equipment on-site.
- B. Condition of Existing Building: Maintain portions of existing building affected by construction operations in a weathertight condition throughout construction period. Repair damage caused by construction operations.
- C. Condition of Existing Grounds: Maintain portions of existing grounds, landscaping, and hardscaping affected by construction operations throughout construction period. Repair damage caused by construction operations.

1.5 COORDINATION WITH OCCUPANTS

- A. Partial Owner Occupancy: Owner will occupy the park premises during the entire construction period, apart from areas under construction. Cooperate with Owner during construction operations to minimize conflicts and facilitate Owner usage. Perform the Work so as not to interfere with Owner's operations. Maintain existing exits unless otherwise indicated.
 1. Maintain access to existing driveways and walkways. Do not close or obstruct driveways and walkways without permission from Owner.
 2. Notify Owner not less than 72 hours in advance of activities that will affect Owner's operations.

1.6 WORK RESTRICTIONS

- A. On-Site Work Hours: Work shall be generally performed during normal business working hours of 7:00 a.m. to 5:00 p.m., Monday through Friday, except otherwise indicated.
 1. Weekend Hours: As approved by Owner.
 2. Early Morning Hours: As approved by Owner.
 3. Hours for Utility Shutdowns: As approved by Architect and Owner.
 4. Provide 24-hour notice to Architect when performing work other than normal working hours and work that will involve louder than normal equipment.
- B. Existing Utility Interruptions: Do not interrupt utilities serving facilities occupied by Owner or others unless permitted under the following conditions and then only after arranging for temporary utility services according to requirements indicated:
 1. Notify Architect and Owner not less than three days in advance of proposed utility interruptions.
 2. Obtain Owner's permission before proceeding with utility interruptions.

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- C. Noise, Vibration, Dust, and Odors: Coordinate operations that may result in high levels of noise and vibration, dust, odors, or other disruption to Owner occupancy with Owner.
 - 1. Notify Architect and Owner not less than two days in advance of proposed disruptive operations.
- D. Smoking and Controlled Substance Restrictions: Use of tobacco products, alcoholic beverages, and other controlled substances within the existing building, on Project site is not permitted.

1.7 SPECIFICATION AND DRAWING CONVENTIONS

- A. Specification Content: The Specifications use certain conventions for the style of language and the intended meaning of certain terms, words, and phrases when used in particular situations. These conventions are as follows:
 - 1. Imperative mood and streamlined language are generally used in the Specifications. The words "shall," "shall be," or "shall comply with," depending on the context, are implied where a colon (:) is used within a sentence or phrase.
 - 2. Hypertext: Text used in the Specifications may contain hyperlinks. Hyperlinks may allow for access to linked information that is not residing in the Specifications. Unless otherwise indicated, linked information is not part of the Contract Documents.
 - 3. Specification requirements are to be performed by the Contractor unless specifically stated otherwise.
- B. Division 00 Contracting Requirements: General provisions of the Contract, including General and Supplementary Conditions, provided by the State of Maine, Bureau of General Services, apply to all Sections of the Specifications.
- C. Division 01 General Requirements: Requirements of Sections in Division 01 apply to the Work of all Sections in the Specifications.
- D. Drawing Coordination: Requirements for materials and products identified on Drawings are described in detail in the Specifications. One or more of the following are used on Drawings to identify materials and products:
 - 1. Terminology: Materials and products are identified by the typical generic terms used in the individual Specifications Sections.
 - 2. Abbreviations: Materials and products are identified by abbreviations scheduled on Drawings and published as part of the U.S. National CAD Standard.
 - 3. Keynoting: Materials and products are identified by reference keynotes referencing Specification Section numbers found in this Project Manual.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION 011000

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SECTION 012300 - ALTERNATES

PART 1 - GENERAL

1.1 SUMMARY

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

1.2 DEFINITIONS

- A. Alternate: An amount proposed by bidders and stated on the Bid Form for certain work defined in the bidding requirements that may be added to or deducted from the base bid amount if the 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 alternates into the Work.

1.3 PROCEDURES

- A. Coordination: Revise or adjust affected adjacent work as necessary to completely integrate work of the alternate into Project.
 - 1. Include, as part of each alternate, miscellaneous devices, accessory objects, and similar items incidental to or required for a complete installation, indicated as part of alternate.
- B. Execute accepted alternates under the same conditions as other Work of the Contract.

PART 2 - EXECUTION

2.1 SCHEDULE OF ALTERNATES

- 1. Alternate No. 01:
- 2. Alternate No. 02:
- 3. Alternate No. 03:

END OF SECTION 012300

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SUBSTITUTION REQUEST FORM

Project: _____ Substitution Request Number: _____
To: _____ From: _____
Re: _____ Date: _____

Specification Title: _____ Description: _____
Section: _____ Page: _____ Article/Paragraph: _____

Proposed Substitution: _____
Manufacturer: _____ Address: _____ Phone: _____
Trade Name: _____ Model No. _____

Attached data includes product description, specifications, drawings, and performance and test data adequate for evaluation of the request: applicable portions of the data are clearly identified.

Attached data also includes a description of changes to the Contract Documents that the proposed substitutions will require for its proper installation.

The Undersigned certifies:

1. Has investigated proposed Product and determined that it meets or exceeds the quality level of the specified product.
2. Will provide the same warranty for the Substitution as for the specified Product.
3. Will provide no additional cost to the Owner.
4. Will coordinate installation and make changes to other Work that may be required for the Work to be complete with no additional cost to Owner.
5. Waive claims for additional costs or time extension that may subsequently become apparent.
6. Will reimburse Owner and Architect/Engineer for review or redesign services associated with substitution.

Submitted By: _____
Signed By: _____
Firm: _____
Address: _____
Telephone: _____ Fax: _____

A/E's REVIEW AND ACTION

- Submission approved - Make submittals in accordance with Specification Section 013300.
 Submission approved as noted - Make submittals in accordance with Specification Section 013300.
 Submission rejected - Use specified materials.
 Submission request received too late - Use specified materials.

Signed by: _____ Date: _____

Supporting Data Attached: Drawings Product Data Samples Tests Reports
 Other _____

SECTION 013300 - SUBMITTAL PROCEDURES

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Submittal schedule requirements.
2. Administrative and procedural requirements for submittals.

B. Related Requirements:

1. Section 007213 "General Conditions, 15. Shop Drawings and 16. Samples".

1.2 SUBMITTAL SCHEDULE

A. Submittal Schedule: Submit a schedule of submittals, arranged in chronological order by dates required by construction schedule. Include time required for review, ordering, manufacturing, fabrication, and delivery when establishing dates. Include additional time required for making corrections or revisions to submittals noted by Architect and additional time for handling and reviewing submittals required by those corrections.

1. Coordinate submittal schedule with list of subcontracts, the schedule of values, and Contractor's construction schedule.
2. Initial Submittal: Within ten (10) days after signing the Contract, submit concurrently with startup construction schedule. Include submittals required during the first 60 days of construction. List those submittals required to maintain orderly progress of the Work and those required early because of long lead time for manufacture or fabrication.
3. Final Submittal: Submit concurrently with the first complete submittal of Contractor's construction schedule.
 - a. Submit revised submittal schedule to reflect changes in current status and timing for submittals.
4. Format: Arrange the following information in a tabular format:
 - a. Scheduled date for first submittal.
 - b. Specification Section number and title.
 - c. Submittal category: Action; informational.
 - d. Name of subcontractor.
 - e. Description of the Work covered.
 - f. Scheduled date for Architect's final release or approval.
 - g. Scheduled date of fabrication.

1.3 SUBMITTAL FORMATS

A. Submittal Information: Include the following information in each submittal:

1. Project name.
2. Date.
3. Name of Architect.
4. Name of Construction Manager.
5. Name of Contractor.
6. Name of firm or entity that prepared submittal.
7. Names of subcontractor, manufacturer, and supplier.
8. Unique submittal number, including revision identifier. Include Specification Section number with sequential alphanumeric identifier; and alphanumeric suffix for resubmittals.
 - a. Submittal number shall use Specification Section number followed by a decimal point and then a sequential number (e.g., ABCD-061000.01). Resubmittals shall include an alphabetic suffix after another decimal point (e.g., ABCD-061000.01.A).
9. Category and type of submittal.
10. Submittal purpose and description.
11. Number and title of Specification Section, with paragraph number and generic name for each of multiple items.
12. Drawing number and detail references, as appropriate.
13. Indication of full or partial submittal.
14. Location(s) where product is to be installed, as appropriate.
15. Other necessary identification.
16. Remarks.
17. Signature of transmitter.

B. Options: Identify options requiring selection by Architect.

C. Deviations and Additional Information: On each submittal, clearly indicate deviations from requirements in the Contract Documents, including minor variations and limitations; include relevant additional information and revisions, other than those requested by Architect on previous submittals. Indicate by highlighting on each submittal or noting on attached separate sheet.

D. Paper Submittals:

1. Place a permanent label or title block on each submittal item for identification; include name of firm or entity that prepared submittal.
2. Provide a space approximately 6 by 8 inches on label or beside title block to record Contractor's review and approval markings and action taken by Architect.
3. Action Submittals: Submit three paper copies of each submittal unless otherwise indicated. Architect will return two copies.
4. Informational Submittals: Submit two paper copies of each submittal unless otherwise indicated. Architect will not return copies.
5. Additional Copies: Unless additional copies are required for final submittal, and unless Architect observes noncompliance with provisions in the Contract Documents, initial submittal may serve as final submittal.

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6. Transmittal for Submittals: Assemble each submittal individually and appropriately for transmittal and handling. Transmit each submittal using a transmittal form. Architect will return without review submittals received from sources other than Contractor.
- E. PDF Submittals: Prepare submittals as PDF package, incorporating complete information into each PDF file. Name PDF file with submittal number.

1.4 SUBMITTAL PROCEDURES

- A. Prepare and submit submittals required by individual Specification Sections. Types of submittals are indicated in individual Specification Sections.
 1. Email: Prepare submittals as PDF package and transmit them to Architect by sending via email. Include PDF transmittal form. Include information in email subject line as requested by Architect.
 - a. Architect will return annotated file. Annotate and retain one copy of the file as a digital Project Record Document file.
 2. Paper: Prepare submittals in paper form and deliver to Architect.
- B. Architect's Digital Data Files: Electronic digital data files of the Contract Drawings will be provided by Architect for Contractor's use in preparing submittals, if requested.
 1. Architect will furnish Contractor one set of digital data drawing files of the Contract Drawings for use in preparing Shop Drawings and Project record drawings.
 2. Contractors requesting files shall sign the "Electronic Files Request Form and Waiver" and submit an agreement included at the end of this section.
- C. Coordination: Coordinate preparation and processing of submittals with performance of construction activities.
 1. Coordinate each submittal with fabrication, purchasing, testing, delivery, other submittals, and related activities that require sequential activity.
 2. Submit all submittal items required for each Specification Section concurrently unless partial submittals for portions of the Work are indicated on approved submittal schedule.
 3. Submit action submittals and informational submittals required by the same Specification Section as separate packages under separate transmittals.
 4. Coordinate transmittal of different types of submittals for related parts of the Work so processing will not be delayed because of need to review submittals concurrently for coordination.
 - a. Architect reserves the right to withhold action on a submittal requiring coordination with other submittals until related submittals are received.
- D. Processing Time: Allow time for submittal review, including time for resubmittals, as follows. Time for review shall commence on Architect's receipt of submittal. No extension of the Contract Time will be authorized because of failure to transmit submittals enough in advance of the Work to permit processing, including resubmittals.

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1. Initial Review: Allow 10 days for initial review of each submittal. Allow additional time if coordination with subsequent submittals is required. Architect will advise Contractor when a submittal being processed must be delayed for coordination.
2. Intermediate Review: If intermediate submittal is necessary, process it in same manner as initial submittal.
3. Resubmittal Review: Allow 10 days for review of each resubmittal.
 - a. Mechanical submittals.
 - b. Electrical submittals.
 - c. Data & Communications Systems submittals.
4. No extension of the Contract Time will be authorized because of failure to transmit submittals enough in advance of the Work to permit processing.
5. Submittals with Color Selections: Deliver to Architect a list of submittals required for the exterior color package and a list required for the interior color package. The Architect needs to coordinate the colors of all exterior and interior items and will hold submittals with color selections until all materials in the exterior color package have been received. Allow 2 weeks after the last item has been submitted for return of exterior color selections. The Architect will hold submittals with color selections until all materials in the interior color package have been received. Allow 3 weeks after the last item has been submitted for return of interior color selections. Careful coordination of the Submittal Schedule by the Contractor is required so as not to delay the Work.

E. Resubmittals: Make resubmittals in the 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.

F. Distribution: Furnish copies of final submittals to manufacturers, subcontractors, suppliers, fabricators, installers, authorities having jurisdiction, and others as necessary for performance of construction activities. Show distribution on transmittal forms.

G. Use for Construction: Retain complete copies of submittals on Project site. Use only final action submittals that are marked with approval notation from Architect's action stamp.

1.5 SUBMITTAL REQUIREMENTS

A. Product Data: Collect information into a single submittal for each element of construction and type of product or equipment.

1. If information must be specially prepared for submittal because standard published data are not suitable for use, submit as Shop Drawings, not as Product Data.
2. Mark each copy of each submittal to show which products and options are applicable. Mark with dark colored pen that permits photocopying.
3. Include the following information, as applicable:
 - a. Manufacturer's catalog cuts.

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- 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. Manufacturer's Safety and Data Sheets (MSDS).
 - h. Notation of coordination requirements.
 - i. 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 Samples.
 6. Submit Product Data in the following format:
 - a. PDF electronic file, or
 - b. Three paper copies of Product Data unless otherwise indicated. Architect will return two copies.
- B. Shop Drawings: Prepare Project-specific information, drawn accurately to scale. Do not base Shop Drawings on reproductions of the Contract Documents or standard printed data.
 1. Preparation: Fully illustrate requirements in the Contract Documents. Include the following information, as applicable:
 - a. Identification of products.
 - b. Schedules.
 - c. Compliance with specified standards.
 - d. Notation of coordination requirements.
 - e. Notation of dimensions established by field measurement.
 - f. Relationship and attachment to adjoining construction clearly indicated.
 - g. Seal and signature of professional engineer if specified.
 2. Sheet Size: Except for templates, patterns, and similar full-size drawings, submit Shop Drawings on sheets at least 8-1/2 by 11 inches, but no larger than 30 by 42 inches.
 3. Submit Shop Drawings in the following format:
 - a. PDF electronic file, or
 - b. Three opaque copies of each submittal. Architect will retain two copies; remainder will be returned.
- C. Samples: Submit Samples for review of kind, color, pattern, and texture for a check of these characteristics with other elements and for a comparison of these characteristics between submittal and actual component as delivered and installed.

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1. Transmit Samples that contain multiple, related components such as accessories together in one submittal package.
2. Identification: Attach label on unexposed side of Samples that includes the following:
 - a. Project name and submittal number.
 - b. Generic description of Sample.
 - c. Product name and name of manufacturer.
 - d. Sample source.
 - e. Number and title of applicable Specification Section.
 - f. Specification paragraph number and generic name of each item.
3. Email Transmittal: Provide PDF transmittal. Include digital image file illustrating Sample characteristics, and identification information for record.
4. Paper Transmittal: Include paper transmittal including complete submittal information indicated.
5. Disposition: Maintain sets of approved Samples at Project site, available for quality-control comparisons throughout the course of construction activity. Sample sets may be used to determine final acceptance of construction associated with each set.
 - a. Samples that may be incorporated into the Work are indicated in individual Specification Sections. Such Samples must be in an undamaged condition at time of use.
 - b. Samples not incorporated into the Work, or otherwise designated as Owner's property, are the property of Contractor.
6. Samples for Verification: Submit full-size units or Samples of size indicated, prepared from same material to be used for the Work, cured and finished in manner specified, and physically identical with material or product proposed for use, and that show full range of color and texture variations expected. Samples include, but are not limited to, the following: partial sections of manufactured or fabricated components; small cuts or containers of materials; complete units of repetitively used materials; swatches showing color, texture, and pattern; color range sets; and components used for independent testing and inspection.
 - a. Number of Samples: Submit three sets of Samples. Architect will retain two Sample sets; remainder will be returned. Mark up and retain one returned Sample set as a project record sample.
 - 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.
- D. Qualification Data: Prepare written information that demonstrates capabilities and experience of firm or person. Include lists of completed projects with project names and addresses, contact information of architects and owners, and other information specified.
- E. Design Data: Prepare and submit written and graphic information indicating compliance with indicated performance and design criteria in individual Specification Sections. Include list of

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assumptions and summary of loads. Include load diagrams if applicable. Provide name and version of software, if any, used for calculations. Number each page of submittal.

F. Certificates:

1. Certificates and Certifications Submittals: Submit 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. Provide a notarized signature where indicated.
2. Installer Certificates: Submit written statements on manufacturer's letterhead certifying that Installer complies with requirements in the Contract Documents and, where required, is authorized by manufacturer for this specific Project.
3. Manufacturer Certificates: Submit written statements on manufacturer's letterhead certifying that manufacturer complies with requirements in the Contract Documents. Include evidence of manufacturing experience where required.
4. Material Certificates: Submit written statements on manufacturer's letterhead certifying that material complies with requirements in the Contract Documents.
5. Product Certificates: Submit written statements on manufacturer's letterhead certifying that product complies with requirements in the Contract Documents.
6. Welding Certificates: Prepare written certification that welding procedures and personnel comply with requirements in the Contract Documents. Submit record of Welding Procedure Specification and Procedure Qualification Record on AWS forms. Include names of firms and personnel certified.

G. Test and Research Reports:

1. Compatibility Test Reports: Submit reports written by a qualified testing agency, on testing agency's standard form, indicating and interpreting results of compatibility tests performed before installation of product. Include written recommendations for primers and substrate preparation needed for adhesion.
2. Field Test Reports: Submit written reports indicating and interpreting results of field tests performed either during installation of product or after product is installed in its final location, for compliance with requirements in the Contract Documents.
3. Material Test Reports: Submit reports written by a qualified testing agency, on testing agency's standard form, indicating and interpreting test results of material for compliance with requirements in the Contract Documents.
4. Preconstruction Test Reports: Submit reports written by a qualified testing agency, on testing agency's standard form, indicating and interpreting results of tests performed before installation of product, for compliance with performance requirements in the Contract Documents.
5. Product Test Reports: Submit written reports indicating that current product produced by manufacturer complies with requirements in the Contract Documents. Base reports on evaluation of tests performed by manufacturer and witnessed by a qualified testing agency, or on comprehensive tests performed by a qualified testing agency.
6. Research Reports: Submit written evidence, from a model code organization acceptable to authorities having jurisdiction, that product complies with building code in effect for Project. Include the following information:
 - a. Name of evaluation organization.
 - b. Date of evaluation.
 - c. Time period when report is in effect.

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- d. Product and manufacturers' names.
- e. Description of product.
- f. Test procedures and results.
- g. Limitations of use.

1.6 CONTRACTOR'S REVIEW

- A. Action and Informational Submittals: Review each submittal and check for coordination with other Work of the Contract and for compliance with the Contract Documents. Note corrections and field dimensions. Mark with approval stamp before submitting to Architect.
 - 1. The Contractor shall review submittals for completeness and compliance with the Contract Documents. If submittal contains substitutions, Contractor shall process substitutions in accordance with Section 012500 "Substitution Procedures," and not part of specified Shop Drawings or Product Data submittals. Contractor is responsible for keeping Subcontractors on time with the submittal schedule. If the Contractor submits submittals that are repeatedly rejected, requiring the Architect to perform multiple reviews of the same submittal because of the failure to properly prepare and complete the submittals.
 - a. Owner will compensate Architect for such additional services.
 - b. Owner will deduct the amount of such compensation from the final payment of the Contractor.
- B. Approval Stamp: Stamp each submittal with a uniform, approval stamp. Include Project name and location, submittal number, Specification Section title and number, name of reviewer, date of Contractor's approval, and statement certifying that submittal has been reviewed, checked, and approved for compliance with the Contract Documents.
 - 1. Stamp or statement shall include the following: "The Contractor represents that he has determined and verified all materials, field measurements, and field construction criteria related thereto or will do so, and that he has checked and coordinated the information contained within such submittals with the requirements of the Work and of the Contract Documents."

1.7 ARCHITECT'S ACTION

- A. Action Submittals: Architect will review each submittal, make marks to indicate corrections or revisions required, and return it. Architect will stamp each submittal with an action stamp and will mark stamp appropriately to indicate taken, as follows:
 - 1. Reviewed: Final Unrestricted Release. Work may proceed, provided it complies with the Contract Documents.
 - 2. Furnish as Corrected: Final, But Conditional Release. Work may proceed, provided it complies with the notations and corrections on submittals and with Contract Documents. Architect's comments shall be considered a part of the original submittal. Should Contractor disagree with any such comments, so notify the Architect within fourteen (14) days after receipt of such transmittal and before commencing work on the items in question. Failing this, Contractor shall be deemed to have agreed to such comments by the Architect

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- and to have accepted full responsibility for implementing them at no additional cost to the Owner.
3. **Revise and Resubmit:** Returned for Resubmittal. Do not proceed with the work at the site or allow submittal at site. Fabrication in shop or factory may proceed on items not affected by the Architect's comments only. Revise submittal in accordance with notations thereon, and resubmit without delay to obtain a different action marking. Revise and Resubmit
 4. **Submit Specified Item:** Resubmit using a specified item. Where submittal is rejected and returned for resubmittal of a specified product. Consult product section for list of acceptable manufacturers.
 5. **Rejected:** Where submittal is returned for other reasons, with Architect's explanation included.
- B. **Informational Submittals:** Architect will review each submittal and will not return it, or will return it if it does not comply with requirements. Architect will forward each submittal to appropriate party.
- C. **Partial submittals prepared for a portion of the Work** will be reviewed when use of partial submittals has received prior approval from Architect.
- D. **Incomplete submittals are unacceptable, will be considered nonresponsive, and will be returned for resubmittal without review.**
- E. **Submittals not required by the Contract Documents may be returned by the Architect without action.**

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION 013300

SECTION 014339 - INTEGRATED EXTERIOR MOCKUPS

PART 1 - GENERAL

1.1 SUMMARY

- A. This Section includes administrative and procedural requirements for constructing the Integrated Exterior Mockups.
 - 1. Related Sections that will comprise required components within the Integrated Exterior Mockup include the following:
 - a. Division 03 Section "Cast-In-Place Concrete" for formed concrete wall system.
 - b. Division 04 Section "Unit Masonry" for cavity insulation, masonry veneer materials and systems.
 - c. Division 06 Section "Rough Carpentry" for wood blocking at windows.
 - d. Division 07 Section "Joint Sealants" for sealing control and expansion joints in unit masonry.

1.2 DEFINITIONS

- A. Mockups: Full size physical assemblies that are constructed on-site. Mockups are constructed to verify selections made under sample submittals; to demonstrate aesthetic effects and, where indicated, qualities of materials and execution; to review coordination, testing, or operation; to show interface between dissimilar materials; 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. 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.
- B. Installer/Applicator/Erector: Contractor or another entity engaged by Contractor as an employee, Subcontractor, or Sub-subcontractor, to perform a particular construction operation, including installation, erection, application, and similar operations.
 - 1. Using a term such as "carpentry" does not imply that certain construction activities must be performed by accredited or unionized individuals of a corresponding generic name, such as "carpenter." It also does not imply that requirements specified apply exclusively to tradespeople of the corresponding generic name.
- C. Experienced: When used with an entity, "experienced" means having successfully completed a minimum of five previous projects similar in size and scope to this Project; being familiar with special requirements indicated; and having complied with requirements of authorities having jurisdiction.

1.3 QUALITY ASSURANCE

- A. Integrated Exterior Mockups: Before installing portions of the Work requiring mockups, construct integrated exterior mockup as indicated on Drawing attached to this section. Coordinate installation of exterior envelope materials and products for which mockups are required in individual specification sections, along with supporting materials, 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. Employ supervisory personnel who will oversee mockup construction. Employ workers that will be employed during the construction of the Project.
 3. Demonstrate the proposed range of aesthetic effects and workmanship.
 4. Obtain Architect's approval of mockups before starting work, fabrication, or construction.
 5. Unless otherwise indicated, approved mockups establish the standard by which the Work will be judged. Approval of mockups does not constitute approval of deviations from the Contract Documents contained in mockups unless such deviations are specifically approved by Architect in writing.

PART 2 - PRODUCTS

- 2.1 Refer to individual specification sections for products and materials required for mockup.

PART 3 - EXECUTION

3.1 MOCKUP REVIEW

- A. Notify Architect seven days in advance of dates and times when mockups will be constructed and ready for review.

3.2 PROTECTION

- A. Protect mockup assemblies for quality-control service activities.
- B. Maintain mockups during construction in an undisturbed condition as a standard for judging the completed Work.

END OF SECTION 014000

SECTION 015000 - TEMPORARY FACILITIES AND CONTROLS

PART 1 - GENERAL

1.1 SUMMARY

- A. Section includes requirements for utilities, support facilities, and security and protection facilities.
- B. Related Requirements:
 - 1. Section 007213 “General Conditions”.

1.2 USE CHARGES

- A. Installation, removal, and use charges for temporary facilities shall be included in the Contract Sum unless otherwise indicated. Allow other entities engaged in the Project to use temporary services and facilities without cost, including, but not limited to the Owner, Architect, testing agencies, and authorities having jurisdiction.
- B. Water Service: Owner will provide water used by all entities for construction operations.
- C. Electric Power Service: Owner will pay electric-power-service use charges for electricity used by all entities for construction operations.

1.3 INFORMATIONAL SUBMITTALS

- A. Site Utilization Plan: Show temporary facilities, temporary utility lines and connections, staging areas, construction site entrances, vehicle circulation, and parking areas for construction personnel.
- B. Implementation and Termination Schedule: Within 15 days of date established for commencement of the Work, submit schedule indicating implementation and termination dates of each temporary utility.
- C. Fire-Safety Program: Show compliance with requirements of NFPA 241 and authorities having jurisdiction. Indicate Contractor personnel responsible for management of fire-prevention program.
- D. Moisture- and Mold-Protection Plan: Describe procedures and controls for protecting materials and construction from water absorption and damage and mold. Describe delivery, handling, storage, installation, and protection provisions for materials subject to water absorption or water damage.
 - 1. Indicate procedures for discarding water-damaged materials, protocols for mitigating water intrusion into completed Work, and requirements for replacing water-damaged Work.
 - 2. Indicate methods to be used to avoid trapping water in finished work.

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1.4 QUALITY ASSURANCE

- A. Electric Service: Comply with NECA, NEMA, and UL standards and regulations for temporary electric service. Install service to comply with NFPA 70.
- B. Tests and Inspections: Arrange for authorities having jurisdiction to test and inspect each temporary utility before use. Obtain required certifications and permits.

1.5 PROJECT CONDITIONS

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

1.6 TEMPORARY FACILITIES

- A. Field Offices: Prefabricated or mobile units with serviceable finishes, temperature controls, and foundations adequate for normal loading.
- B. Storage and Fabrication Sheds: Provide sheds sized, furnished, and equipped to accommodate materials and equipment for construction operations.
 - 1. Store combustible materials apart from building.

1.7 EQUIPMENT

- A. Fire Extinguishers: Portable, UL rated; with class and extinguishing agent as required by locations and classes of fire exposures.

PART 2 - EXECUTION

2.1 TEMPORARY FACILITIES, GENERAL

- A. Conservation: Coordinate construction and use of temporary facilities with consideration given to conservation of energy, water, and materials. Coordinate use of temporary utilities to minimize waste.
 - 1. Salvage materials and equipment involved in performance of, but not actually incorporated into, the Work. See other Sections for disposition of salvaged materials that are designated as Owner's property.

2.2 INSTALLATION, GENERAL

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

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1. Locate facilities to limit site disturbance as specified in Section 011000 "Summary."
- B. Provide each facility ready for use when needed to avoid delay. Do not remove until facilities are no longer needed or are replaced by authorized use of completed permanent facilities.

2.3 TEMPORARY UTILITY INSTALLATION

- A. General: 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.
- B. Water Service: Connect to Owner's existing water service facilities. Clean and maintain water service facilities in a condition acceptable to Owner. At Substantial Completion, restore these facilities to condition existing before initial use.
- C. Sanitary Facilities:
 1. Use of Permanent Toilets: Use of Owner's existing or new toilet facilities will be permitted, as long as facilities are cleaned and maintained in a condition acceptable to Owner. At Substantial Completion, restore these facilities to condition existing before initial use.

2.4 SUPPORT FACILITIES INSTALLATION

- A. Comply with the following:
 1. Provide construction for temporary field offices, shops, and sheds located within construction area or within 30 feet of building lines that is noncombustible in accordance with ASTM E136. Comply with NFPA 241.
- B. Storage and Staging: Use designated areas of Project site for storage and staging needs.
- C. Waste Disposal Facilities: Provide waste-collection containers in sizes adequate to handle waste from construction operations. Comply with requirements of authorities having jurisdiction.

2.5 SECURITY AND PROTECTION FACILITIES INSTALLATION

- A. Protection of Existing Facilities: Protect existing vegetation, equipment, structures, utilities, and other improvements at Project site and on adjacent properties, except those indicated to be removed or altered. Repair damage to existing facilities.
- B. Environmental Protection: Provide protection, operate temporary facilities, and conduct construction as required to comply with environmental regulations and that minimize possible air, waterway, and subsoil contamination or pollution or other undesirable effects.
 1. Comply with work restrictions specified in Section 011000 "Summary."

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- C. Temporary Erosion and Sedimentation Control: Provide measures to prevent soil erosion and discharge of soil-bearing water runoff and airborne dust to undisturbed areas and to adjacent properties and walkways, according to erosion- and sedimentation-control Drawings.
 - 1. Verify that flows of water redirected from construction areas or generated by construction activity do not enter or cross tree- or plant-protection zones.
 - 2. Inspect, repair, and maintain erosion- and sedimentation-control measures during construction until permanent vegetation has been established.
 - 3. Clean, repair, and restore adjoining properties and roads affected by erosion and sedimentation from Project site during Project.
 - 4. Remove erosion and sedimentation controls and restore and stabilize areas disturbed during removal.
- D. Stormwater Control: Comply with requirements of authorities having jurisdiction. Provide barriers in and around excavations and subgrade construction to prevent flooding by runoff of stormwater from heavy rains.
- E. Tree and Plant Protection: Protect trees and vegetation from damage from construction operations. Protect tree root systems from damage, flooding, and erosion.
- F. Temporary Fire Protection: Install and maintain temporary fire-protection facilities of types needed to protect against reasonably predictable and controllable fire losses. Comply with NFPA 241; manage fire-prevention program.
 - 1. Prohibit smoking in construction areas. Comply with additional limits on smoking specified in other Sections.
 - 2. Supervise welding operations, combustion-type temporary heating units, and similar sources of fire ignition in accordance with requirements of authorities having jurisdiction.
 - 3. Develop and supervise an overall fire-prevention and -protection program for personnel at Project site. Review needs with local fire department and establish procedures to be followed. Instruct personnel in methods and procedures. Post warnings and information.

2.6 OPERATION, TERMINATION, AND REMOVAL

- A. Supervision: Enforce strict discipline in use of temporary facilities. To minimize waste and abuse, limit availability of temporary facilities to essential and intended uses.
- B. Maintenance: Maintain facilities in good operating condition until removal.
 - 1. Maintain operation of temporary enclosures, heating, cooling, humidity control, ventilation, and similar facilities on a 24-hour basis where required to achieve indicated results and to avoid possibility of damage.
- C. Termination and Removal: Remove each temporary facility when need for its service has ended, when it has been replaced by authorized use of a permanent facility, or no later than Substantial Completion. Complete or, if necessary, restore permanent construction that may have been delayed because of interference with temporary facility. Repair damaged Work, clean exposed surfaces, and replace construction that cannot be satisfactorily repaired.

END OF SECTION 015000

SECTION 016000 - PRODUCT REQUIREMENTS

PART 1 - GENERAL

1.1 SUMMARY

- A. Section includes administrative and procedural requirements for selection of products for use in Project; product delivery, storage, and handling; manufacturers' standard warranties on products; special warranties; and comparable products.
- B. Related Requirements:
 - 1. Section 007213 "General Conditions".
 - 2. Section 011000 "Summary" for Contractor requirements related to Owner-furnished products.
 - 3. Section 012300 "Alternates" for products selected under an alternate.

1.2 DEFINITIONS

- A. Products: Items obtained for incorporating into the Work, whether purchased for Project or taken from previously purchased stock. The term "product" includes the terms "material," "equipment," "system," and terms of similar intent.
 - 1. Named Products: Items identified by manufacturer's product name, including make or model number or other designation shown or listed in manufacturer's published product literature that is current as of date of the Contract Documents.
 - 2. New Products: Items that have not previously been incorporated into another project or facility. Salvaged items or items reused from other projects are not considered new products. Items that are manufactured or fabricated to include recycled content materials are considered new products, unless indicated otherwise.
- B. Basis-of-Design Product Specification: A specification in which a single manufacturer's product is named and accompanied by the words "basis-of-design product," including make or model number or other designation. Published attributes and characteristics of basis-of-design product establish salient characteristics of products.
- C. Subject to Compliance with Requirements: Where the phrase "Subject to compliance with requirements" introduces a product selection procedure in an individual Specification Section, provide products qualified under the specified product procedure. In the event that a named product or product by a named manufacturer does not meet the other requirements of the specifications, select another named product or product from another named manufacturer that does meet the requirements of the specifications; submit a comparable product request or substitution request, if applicable.
- D. Substitution: Refer to Section 012500 "Substitution Procedures" for definition and limitations on substitutions.

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1.3 QUALITY ASSURANCE

- A. Compatibility of Options: If Contractor is given option of selecting between two or more products for use on Project, select product compatible with products previously selected, even if previously selected products were also options.
- B. Identification of Products: Except for required labels and operating data, do not attach or imprint manufacturer or product names or trademarks on exposed surfaces of products or equipment that will be exposed to view in occupied spaces or on the exterior.
 - 1. Labels: Locate required product labels and stamps on a concealed surface, or, where required for observation following installation, on a visually accessible surface that is not conspicuous.
 - 2. Equipment Nameplates: Provide a permanent nameplate on each item of service- or power-operated equipment. Locate on a visually accessible but inconspicuous surface. Include information essential for operation, including the following:
 - a. Name of product and manufacturer.
 - b. Model and serial number.
 - c. Capacity.
 - d. Speed.
 - e. Ratings.
 - 3. See individual identification Sections in Divisions 21, 22, 23, and 26 for additional equipment identification requirements.
- C. Products with asbestos: Asbestos containing materials are not to be purchased or installed in this project. Comply with AHERA (Asbestos Hazard Emergency Response Act) and provide certification that no asbestos containing materials have been used in the construction of this project.

1.4 COORDINATION

- A. Modify or adjust affected work as necessary to integrate work of approved comparable products and approved substitutions.

1.5 PRODUCT DELIVERY, STORAGE, AND HANDLING

- A. Deliver, store, and handle products, using means and methods that will prevent damage, deterioration, and loss, including theft and vandalism. Comply with manufacturer's written instructions.
- B. Delivery and Handling:
 - 1. Schedule delivery to minimize long-term storage at Project site and to prevent overcrowding of construction spaces.
 - 2. Coordinate delivery with installation time to ensure minimum holding time for items that are flammable, easily damaged, or sensitive to deterioration, theft, and other losses.

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3. Deliver products to Project site in an undamaged condition in manufacturer's original sealed container or other packaging system, complete with labels and instructions for handling, storing, unpacking, protecting, and installing.
4. Inspect products on delivery to determine compliance with the Contract Documents and that products are undamaged and properly protected.

C. Storage:

1. Provide a secure location and enclosure at Project site for storage of materials and equipment.
2. Store products to allow for inspection and measurement of quantity or counting of units.
3. Store materials in a manner that will not endanger Project structure.
4. Store products that are subject to damage by the elements under cover in a weathertight enclosure above ground, with ventilation adequate to prevent condensation and with adequate protection from wind.
5. Protect foam plastic from exposure to sunlight, except to the extent necessary for period of installation and concealment.
6. Comply with product manufacturer's written instructions for temperature, humidity, ventilation, and weather-protection requirements for storage.

D. During the construction process, meet or exceed the following minimum requirements to prevent the growth of mold and bacteria:

1. Keep building materials dry. Wood, porous insulation, paper, fabric, and similar absorptive materials shall be kept dry to prevent the growth of mold and bacteria. Cover these materials to prevent rain damage, and if resting on the ground, use spacers to allow air to circulate between the ground and the materials.
2. Replace water-damaged materials, or dry within 24 hours, due to the possibility of mold and bacterial growth. Materials that are damp or wet for more than 24 hours shall be discarded if evidence of mold occurs.
3. Immediately remove materials showing signs of mold and mildew, including materials with exposed moisture stains, from the site and properly dispose of them. Replace moldy materials with new, undamaged materials.
4. Require that moisture sensitive materials be delivered dry and protected from the elements.
5. Allow for time in the construction schedule for materials to dry before they are enclosed.

1.6 PRODUCT WARRANTIES

A. Warranties specified in other Sections shall be in addition to, and run concurrent with, other warranties required by the Contract Documents. Manufacturer's disclaimers and limitations on product warranties do not relieve Contractor of obligations under requirements of the Contract Documents.

1. **Manufacturer's Warranty:** Written standard warranty form furnished by individual manufacturer for a particular product and issued in the name of the Owner or endorsed by manufacturer to Owner.
2. **Special Warranty:** Written warranty required by the Contract Documents to provide specific rights for Owner and issued in the name of the Owner or endorsed by manufacturer to Owner.

PART 2 - PRODUCTS

2.1 PRODUCT SELECTION PROCEDURES

- A. General Product Requirements: Provide products that comply with the Contract Documents, are undamaged and, unless otherwise indicated, are new at time of installation.
1. Provide products complete with accessories, trim, finish, fasteners, and other items needed for a complete installation and indicated use and effect.
 2. Standard Products: If available, and unless custom products or nonstandard options are specified, provide standard products of types that have been produced and used successfully in similar situations on other projects.
 3. Owner reserves the right to limit selection to products with warranties meeting requirements of the Contract Documents.
 4. Where products are accompanied by the term "as selected," Architect will make selection.
 5. Descriptive, performance, and reference standard requirements in the Specifications establish salient characteristics of products.
 6. Or Equal: Where products are specified by name and accompanied by the term "or equal" or "or approved equal" or "or approved substitute" or approved," comply with provisions in "Product Substitutions" Article to obtain approval for use of an unnamed product.
- B. Product Selection Procedures:
1. Sole Product: Where Specifications name a single manufacturer and product, provide the named product that complies with requirements. Comparable products or substitutions for the Contractor's convenience will not be considered.
 - a. Sole product may be indicated by the phrase "Subject to compliance with requirements, provide the following."
 2. Sole Manufacturer/Source: Where Specifications name a single manufacturer or source, provide a product by the named manufacturer or source that complies with requirements. Comparable products or substitutions for the Contractor's convenience will not be considered.
 - a. Sole manufacturer/source may be indicated by the phrase "Subject to compliance with requirements, provide products by the following."
 3. Limited List of Products: Where Specifications include a list of names of both manufacturers and products, provide one of the products listed that complies with requirements.
 - a. Limited list of products may be indicated by the phrase "Subject to compliance with requirements, provide one of the following."
 4. Non-Limited List of Products: Where Specifications include a list of names of both available manufacturers and products, provide one of the products listed or an unnamed product that complies with requirements.

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- a. Non-limited list of products is indicated by the phrase "Subject to compliance with requirements, available products that may be incorporated in the Work include, but are not limited to, the following."
5. Limited List of Manufacturers: Where Specifications include a list of manufacturers' names, provide a product by one of the manufacturers listed that complies with requirements. Comply with requirements in Division 01 Section "Substitution Procedures" for consideration of an unnamed product.
 - a. Limited list of manufacturers is indicated by the phrase "Subject to compliance with requirements, provide products by one of the following."
6. Non-Limited List of Manufacturers: Where Specifications include a list of available manufacturers, provide a product by one of the manufacturers listed or a product by an unnamed manufacturer that complies with requirements.
 - a. Non-limited list of manufacturers is indicated by the phrase "Subject to compliance with requirements, available manufacturers whose products may be incorporated in the Work include, but are not limited to, the following."
 - b. Provision of products of an unnamed manufacturer is not considered a substitution if the product complies with requirements.
7. Basis-of-Design Product: Where Specifications name a product, or refer to a product indicated on Drawings, and include a list of manufacturers, provide the specified or indicated product or a comparable product by one of the other named manufacturers. Drawings and Specifications may additionally indicate sizes, profiles, dimensions, and other characteristics that are based on the product named. Comply with requirements in Division 01 Section "Substitution Procedures" for consideration of an unnamed product or manufacturer.
 - a. For approval of products by unnamed manufacturers, comply with requirements in Section 012500 "Substitution Procedures" for substitutions for convenience.
- C. Visual Matching Specification: Where Specifications require the phrase "match Architect's sample," provide a product that complies with requirements and matches Architect's sample. Architect's decision will be final on whether a proposed product matches.
 1. If no product available within the specified category matches and complies with other specified requirements, comply with requirements in Section 012500 "Substitution Procedures" for proposal of product.
- D. Visual Selection Specification: Where Specifications include the phrase "as selected by Architect from manufacturer's full range" or a similar phrase, select a product that complies with requirements. Architect will select color, gloss, pattern, density, or texture from manufacturer's product line that includes both standard and premium items.

PART 3 - EXECUTION (Not Used)

END OF SECTION 016000

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SECTION 024113 - SELECTIVE SITE DEMOLITION

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes the following:

1. Demolition and removal of site improvements.
2. Disconnecting, capping or sealing, and abandoning in-place site utilities as indicated.
3. Salvaging items for reuse by Owner.

B. Related Sections include the following:

1. Division 31 Section "Site Clearing" for site clearing and removal of above-grade site improvements not part of site demolition.

1.2 DEFINITIONS

A. Demolish: Completely remove and legally dispose of off-site.

B. Salvage: Carefully detach from existing construction, in a manner to prevent damage, and deliver to Owner ready for reuse. Include fasteners or brackets needed for reattachment elsewhere.

1.3 MATERIALS OWNERSHIP

A. Unless otherwise indicated, demolition waste becomes property of Contractor.

B. Historic items, relics, antiques, and similar objects including, but not limited to, cornerstones and their contents, commemorative plaques and tablets, and other items of interest or value to Owner that may be uncovered during demolition remain the property of Owner.

1. Carefully salvage in a manner to prevent damage and promptly return to Owner.

C. All items indicated on the drawings to be "Salvage" shall remain the property of the Owner and stored and delivered per direction of Owner's Representative.

1.4 SUBMITTALS

A. Schedule of Site Demolition Activities: Indicate the following:

1. Detailed sequence of demolition work, with starting and ending dates for each activity.
2. Temporary interruption of utility services.
3. Shutoff and capping of utility services.

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- B. Landfill Records: Indicate receipt and acceptance of hazardous wastes by a landfill facility licensed to accept hazardous wastes.

1.5 QUALITY ASSURANCE

- A. Regulatory Requirements: Comply with governing EPA notification regulations before beginning demolition. Comply with hauling and disposal regulations of authorities having jurisdiction.

1.6 PROJECT CONDITIONS

- A. Conduct site demolition so operations of adjacent occupied buildings will not be disrupted.
 - 1. Provide not less than 72 hours' notice of activities that will affect operations of adjacent buildings or facilities.
 - 2. Maintain access to existing walkways, exits, and other facilities used by occupants of adjacent buildings.
 - a. Do not close or obstruct walkways, exits, or other facilities used by occupants of adjacent buildings without written permission from authorities having jurisdiction and Owner's Representative.
- B. Owner assumes no responsibility for utilities to be demolished.
 - 1. Conditions existing at time of inspection for bidding purpose will be maintained by Owner as far as practical.
 - 2. Before site demolition, Owner will remove wanted items.
- C. Hazardous Materials: It is not expected that hazardous materials will be encountered in the Work.
 - 1. If materials suspected of containing hazardous materials are encountered by the Contractor, do not disturb; immediately notify the Owner's Representative for review of situation and development of remedial action required.
- D. On-site storage of removed items or materials is not permitted without the permission of the Owner's Representative.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Verify that utilities have been disconnected and capped before starting demolition operations.

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- B. Review Project Record Documents of existing construction provided by Owner. Owner does not guarantee that existing conditions are same as those indicated in Project Record Documents.
- C. Inventory and record the condition of items to be removed and salvaged. Provide photographs of conditions that might be misconstrued as damage caused by salvage operations.

3.2 PREPARATION

- A. Existing Utilities: Locate, identify, disconnect, and seal or cap off indicated utilities serving buildings, structures, and utilities to be demolished.
 - 1. Owner will arrange to shut off indicated utilities when requested by Contractor.
 - 2. Arrange to shut off indicated utilities with utility companies.
 - 3. If removal, relocation, or abandonment of utility services will affect adjacent occupied buildings, then provide temporary utilities that bypass buildings and structures to be demolished and that maintain continuity of service to other buildings and structures.
 - 4. Cut off pipe or conduit a minimum of 24 inches below grade. Cap, valve, or plug and seal remaining portion of pipe or conduit after bypassing according to requirements of authorities having jurisdiction.
- B. Existing Utilities: Refer to Divisions 22 and 26 Sections for shutting off, disconnecting, removing, and sealing or capping utilities. Do not start demolition work until utility disconnecting and sealing have been completed and verified in writing.
- C. Salvaged Items: Comply with the following:
 - 1. Clean salvaged items of dirt and demolition debris.
 - 2. Pack or crate items after cleaning. Identify contents of containers.
 - 3. Store items in a secure area until delivery to Owner.
 - 4. Transport items to storage area indicated on Drawings or as directed by the Owner's Representative.
 - 5. Protect items from damage during transport and storage.

3.3 PROTECTION

- A. Existing Facilities: Protect adjacent walkways, loading docks, building entries, and other building facilities during demolition operations. Maintain exits from existing buildings at all times.
- B. Existing Utilities: Maintain utility services to remain and protect from damage during demolition operations.
 - 1. Do not interrupt existing utilities serving adjacent occupied or operating facilities unless authorized in writing by Owner's Representative and authorities having jurisdiction.
 - 2. Provide temporary services during interruptions to existing utilities, as acceptable to Owner's Representative and authorities having jurisdiction.
 - a. Provide at least 72 hours' notice to occupants of affected buildings if shutdown of service is required during changeover.

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- C. Temporary Protection: Erect temporary protection, such as walks, fences, railings, canopies, and covered passageways, where required by authorities having jurisdiction and as indicated. Comply with requirements in Division 01 Section "Temporary Facilities and Controls."
 - 1. Protect adjacent buildings and facilities from damage due to demolition activities.
 - 2. Protect existing site improvements, appurtenances, and landscaping to remain.
 - 3. Provide temporary barricades and other protection required to prevent injury to people and damage to adjacent buildings and facilities to remain.
 - 4. Provide protection to ensure safe passage of people around building demolition area and to and from occupied portions of adjacent buildings and structures.
 - 5. Protect walls, windows, roofs, and other adjacent exterior construction that are to remain and that are exposed to building demolition operations.
 - 6. Erect and maintain dustproof partitions and temporary enclosures to limit dust, noise, and dirt migration to occupied portions of adjacent buildings.
- D. Remove temporary barriers and protections where hazards no longer exist. Where open excavations or other hazardous conditions remain, leave temporary barriers and protections in place.

3.4 DEMOLITION, GENERAL

- A. General: Demolish indicated site structures and site improvements completely or to the limits indicated on the drawings. Use methods required to complete the Work within limitations of governing regulations and as follows:
 - 1. Do not use cutting torches until work area is cleared of flammable materials. Maintain portable fire-suppression devices during flame-cutting operations.
 - 2. Maintain fire watch during and for at least 8 hours after flame cutting operations.
 - 3. Maintain adequate ventilation when using cutting torches.
 - 4. Locate building demolition equipment and remove debris and materials so as not to impose excessive loads on supporting walls, floors, or framing.
- B. Site Access and Temporary Controls: Conduct building demolition and debris-removal operations to ensure minimum interference with roads, streets, walks, walkways, and other adjacent occupied and used facilities.
 - 1. Do not close or obstruct streets, walks, walkways, or other adjacent occupied or used facilities without permission from Owner and authorities having jurisdiction. Provide alternate routes around closed or obstructed traffic ways if required by authorities having jurisdiction.
 - 2. Use water mist and other suitable methods to limit spread of dust and dirt. Comply with governing environmental-protection regulations. Do not use water when it may damage adjacent construction or create hazardous or objectionable conditions, such as ice, flooding, and pollution.
- C. Explosives: Use of explosives is not permitted.
- D. Salvage: Items to be salvaged are indicated on Drawings.

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3.5 UTILITIES

- A. Existing Utilities: Abandon existing utilities and below-grade utility structures. Cut utilities flush with grade.
 - 1. Fill abandoned utility structures with satisfactory soil materials according to backfill requirements in Section 312000 "Earth Moving."

3.6 SITE RESTORATION

- A. Site Grading: Uniformly rough grade area of demolished construction to a smooth surface, free from irregular surface changes. Provide a smooth transition between adjacent existing grades and new grades.

3.7 REPAIRS

- A. Promptly repair damage to adjacent buildings caused by demolition operations.

3.8 DISPOSAL OF DEMOLISHED MATERIALS

- A. Remove demolition waste materials from Project site and legally dispose of them in an EPA-approved landfill acceptable to authorities having jurisdiction.
 - 1. Do not allow demolished materials to accumulate on-site.
 - 2. Remove and transport debris in a manner that will prevent spillage on adjacent surfaces and areas.
- B. Do not burn demolished materials.

END OF SECTION 0241113

SECTION 033000 - 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."

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- 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.

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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.

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- 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.

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- 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.

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- 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.

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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.

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- 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

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- 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

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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

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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

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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. Unslomed 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

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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.

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- 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.

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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.

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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.

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- 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 033533 - SPECIAL CONCRETE FLOOR FINISHES

PART 1 - GENERAL

1.1 SUMMARY

- A. This Section specifies the following:
 - 1. Single application water-repellent for new concrete floors.
 - 2. Single application water-repellent for interior cmu walls.
- B. Related Section:
 - 1. Cast-In-Place Concrete: Division 03 Cast-In-Place Concrete sections.

1.2 SUBMITTALS

- A. Product Data: For each type of manufactured material and product indicated.
- B. Certificates: Manufacturer's certification that the installer is acceptable.
- C. Maintenance Data: Maintenance instructions, including precautions for avoiding staining after application.

1.3 DELIVERY, STORAGE AND HANDLING

- A. Delivery: Deliver materials in manufacturer's original, unopened, undamaged containers with identification labels intact.
- B. Storage and Protection: Store materials protected from exposure to harmful environmental conditions and at temperature and humidity conditions recommended by the manufacturer.
- C. Handling: Protect materials from dirt, corrosion, oil, grease, and other contaminants.

1.4 PROJECT CONDITIONS

- A. Environmental limitations:
 - 1. Comply with manufacturer's written instructions for substrate temperature and moisture content, ambient temperature and humidity, ventilation, and other conditions affecting topping performance.
- B. Close areas to traffic during floor application and after application, for time period recommended in writing by manufacturer.

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C. Application is to be performed as follows:

1. Prior to installations of wall and/or floor-mounted plumbing or accessories.
2. Mask glass block units as required to prevent overspray. Clean off any overspray immediately from glass block.

PART 2 - PRODUCTS

2.1 MATERIAL

A. Basis-in-Design: ConProCo, Dover, NH; “Conpro Shield MX”: Spray, roller or brush applied, penetrating aqueous silane/siloxane water repellent. See Conproco specifications sheet. Conproco, 17 Production Drive, Dover, NH. 03820, or comparable product by one of the following:

1. ChemProbe, Garland, TX; “Prime-A-Pell Plus”, Series-662.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrate, with installer present, for conditions affecting performance of finish. Correct conditions detrimental to timely and proper work. Do not proceed until unsatisfactory conditions are corrected.

3.2 PREPARATION

- A. Clean surfaces thoroughly prior to installation. Remove debris & dust from any saw-cut joints and other material interface joints and clean thoroughly.
- B. Surfaces to be treated must be clean, completely dry, free of frost, loose debris, coatings, dirt, mildew, oils and grease, or any other substance that would interfere with penetration.
- C. Prepare surfaces using the methods recommended by the manufacturer for achieving the best result for the substrate under the project conditions.
- D. If construction equipment must be used for application, diaper all components that might drip oil, hydraulic fluid, or other liquids.

3.3 APPLICATION

A. Compliance: Comply with manufacturer’s product data, including product technical bulletins, product catalog installation instructions and product carton instructions for installation.

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- B. All work must be performed by an applicator certified by the manufacturer. Certification credentials are required.
- C. New Concrete and CMU: Apply water repellent to new substrate following curing of surface for 7 days.
 - 1. Spray on at a rate recommended by manufacturer to achieve proper and recommended coating application.
 - 2. Follow all manufacturer's application instructions that are specific to each substrate material.
 - 3. Follow all manufacturer's application methods and/or procedures that are specific to substrate orientation eg. vertical or horizontal surfaces.
- D. Apply water repellent with a low-pressure fan tip sprayer.
- E. Protect installed floors for at least 14 days until the penetrant is fully cured.
 - 1. Do not allow traffic on floor for 12 hours after application.
 - 2. Protect all surfaces from moisture for 8 hours after application.
 - 3. Do not allow parking of vehicles on concrete slab.
 - 4. If vehicles must be temporarily parked on slab, place drop cloths under vehicles during entire time parked.
 - 5. Do not allow pipe cutting using pipe cutting machinery on concrete slab.
 - 6. Do not allow temporary placement and storage of steel members on concrete slabs.
 - 7. Clean up spills immediately and spot-treat stains with degreaser or oil emulsifier.
 - 8. Clean floor regularly in accordance with manufacturer's recommendations.

END OF SECTION 033536

SECTION 042000 - UNIT MASONRY

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. Concrete Masonry Units
- 2. Mortar.
- 3. Steel Reinforcing bars.
- 4. Masonry-joint reinforcement.
- 5. Miscellaneous masonry accessories.

B. Products Installed but not Furnished under This Section:

- 1. Steel lintels in unit masonry.
- 2. Hollow-metal frames in masonry openings, furnished under Division 08-Section 081113 "Hollow Metal Doors & Frames".
- 3. Water repellent furnished under Division 08 Section 033533 "Special Concrete Floor Finishes."

1.3 PREINSTALLATION MEETINGS

- A. Pre-installation Conference: Conduct conference at Project site to comply with requirements in Section 013100 "Project Management and Coordination."

- 1. At least 7 days prior to starting masonry, conduct a meeting to review detailed requirements for mortar mix and to determine procedures for satisfactory construction operations. Review requirements of submittals, status of coordinating work, and availability of materials. Review requirements tenting and heating. Establish preliminary work progress schedule and procedures for materials inspection, testing, and certifications. Require representatives of each entity directly concerned with masonry construction to attend, include Contractor's superintendent, masonry foreman and Architect.
 - a. Review sample panel.
 - b. Review tooling requirements for masonry.
 - c. Review procedures and installation requirements of flexible flashings, if used.

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1.4 ACTION SUBMITTALS

- A. Product Data: For each type of product.
- B. Shop Drawings: For the following:
 - 1. Masonry Units: Show sizes, profiles, coursing, and locations of special shapes.
 - 2. Fabricated Flashing: Detail corner units, end-dam units, and other special applications.
- C. Samples for Verification: For each type, color, and surface finish of the following:
 - 1. Concrete Masonry Units in the form of straps of five or more blocks.
 - 2. Pigmented mortar. Make Samples using the same sand and mortar ingredients to be used on Project.
 - 3. Accessories embedded in masonry.

1.5 INFORMATIONAL SUBMITTALS

- A. List of Materials Used in Constructing Mockups: List generic product names together with manufacturers, manufacturers' product names, model numbers, lot numbers, batch numbers, source of supply, and other information as required to identify materials used. Include mix proportions for mortar and source of aggregates.
 - 1. Submittal is for information only. Receipt of list does not constitute approval of deviations from the Contract Documents unless such deviations are specifically brought to the attention of Architect and approved in writing.
- B. Qualification Data: For testing agency.
- C. Material Certificates: For each type and size of the following:
 - 1. Masonry units.
 - a. Include data on material properties or material test reports substantiating compliance with requirements.
 - b. For CMU, include size-variation data verifying that actual range of sizes falls within specified tolerances.
 - c. For exposed CMU, include test report for efflorescence according to ASTM C67.
 - d. For masonry units used in structural masonry, include data and calculations establishing average net-area compressive strength of units.
 - 2. Integral water-repellent used in CMUs.
 - 3. Mortar admixtures.
 - 4. Pre-blended, dry mortar mixes. Include description of type and proportions of ingredients.
- D. Mix Designs: For each type of mortar. Include description of type and proportions of ingredients.
 - 1. Include test reports for mortar mixes required to comply with property specification. Test according to ASTM C109/C109M for compressive strength, ASTM C1506 for water retention, and ASTM C91/C91M for air content.

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- E. Statement of Compressive Strength of Masonry: For each combination of masonry unit type and mortar type, provide statement of average net-area compressive strength of masonry units, mortar type, and resulting net-area compressive strength of masonry determined according to TMS 602/ACI 530.1/ASCE 6.
- F. Cold-Weather and Hot-Weather Procedures: Detailed description of methods, materials, and equipment to be used to comply with requirements.

1.6 QUALITY ASSURANCE

- A. Installer Qualifications: Company specializing in performing the work of this Section with a minimum of 5 years of experience.
- B. Testing Agency Qualifications: Qualified according to ASTM C1093 for testing indicated.
- C. Mockups: Build mockups to verify selections made under Sample submittals, to demonstrate aesthetic effects, and to set quality standards for materials and execution.
 - 1. Build mockups for typical exterior and interior walls in sizes approximately 8 feet long by 4 feet high by full thickness, including face wythe and accessories, corner connection to portion of glass block, interior and exterior benches.
 - a. Include lower corner of glass block recess. Make the opening approximately 8 inches wide by 16 inches high. Include CMU support for both exterior and interior benches.
 - 2. Clean exposed faces of mockups with masonry cleaner as indicated.
 - 3. Protect accepted mockups from the elements with weather-resistant membrane.
 - 4. Approval of mockups is for color, texture, and blending of masonry units; relationship of mortar and sealant colors to masonry unit colors; tooling of joints; and aesthetic qualities of workmanship.
 - a. Approval of mockups is also for other material and construction qualities specifically approved by Architect.
 - b. Approval of mockups does not constitute approval of deviations from the Contract Documents contained in mockups unless Architect specifically approves such deviations in writing.
 - 5. Subject to compliance with requirements, approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

1.7 DELIVERY, STORAGE, AND HANDLING

- A. Store masonry units on elevated platforms in a dry location. If units are not stored in an enclosed location, cover tops and sides of stacks with waterproof sheeting, securely tied. If units become wet, do not install until they are dry.
- B. Store aggregates where grading and other required characteristics can be maintained, and contamination avoided.

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- C. Deliver pre-blended, dry mortar mix in moisture-resistant containers. Store pre-blended, dry mortar mix in delivery containers on elevated platforms in a dry location or in covered weatherproof dispensing silos.

1.8 FIELD CONDITIONS

- A. Protection of Masonry: During construction, cover tops of walls, projections, and sills with waterproof sheeting at end of each day's work. Cover partially completed masonry when construction is not in progress.
 - 1. Extend cover a minimum of 24 inches down both sides of walls and hold cover securely in place.
- B. Do not apply uniform floor or roof loads for at least 12 hours and concentrated loads for at least three days after building masonry walls or columns.
- C. Stain Prevention: Prevent mortar and soil from staining the face of masonry and adjacent surfaces to be left exposed or painted. Immediately remove mortar and soil that come in contact with such masonry and adjacent surfaces.
 - 1. Protect the base of walls from rain-splashed mud and from mortar splatter by spreading coverings on ground and over wall surface.
 - 2. Protect sills, ledges, and projections from mortar droppings.
 - 3. Protect surfaces of door frames, as well as similar products with painted and integral finishes, from mortar droppings.
 - 4. Turn scaffold boards near the wall on edge at the end of each day to prevent rain from splashing mortar and dirt onto completed masonry.
- D. Cold-Weather Requirements: Do not use frozen materials or materials mixed or coated with ice or frost. Do not build on frozen substrates or setting beds. Remove and replace unit masonry damaged by frost or by freezing conditions. Comply with the following requirements:
 - 1. Cold-Weather Construction: When the anticipated daytime low temperature is within the limits indicated, use the following procedures:
 - a. 40 to 32 deg F: Heat mixing water or sand to produce mortar temperatures between 40 and 120 deg F.
 - b. 32 to 25 deg F: Heat mixing water and sand to produce mortar temperatures between 40 and 120 deg F. Heat grout materials to produce grout temperatures between 40 and 120 deg F. Heat masonry units to 40 deg F. Maintain mortar and grout above freezing until used in masonry. Use heat on both sides of walls under construction.
 - c. Do not install masonry when temperatures are below the above ranges.
 - 2. Cold-Weather Protection: When the anticipated daytime low temperature is within the limits indicated, coordinate with the General Contractor to provide the following protection. This is in addition to construction procedures specified above:
 - a. 40 to 32 deg F: Cover masonry with insulating blankets for 48 hours after construction.

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- b. 32 deg F and Below: Provide enclosure and heat to maintain temperatures above 32 deg F within the enclosure for 72 hours after construction.
3. Cold-Weather Cleaning: Use liquid cleaning methods only when air temperature is 40 deg F and above and will remain so until masonry has dried out, but not less than 7 days after completion of cleaning.
- E. Hot-Weather Requirements: Coordinate with the General Contractor to protect unit masonry work when temperature and humidity conditions produce excessive evaporation of water from mortar and grout. Provide artificial shade and wind breaks and use cooled materials as required.
 1. When ambient temperature exceeds 100 deg F, or 90 deg F with a wind velocity greater than 8 mph, do not spread mortar beds more than 48 inches ahead of masonry. Set masonry units within one minute of spreading mortar.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Source Limitations for Masonry Units: Obtain exposed masonry units of a uniform texture and color, or a uniform blend within the ranges accepted for these characteristics, from single source from single manufacturer for each product required.
 1. Genest Precast, Sanford, Maine
 2. Gagne & Son, Belgrade, Maine
- B. Source Limitations for Mortar Materials: Obtain mortar ingredients of a uniform quality, including color for exposed masonry, from single manufacturer for each cementitious component and from single source or producer for each aggregate.

2.2 PERFORMANCE REQUIREMENTS

- A. Provide structural unit masonry that develops indicated net-area compressive strength (f'_m) of 2000 psi at 28 days.
 1. Determine net-area compressive strength of masonry from average net-area compressive strengths of masonry units and mortar types (unit-strength method) according to TMS 602/ACI 530.1/ASCE 6.
 2. Determine net-area compressive strength of masonry by testing masonry prisms according to ASTM C1314.

2.3 UNIT MASONRY, GENERAL

- A. Masonry Standard: Comply with TMS 602/ACI 530.1/ASCE 6, except as modified by requirements in the Contract Documents.

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- B. Defective Units: Referenced masonry unit standards may allow a certain percentage of units to contain chips, cracks, or other defects exceeding limits stated. Do not use units where such defects are exposed in the completed Work.

2.4 CONCRETE MASONRY UNITS

- A. Regional Materials: Verify masonry units are manufactured within 300 miles of Project site from materials that have been extracted, harvested, or recovered, as well as manufactured, within 300 miles of Project site.
- B. General: Provide shapes indicated and as follows, with exposed surfaces matching finish and color of exposed faces of adjacent units:
 - 1. For ends of sills and caps and for similar applications that would otherwise expose unfinished CMU surfaces, provide units without cores or frogs and with exposed surfaces finished.
 - 2. Provide special shapes for applications where stretcher units cannot accommodate special conditions, including those at corners, movement joints, bond beams, sashes, and lintels.
 - 3. Provide special shapes for applications requiring CMU size, form, color, and texture on exposed surfaces that cannot be produced by sawing.
 - 4. Provide special shapes for applications where shapes produced by sawing would result in sawed surfaces being exposed to view.
- C. Concrete Masonry Units: Facing complying with ASTM C90.
 - 1. Basis-of-Design Product: Genest Precast or comparable product by one of the following:
 - 2. 600 and 800 Series, by Gagne Concrete Products, Belgrade, Maine.
 - 3. Density Classification: Normal weight.
 - 4. Pattern and Texture:
 - a. Standard flush block face. Genest Standard Gray [Interior wall partitions]
 - b. Split-face finish. Genest #246 Pebble Brown [Exterior wall face]
 - c. Ground face Genest #246 Pebble Brown [Interior base course at wet walls, see Drawings for locations.]
 - d. Unit Compressive Strength: Provide units with minimum net-area compressive strength (f'm) of 2000 psi, ASTM C90.
 - e. Water Absorption: Less than 15 lb/cu ft. max., when tested according to ASTM C90.
 - f. Efflorescence: Provide CMU that has been tested according to ASTM C67 and is rated "not effloresced."
 - 5. Size (Actual Dimensions): 7-5/8 inches wide by 7-5/8 inches high by 15-5/8 inches long.
 - 6. Size (Actual Dimensions): 5-5/8 inches wide by 7-5/8 inches high by 15-5/8 inches long.
 - 7. Application: Use where masonry unit is exposed unless otherwise indicated, Interior and Exterior.
- D. Integral Water Repellent Admixture: Provide units made with integral water-repellent for exterior wall Split-faced concrete masonry units.

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1. Integral Water Repellent Admixture: Liquid polymeric, integral water-repellent admixture that does not reduce flexural bond strength. Units made with integral water repellent, when tested in accordance with ASTM E514/E514M as a wall assembly made with mortar containing water-repellent manufacturer's mortar additive, with test period extended to 24 hours, shall show no visible water or leaks on the back of test specimen.
2. Basis of Design Products:
 - a. Master Builders Solutions, Beachwood, OH; "MasterPel 240" masonry water-repellent admixture.

2.5 MORTAR

- A. General: Mortar may be provided in one of two options; field mix of Portland cement, lime, and sand or with specified Portland Cement-Lime Mix.
- B. Portland Cement: ASTM C150/C150M, Type I or II, except Type III may be used for cold-weather construction. Provide natural color or white cement as required to produce mortar color indicated.
 1. Alkali content shall not be more than 0.1 percent when tested according to ASTM C114.
- C. Hydrated Lime: ASTM C207, Type S.
- D. Portland Cement-Lime Mix: Packaged blend of Portland cement and hydrated lime containing no other ingredients.
 1. Available Products: Provide one of the following or approved substitutes.
 - a. Dragon Cement and Concrete: Type S Masonry Cement.
 - b. Quikrete: Portland and lime Quikrete.
- E. Mortar Pigments: Natural and synthetic iron oxides and chromium oxides, compounded for use in mortar mixes and complying with ASTM C979/C979M. Use only pigments with a record of satisfactory performance in masonry mortar.
 1. Basis-of-Design Products:
 - a. Davis Colors, Los Angeles, CA; True Tone Mortar Colors. Medium "MC 88".
 - b. Solomon Colors, Inc., Springfield, IL; SGS Mortar Colors.
- F. Aggregate for Mortar: ASTM C144.
 1. For mortar that is exposed to view, use washed aggregate consisting of natural sand or crushed stone.
 2. For joints less than 1/4 inch thick, use aggregate graded with 100 percent passing the No. 16 sieve.
 3. White-Mortar Aggregates: Natural white sand or crushed white stone.
 4. Colored-Mortar Aggregates: Natural sand or crushed stone of color necessary to produce required mortar color.

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- G. Water-Repellent Mortar Admixture: ASTM E514.
 - 1. For mortar that is used for Exterior Split-faced block (with In-mix block water-repellent) and Interior Standard block (to receive In-place block water-repellent application).
 - 2. Basis of Design Products:
 - a. Master Builders Solutions, Beachwood, OH; “MasterPel 240” masonry water-repellent admixture.
- H. Water: Potable.

2.6 MISCELLANEOUS MASONRY ACCESSORIES

- A. Compressible Filler: Pre-molded filler strips complying with ASTM D1056, Grade 2A1; compressible up to 35 percent of width and thickness indicated; formulated from neoprene.
 - 1. Available Products: Provide one of the following or approved substitutes.
 - a. Holmann & Barnard: #NS – Closed Cell Neoprene.
 - b. Sandell: Closed Cell Neoprene.
 - c. Wire Bond: 3000 Horizontal.
 - B. Preformed Control-Joint Gaskets: Made from styrene-butadiene-rubber compound, complying with ASTM D2000, Designation M2AA-805 or PVC, complying with ASTM D2287, Type PC-65406 and designed to fit standard sash block and to maintain lateral stability in masonry wall; size and configuration as indicated, if needed.

2.7 MASONRY CLEANERS

- A. Job-Mixed Detergent Solution: Solution of 1/2-cup dry measure tetrasodium polyphosphate (Spic and Span) and 1/2-cup dry measure laundry detergent dissolved in 1 gal. of water.
- B. EaCoChem EC Jet Cleaning Process: New Masonry Detergent (NMD) 80.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine conditions, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of the Work.
 - 1. For the record, prepare a written report, endorsed by Installer, listing conditions detrimental to performance of the Work.
 - 2. Verify that foundations are within tolerances specified.
 - 3. Verify that substrates are free of substances that impair mortar bond.
 - 4. Examine wall framing and sheathing to verify that stud locations are suitable for spacing of veneer anchors and that installation will result in a weatherproof covering.

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- B. Before installation, examine rough-in and built-in construction for piping systems to verify actual locations of piping connections.
- C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION, GENERAL

- A. Thickness: Build single-wythe walls to actual widths of masonry units, using units.
- B. Use full-size units without cutting if possible. If cutting is required to provide a continuous pattern or to fit adjoining construction, cut units with motor-driven saws; provide clean, sharp, unchipped edges. Allow units to dry before laying unless wetting of units is specified. Install cut units with cut surfaces and, where possible, cut edges concealed.
- C. Select and arrange units for exposed unit masonry to produce a uniform blend of colors and textures. Mix units from several pallets or cubes as they are placed.
- D. Bracing Walls During Construction: It is the sole responsibility of the masonry contractor to design and provide temporary bracing of masonry walls during construction. Masonry wall below 13 feet in height may employ internal bracing per NCMA Tek Bulletin 3-4B and applicable OSHA standards. Masonry walls in excess of 13 feet in height are to be externally braced during construction with bracing designed and installed by the masonry contractor and also meet all applicable OSHA standards.

3.3 TOLERANCES

- A. Dimensions and Locations of Elements:
 - 1. For dimensions in cross section or elevation, do not vary by more than plus 1/2 inch or minus 1/4 inch.
 - 2. For location of elements in plan, do not vary from that indicated by more than plus or minus 1/2 inch.
- B. Lines and Levels:
 - 1. For bed joints and top surfaces of bearing walls, do not vary from level by more than 1/4 inch in 10 feet, or 1/2-inch maximum.
 - 2. For conspicuous horizontal lines, such as lintels, sills, and reveals, do not vary from level by more than 1/8 inch in 10 feet, 1/4 inch in 20 feet, or 1/2-inch maximum.
 - 3. For vertical lines and surfaces, do not vary from plumb by more than 1/4 inch in 10 feet, 3/8 inch in 20 feet, or 1/2-inch maximum.
 - 4. For conspicuous vertical lines, such as external corners, door jambs, reveals, and expansion and control joints, do not vary from plumb by more than 1/8 inch in 10 feet, 1/4 inch in 20 feet, or 1/2-inch maximum.
 - 5. For vertical alignment of exposed head joints, do not vary from plumb by more than 1/4 inch in 10 feet or 1/2-inch maximum.
 - 6. For faces of adjacent exposed masonry units, do not vary from flush alignment by more than 1/16 inch except due to warpage of masonry units within tolerances specified for warpage of units.

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C. Joints:

1. For bed joints, do not vary from thickness indicated by more than plus or minus 1/8 inch, with a maximum thickness limited to 1/2 inch.
2. For exposed bed joints, do not vary from bed-joint thickness of adjacent courses by more than 1/8 inch.
3. For head and collar joints, do not vary from thickness indicated by more than plus 3/8 inch or minus 1/4 inch.
4. For exposed head joints, do not vary from thickness indicated by more than plus or minus 1/8 inch. Do not vary from adjacent bed and head-joint thicknesses by more than 1/8 inch.

3.4 LAYING MASONRY WALLS

- A. Lay out walls in advance for accurate spacing of surface bond patterns with uniform joint thicknesses and for accurate location of openings, movement-type joints, and returns. Avoid using less-than-half-size units, particularly at corners, jambs, and, where possible, at other locations.
- B. Bond Pattern for Exposed Masonry: Unless otherwise indicated, lay exposed masonry in running bond; do not use units with less than nominal 4-inch horizontal face dimensions at corners or jambs.
- C. Stopping and Resuming Work: Stop work by stepping back units in each course from those in course below; do not tooth. When resuming work, clean masonry surfaces that are to receive mortar, remove loose masonry units and mortar, and wet brick if required before laying fresh masonry.
- D. Built-in Work: As construction progresses, build in items specified in this and other Sections. Fill in solidly with masonry around built-in items.

3.5 MORTAR BEDDING AND JOINTING

- A. Tool exposed joints slightly concave when thumbprint hard, using a jointer larger than joint thickness unless otherwise indicated.
- B. Do not shift or tap masonry units after mortar has achieved initial set. Where adjustment is necessary, remove the mortar and replace.

3.6 CONTROL AND EXPANSION JOINTS

- A. General: Install control- and expansion-joint materials in unit masonry as masonry progresses. Do not allow materials to span control and expansion joints without provision to allow for in-plane wall or partition movement.
- B. Install control joints in unit masonry where indicated, or if not indicated, provide control joints in masonry partitions at changes in wall heights, within 8' of wall corners or intersections for walls greater than 16', and at not less than 24' on center for straight walls. Build-in related items as masonry progresses. Do not form a continuous span through movement joints unless provisions are made to prevent in-plane restraint of wall or partition movement.

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- C. Provide horizontal, pressure-relieving joints by either leaving an airspace or inserting a compressible filler of width required for installing sealant and backer rod specified in Section 079200 "Joint Sealants," but not less than 3/8 inch.
 - 1. Locate horizontal, pressure-relieving joints beneath shelf angles supporting masonry.

3.7 LINTELS

- A. Install galvanized steel lintels where indicated.
- B. Provide masonry lintels where shown and where openings of more than 12 inches for brick-size units are shown without structural steel or other supporting lintels.
- C. Provide a minimum bearing of 8 inches at each jamb unless otherwise indicated.

3.8 REPAIRING, POINTING, AND CLEANING

- A. Remove and replace masonry units that are loose, chipped, broken, stained, or otherwise damaged or that do not match adjoining units. Install new units to match adjoining units; install in fresh mortar, pointed to eliminate evidence of replacement.
- B. Pointing: During the tooling of joints, enlarge voids and holes, except weep holes, and completely fill with mortar. Point up joints, including corners, openings, and adjacent construction, to provide a neat, uniform appearance. Prepare joints for sealant application, where indicated.
- C. In-Progress Cleaning: Clean unit masonry as work progresses by dry brushing to remove mortar fins and smears before tooling joints.
- D. Final Cleaning for CMU: After mortar is thoroughly set and cured for a minimum of 7 days, clean exposed masonry as follows:
 - 1. Remove large mortar particles by hand with wooden paddles and nonmetallic scrape hoes or chisels.
 - 2. Protect adjacent non-masonry surfaces from contact with cleaner by covering them with liquid strippable masking agent or polyethylene film and waterproof masking tape.
 - 3. Wet wall surfaces with water before applying cleaners; remove cleaners promptly by rinsing surfaces thoroughly with clear water. Do not use pressure sprayers, garden hose type and pressure only.
 - 4. Clean CMU by bucket-and-brush hand-cleaning method described in BIA Technical Notes 20 Revised, and manufacturer's printed instructions.

3.9 MASONRY WASTE DISPOSAL

- A. Salvageable Materials: Unless otherwise indicated, excess masonry materials are Contractor's property. At completion of unit masonry work, remove from Project site.
- B. Waste Disposal as Fill Material: Dispose of clean masonry waste, including excess or soil-contaminated sand, waste mortar, and broken masonry units, by crushing and mixing with fill material as fill is placed.

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1. Crush masonry waste to less than 4 inches in each dimension.
 2. Mix masonry waste with at least two parts of specified fill material for each part of masonry waste. Fill material is specified in Section 312000 "Earth Moving."
 3. Do not dispose of masonry waste as fill within 18 inches of finished grade.
- C. Excess Masonry Waste: Remove excess clean masonry waste that cannot be used as fill, as described above or recycled, and other masonry waste, and legally dispose of off Owner's property.

END OF SECTION 042000

SECTION 042300 - GLASS UNIT MASONRY

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. Glass Masonry Units
- 2. Mortar.
- 3. Miscellaneous masonry accessories.

B. Products Installed but not Furnished under This Section:

- 1. Steel lintels in unit masonry.

C. Related Requirements:

- 1. Section 079200 "Joint Sealant".

1.3 PREINSTALLATION MEETINGS

- A. Pre-installation Conference: Conduct conference at Project site to comply with requirements in Section 013100 "Project Management and Coordination."

- 1. At least 7 days prior to starting masonry, conduct a meeting to review detailed requirements for mortar mix and to determine procedures for satisfactory construction operations. Review requirements of submittals, status of coordinating work, and availability of materials. Establish preliminary work progress schedule and procedures for materials inspection, testing, and certifications. Require representatives of each entity directly concerned with masonry construction to attend, include Contractor's superintendent, masonry foreman and Architect.

- a. Review sample panel.
- b. Review tooling requirements for masonry.
- c. Review procedures and installation requirements of flexible flashings.

1.4 ACTION SUBMITTALS

- A. Product Data: For each type of product.

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B. Shop Drawings: For the following:

1. Glass Masonry Units: Show sizes, profiles, and coursing.

C. Samples for Verification: For each type and color of the following:

1. Glass Masonry Units, submit two (2) blocks of type specified showing size, design and pattern of faces.
2. Pigmented mortar. Make Samples using the same sand and mortar ingredients to be used on Project.
3. Asphalt emulsion type and install process.

1.5 INFORMATIONAL SUBMITTALS

A. List of Materials Used in Constructing Mockups: List generic product names together with manufacturers, manufacturers' product names, model numbers, lot numbers, batch numbers, source of supply, and other information as required to identify materials used. Include mix proportions for mortar and source of aggregates.

1. Submittal is for information only. Receipt of list does not constitute approval of deviations from the Contract Documents unless such deviations are specifically brought to the attention of Architect and approved in writing.

B. Qualification Data: For testing agency.

C. Material Certificates: For each type and size of the following:

1. Glass Masonry units.
 - a. Include data on material properties or material test reports substantiating compliance with requirements eg. ISO 21690:2021.
 - b. For Glass block, include size-variation data verifying that actual range of sizes falls within specified tolerances.
2. Mortar admixtures.
3. Pre-blended, dry mortar mixes. Include description of type and proportions of ingredients.
4. Expansion strips, if required.
5. Joint Sealant.
6. Asphalt Emulsion: ASTM D1227, Type III for porous surfaces.
7. Anchors, ties, and metal accessories.

D. Mix Designs: For each type of mortar. Include description of type and proportions of ingredients.

1. Include test reports for mortar mixes required to comply with property specification. Test according to ASTM C109/C109M for compressive strength, ASTM C1506 for water retention, and ASTM C91/C91M for air content.

E. Cold-Weather and Hot-Weather Procedures: Detailed description of methods, materials, and equipment to be used to comply with requirements.

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1.6 QUALITY ASSURANCE

- A. Installer Qualifications: Company specializing in performing the work of this Section with a minimum of 5 years of experience.
- B. Testing Agency Qualifications: Qualified according to ASTM C1093 for testing indicated.

1.7 DELIVERY, STORAGE, AND HANDLING

- A. Store glass masonry units on elevated platforms in a dry location. Protect unit edges to avoid chipping. If units are not stored in an enclosed location, cover tops and sides of stacks with waterproof sheeting, securely tied. If units become wet, do not install until they are dry.
- B. Store aggregates where grading and other required characteristics can be maintained, and contamination avoided.
- C. Deliver pre-blended, dry mortar mix in moisture-resistant containers. Store pre-blended, dry mortar mix in delivery containers on elevated platforms in a dry location or in covered weatherproof dispensing silos.

1.8 FIELD CONDITIONS

- A. Protection of Masonry: During construction, cover tops of walls, projections, and sills with waterproof sheeting at end of each day's work. Cover partially completed masonry when construction is not in progress.
 - 1. Extend cover a minimum of 24 inches down both sides of walls, and hold cover securely in place.
- B. Do not apply uniform floor or roof loads for at least 12 hours and concentrated loads for at least three days after building masonry walls or columns.
- C. Stain Prevention: Prevent mortar and soil from staining the face of masonry and adjacent surfaces to be left exposed or painted. Immediately remove mortar and soil that come in contact with such masonry and adjacent surfaces.
 - 1. Protect the base of walls from rain-splashed mud and from mortar splatter by spreading coverings on ground and over wall surface.
 - 2. Protect sills, ledges, and projections from mortar droppings.
 - 3. Protect surfaces of window and door frames, as well as similar products with painted and integral finishes, from mortar droppings.
 - 4. Turn scaffold boards near the wall on edge at the end of each day to prevent rain from splashing mortar and dirt onto completed masonry.
- D. Cold-Weather Requirements: Do not use frozen materials or materials mixed or coated with ice or frost. Do not build on frozen substrates or setting beds. Remove and replace unit masonry damaged by frost or by freezing conditions. Comply with the following requirements:
 - 1. Cold-Weather Construction: When the anticipated daytime low temperature is within the limits indicated, use the following procedures:

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- a. 40 to 32 deg F: Heat mixing water or sand to produce mortar temperatures between 40 and 120 deg F.
 - b. 32 to 25 deg F: Heat mixing water and sand to produce mortar temperatures between 40 and 120 deg F. Heat grout materials to produce grout temperatures between 40 and 120 deg F. Heat masonry units to 40 deg F. Maintain mortar and grout above freezing until used in masonry. Use heat on both sides of walls under construction.
 - c. Do not install masonry when temperatures are below the above ranges.
2. Cold-Weather Protection: When the anticipated daytime low temperature is within the limits indicated, coordinate with the General Contractor to provide the following protection. This is in addition to construction procedures specified above:
 - a. 40 to 32 deg F: Cover masonry with insulating blankets for 48 hours after construction.
 - b. 32 deg F and Below: Provide enclosure and heat to maintain temperatures above 32 deg F within the enclosure for 72 hours after construction.
 3. Cold-Weather Cleaning: Use liquid cleaning methods only when air temperature is 40 deg F and above and will remain so until masonry has dried out, but not less than 7 days after completion of cleaning.
- E. Hot-Weather Requirements: Coordinate with the General Contractor to protect unit masonry work when temperature and humidity conditions produce excessive evaporation of water from mortar and grout. Provide artificial shade and wind breaks and use cooled materials as required.
1. When ambient temperature exceeds 100 deg F, or 90 deg F with a wind velocity greater than 8 mph, do not spread mortar beds more than 48 inches ahead of masonry. Set masonry units within one minute of spreading mortar.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Source Limitations for Masonry Units: Obtain exposed masonry units of a uniform texture and color, or a uniform blend within the ranges accepted for these characteristics, from single source from single manufacturer for each product required.
- B. Source Limitations for Mortar Materials: Obtain mortar ingredients of a uniform quality, including color for exposed masonry, from single manufacturer for each cementitious component and from single source or producer for each aggregate.

2.2 PERFORMANCE REQUIREMENTS

- A. Provide glass unit masonry that complies with ISO 21690:2021.

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2.3 UNIT MASONRY, GENERAL

- A. Masonry and Glass Block Standards: Comply with TMS 602/ACI 530.1/ASCE 6 and ISO 21690:2021 except as modified by requirements in the Contract Documents.
- B. Defective Units: Do not use units with defects such as chips, cracks, or pattern flaws where such defects are exposed in the completed Work.

2.4 GLASS MASONRY UNITS

A. General: Provide shapes indicated and as follows, with exposed surfaces matching finish and color of exposed faces of adjacent units:

B. Basis-of-Design Products: Basic Line, Clear Glass, “Sponge Pattern 1919/8” 8”x8”x3” nominal, by Seves Glass Block Inc, Cleveland, OH; Contact:(877) 738-3711 or comparable product from one of the following:

Pittsburgh Glass Block Company.

- 1. Grade: Non-load bearing hollow units.
- 2. Type: Hollow, clear glass block, Sponge pattern, maximum privacy.
- 3. Unit Compressive Strength: Provide units with minimum average net-area compressive strength of 1900 psi, ASTM C140.
- 4. Water Absorption: Less than 15 lb/cu ft. max., when tested according to ASTM C90.
- 5. Size (Actual Dimensions): 7-5/8 inches wide by 7-5/8 inches high by 3 inches long.

2.5 MORTAR

- A. General: Mortar may be provided in one of two options; field mix of Portland cement, lime, and sand or with specified Portland Cement-Lime Mix.
- B. Portland Cement: ASTM C150/C150M, Type I or II, except Type III may be used for cold-weather construction. Provide natural color or white cement as required to produce mortar color indicated.
 - 1. Alkali content shall not be more than 0.1 percent when tested according to ASTM C114.
- C. Hydrated Lime: ASTM C207, Type S.
- D. Portland Cement-Lime Mix: Packaged blend of Portland cement and hydrated lime containing no other ingredients.
 - 1. Available Products: Provide one of the following or approved substitutes.
 - a. Dragon Cement and Concrete: Type S Masonry Cement.
 - b. Quikrete: Portland and lime Quikrete.
- E. Mortar Pigments: Natural and synthetic iron oxides and chromium oxides, compounded for use in mortar mixes and complying with ASTM C979/C979M. Use only pigments with a record of satisfactory performance in masonry mortar.

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1. Basis-of-Design Products: Davis Colors; True Tone Mortar Colors. Medium “MC 88”
 - a. Solomon Colors, Inc.; SGS Mortar Colors.
- F. Aggregate for Mortar: ASTM C144.
 1. For mortar that is exposed to view, use washed aggregate consisting of natural sand or crushed stone.
 2. For joints less than 1/4 inch thick, use aggregate graded with 100 percent passing the No. 16 sieve.
 3. White-Mortar Aggregates: Natural white sand or crushed white stone.
 4. Colored-Mortar Aggregates: Natural sand or crushed stone of color necessary to produce required mortar color.
- G. Refractory Mortar Mix: Ground fireclay or non-water-soluble, calcium aluminate, medium-duty refractory mortar that passes ASTM C199 test; or an equivalent product acceptable to authorities having jurisdiction.
- H. Water: Potable.

2.6 MISCELLANEOUS MASONRY ACCESSORIES

- A. Joint Sealant: and designed to seal mortar joints in and between glass blocks and cmu masonry wall; size and configuration as indicated, if needed.
- B. Asphalt Emulsion: masonry sealer and protectant, made from non-fibrous asphalt, clay and water emulsion.
 1. Available Products: Provide one of the following.
 - a. Henry 107 by The Henry Company, Inc., 1-800-523-0268
 - b. Rust-oleum 380 by Rust-oleum C, Inc.;
 - c. Karnak 100 by Karnak, Inc., Clark, NJ; 1-800-526-4236

2.7 MORTAR

- A. General: Do not use admixtures, including pigments, air-entraining agents, accelerators, retarders, water-repellent agents, antifreeze compounds, or other admixtures unless otherwise indicated.
 1. Do not use calcium chloride in mortar or grout.
 2. Use Portland cement-lime mortar unless otherwise indicated.
- B. Mortar for Unit Masonry: Comply with ASTM C270, Property Specification. Provide the following types of mortar for applications stated unless another type is indicated.
 1. For masonry below grade or in contact with earth, use Type M.
 2. For glass block masonry, use Type S or Type N.

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PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine conditions, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of the Work.
 - 1. For the record, prepare written report, endorsed by Installer, listing conditions detrimental to performance of the Work.
 - 2. Verify that substrates are free of substances that impair mortar bond.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION, GENERAL

- A. Thickness: Glass block to be laid within masonry CMU wall, flush to exterior face of CMU units.
- B. Install glass block joint reinforcement per manufacturer's requirements. Use full-size units without cutting.

3.3 TOLERANCES

- A. Dimensions and Locations of Elements:
 - 1. For dimensions in cross section or elevation, do not vary by more than plus 1/2 inch or minus 1/4 inch.
 - 2. For location of elements in plan, do not vary from that indicated by more than plus or minus 1/2 inch.
- B. Lines and Levels:
 - 1. For bed joints and top surfaces of bearing walls, do not vary from level by more than 1/4 inch in 10 feet, or 1/2-inch maximum.
 - 2. For conspicuous horizontal lines, such as lintels, sills, and reveals, do not vary from level by more than 1/8 inch in 10 feet, 1/4 inch in 20 feet, or 1/2-inch maximum.
 - 3. For vertical lines and surfaces, do not vary from plumb by more than 1/4 inch in 10 feet, 3/8 inch in 20 feet, or 1/2-inch maximum.
 - 4. For faces of adjacent exposed masonry units, do not vary from flush alignment by more than 1/16 inch except due to warpage of masonry units within tolerances specified for warpage of units.
- C. Joints:
 - 1. For bed joints, do not vary from thickness indicated by more than plus or minus 1/8 inch, with a maximum thickness limited to 1/2 inch.
 - 2. For exposed bed joints, do not vary from bed-joint thickness of adjacent courses by more than 1/8 inch.
 - 3. For head and collar joints, do not vary from thickness indicated by more than plus 3/8 inch or minus 1/4 inch.

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4. For exposed head joints, do not vary from thickness indicated by more than plus or minus 1/8 inch. Do not vary from adjacent bed and head-joint thicknesses by more than 1/8 inch.

3.4 LAYING GLASS BLOCK

- A. Lay out walls in advance for accurate spacing of surface bond patterns with uniform joint thicknesses.
- B. Stack Pattern for Exposed Glass Block: Unless otherwise indicated, lay exposed glass block in a stack bond within the CMU running bond; do not use units with less than nominal 8-inch horizontal face dimensions.
- C. Stopping and Resuming Work: Stop work by stepping back units in each course from those in course below; do not tooth. When resuming work, clean masonry surfaces that are to receive mortar, remove loose masonry units and mortar, and wet brick if required before laying fresh masonry.

3.5 MORTAR BEDDING AND JOINTING

- A. Tool exposed joints slightly concave when thumbprint hard, using a jointer larger than joint thickness unless otherwise indicated.
- B. Do not shift or tap masonry units after mortar has achieved initial set. Where adjustment is necessary, remove mortar and replace.

3.6 LINTELS

- A. Install bond beam lintels where indicated.
- B. Provide masonry lintels where shown and where openings of more than 12 inches for brick-size units are shown without structural steel or other supporting lintels.
- C. Provide minimum bearing of 8 inches at each jamb unless otherwise indicated.

3.7 REPAIRING, POINTING, AND CLEANING

- A. Pointing: During the tooling of joints, enlarge voids and holes, except weep holes, and completely fill with mortar. Point up joints, including corners, openings, and adjacent construction, to provide a neat, uniform appearance. Prepare joints for sealant application, where indicated.
- B. In-Progress Cleaning: Clean unit masonry as work progresses by hand-wiping to remove mortar fins and smears before tooling joints.
- C. Final Cleaning for Glass Block: After mortar is thoroughly set and cured for a minimum of 7 days, clean exposed units as follows:

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1. Remove large mortar particles by hand with wooden paddles and nonmetallic scrape hoes or chisels. Follow all manufacturer's recommendations for cleaning of glass block and mortar surfaces.
2. Protect adjacent non-masonry surfaces from contact with cleaner by covering them with liquid strippable masking agent or polyethylene film and waterproof masking tape.
3. Wet wall surfaces with water before applying cleaners; remove cleaners promptly by rinsing surfaces thoroughly with clear water. Do not use pressure sprayers, garden hose type and pressure only.

3.8 MASONRY WASTE DISPOSAL

- A. Salvageable Materials: Unless otherwise indicated, excess masonry materials are Contractor's property. At completion of unit masonry work, remove from Project site.
- B. Excess Masonry Waste: Remove excess clean masonry waste that cannot be used as fill, as described above or recycled and other masonry waste, and legally dispose of off Owner's property.

END OF SECTION 042000

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SECTION 055000 - METAL FABRICATIONS [ARCHITECTURAL]

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Steel wire mesh [ceiling]

1.2 COORDINATION

- A. Coordinate installation of metal fabrications that are anchored to or that receive other work. Furnish setting drawings, templates, and directions for installing anchorages. Deliver such items to Project site in time for installation.

1.3 ACTION SUBMITTALS

A. Product Data: For the following:

1. Fasteners.

- B. Shop Drawings: Show fabrication and installation details. Include plans, sections, and details of metal fabrications and their connections. Show anchorage and accessory items. Provide Shop Drawings for the following:

1. Steel wire mesh ceilings.

1.4 FIELD CONDITIONS

- A. Field Measurements: Verify actual locations of walls and other construction contiguous with metal fabrications by field measurements before fabrication.

PART 2 - PRODUCTS

2.1 METALS – WIRE MESH

- A. Metal Surfaces, General: Provide materials with clean 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.

1. Basis-of-Design: Direct Metals, Atlanta/Chicago. Carbon LCrimp 0.120 Wire Mesh, 3/8 inch opening.
2. Hot-dip galvanized zinc coating.

2.2 FASTENERS

- A. General: Unless otherwise indicated, provide zinc-plated 1” U-shaped staple fasteners with coating complying with ASTM B633 or ASTM F1941/F1941M, Class Fe/Zn 5, anchoring wire mesh to the wood wall cap as shown on the Drawings. Select fasteners for type, grade, and class required.
- B. Anchor Bolts: ASTM F1554, Grade 36, of dimensions indicated; with nuts, ASTM A563; and, where indicated, flat washers.
 - 1. Hot-dip galvanize or provide mechanically deposited, zinc coating where item being fastened is indicated to be galvanized.

2.3 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 metals cleanly and accurately. Remove burrs and ease edges to a radius of approximately 1/32 inch unless otherwise indicated. Remove sharp or rough areas on exposed surfaces.
- C. Form exposed work with accurate angles and surfaces and straight edges.
- D. 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.
- E. 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.

2.4 GENERAL FINISH REQUIREMENTS

- A. Finish metal fabrications after assembly.
- B. Finish exposed surfaces to remove tool and die marks and stretch lines, and to blend into surrounding surface.

2.5 STEEL FINISHES

- A. Galvanizing: Provide coating for steel fabrications applied by the hot-dipped process, Duragalv by Duncan Galvanizing. The galvanizing bath shall contain high grade zinc and other earthy materials. Immediately before galvanizing, the steel shall be immersed in a bath of zinc ammonium chloride. The use of the wet kettle process is prohibited. Comply with ASTM A123 for fabricated products and ASTM A 153 for hardware. Provide thickness of galvanizing specified in referenced standards.

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PART 3 - EXECUTION

3.1 INSTALLATION, GENERAL

- A. Cutting, Fitting, and Placement: Perform cutting 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. 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, through bolts, lag screws, wood screws, and other connectors.

3.2 INSTALLATION OF MISCELLANEOUS FRAMING AND SUPPORTS

- A. General: Install framing and support to comply with requirements of items being supported, including manufacturers' written instructions and requirements indicated on Shop Drawings.

3.3 REPAIRS

- A. Galvanized Surfaces: Clean bolted connections and abraded areas and repair galvanizing to comply with ASTM A780/A780M.

END OF SECTION 055000

SECTION 061000 - 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.

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- 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.

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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.

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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.

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- 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

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SECTION 061516 - WOOD DECKING

PART 1 – GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. This Section includes the following:
 - 1. Solid-sawn roof decking.
- B. Relating Sections include the following:
 - 1. 061800- Glued-Laminated Wood Construction

1.3 SUBMITTALS

- A. Samples: 24 inches long, showing the range of variation to be expected in appearance of wood decking.

1.4 QUALITY ASSURANCE

- A. Standards for Solid-Sawn Wood Decking: Comply with AITC 112, “Standard for Tongue-and-Groove Heavy Timber Roof Decking” and American Wood Council Wood Construction Data (WCD) 2, “Tongue and Groove Wood Decking”.

1.5 DELIVERY, STORAGE, AND HANDLING

- A. Schedule delivery of wood decking to avoid extended on-site storage and to avoid Delaying the work.
- B. Store materials under cover and protected from the weather and contact with damp or wet surfaces. Provide air circulation within and around stacks and under temporary coverings. Stack wood decking with surfaces that are to be exposed in the final work protected from exposure to sunlight.

PART 2 – PRODUCTS

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2.1 WOOD DECKING, GENERAL

- A. General: Comply with applicable grading rules of AITC 112-93
- B. Moisture Content: Provide wood decking with 15 percent maximum moisture content at time of dressing.

2.2 SOLID-SAWN WOOD DECKING

- A. Decking Species: Spruce-Pine-Fir
- B. Decking Nominal Size: 2 inch nominal thickness by 6 inch nominal width heavy timber decking with dimensions in accordance AITC 112-93.
- C. Decking Grade: NLGA No. 1 Grade
- D. Face Surface: Smooth
- E. Edge Pattern: Square
- F. Decking Configuration: Random length and End-Matched

2.3 FASTENERS AND ACCESORY MATERIALS

- A. Fasteners for Solid-Sawn Decking: Provide fastener size and type complying with decking standard for thickness of deck used.
- B. Fastener Material: Each piece must be toe-nailed through the tongue with one 16d common nail and also face nailed with one 16d common nail at each support.
 - 1. Provide hot-dip galvanized fasteners.
 - 2. 16d nails shall have a diameter of 0.162 inch with length of 3-1/2 inches.

2.4 FABRICATION

- A. Fabricate decking in lengths for random length lay-up as defined in AITC 112-93 and Wood Construction Data (WCD) 2 from the American Wood Council (AWC).

PART 3 – EXECUTION

3.1 EXAMINATION

- A. Examine walls and support framing in areas to receive wood decking for compliance with installation tolerances and other conditions affecting performance of wood decking.
 - 1. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

- A. Install and fasten solid-sawn wood decking to comply with AITC 112-93 and AWC WCD-2.
- B. Apply joint sealant to seal roof decking at exterior walls at the following locations:
 - 1. Between decking and supports located at exterior walls.
 - 2. Between decking and exterior walls that butt against underside of decking.
 - 3. Between tongues and grooves of decking over exterior walls and supports at exterior walls.

3.3 ADJUSTING

- A. Repair damaged surfaces and finishes after completing erection. Replace damaged decking if repairs are not approved by Architect.

3.4 PROTECTION

- A. Provide temporary waterproof covering to protect exposed decking before applying roofing.

END OF
SECTION

COBSCOOK BAY STATE PARK – SHOWER BUILDING & UTILITY IMPROVEMENTS

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.

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- 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 06 18 00 - GLUE-LAMINATED CONSTRUCTION

PART 1 - GENERAL

1.1 GENERAL PROVISIONS

- A. The CONDITIONS OF THE CONTRACT and all Sections of Division 1 are hereby made a part of 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. Glue-laminated framing.
 - 2. Bolts and hardware for connection of members

1.3 QUALITY ASSURANCE

- A. Materials, manufacturing and quality control shall be in conformance with American National Standard ANSI A190.1-2022, “Standard for Structural Glued Laminated Timber”.
- 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.

1.4 SUBMITTALS

- A. Submit shop drawings of glued-laminated framing in accordance with Section 01 33 00, Submittal Procedures.
- B. Drawings shall show all shop and erection details, type of material and allowable stresses.
- C. Drawings shall be reviewed for size and arrangement of principal and auxiliary members. Dimensional errors on the shop drawings shall be the responsibility of the Contractor.

PART 2 - PRODUCTS

2.1 MATERIALS

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- A. All glue-laminated beams and rafters shall be fabricated with layup combination symbol 24F-V5, from Southern Yellow Pine with the following minimum allowable stresses:
F_b=2,400 psi, F_t = 1150 psi. F_c=1600 psi, F_v=300 psi, E=1,700,000 psi.
- B. All glue-laminated columns shall be fabricated with layup combination symbol 50, Grade N1D14 from Southern Yellow Pine with the following minimum allowable stresses:
F_b=2100 psi, F_t = 1550 psi. F_c=2300 psi, F_v=300 psi, E=1,900,000 psi.
- C. Adhesives shall meet the requirements for wet condition of service.
- D. All connection steel for joining timber members to each other and to their support shall meet the requirements of ASTM A36. The fabricator shall furnish connection steel and hardware for joining timber members to each other and to their supports.
 - 1. All steel shall be hot-dipped galvanized.
- E. Appearance of laminated members shall be architectural grade.
- F. Members shall be marked, on non-exposed surface, with a quality mark indicating conformance with Product Standard A190.1-2022.
- G. A coat of sealer shall be applied to the ends of all members as soon as practicable after end trimming.

2.2 FABRICATION

- A. All holes required for connections shall be drilled in the factory.

2.3 FINISH AND COVERING

- A. All members shall be coated with a surface sealer.
- B. All members shall be bundle wrapped for shipment and shall be protected from weather and moisture during storage, transportation, fabrication and erection.

PART 3 - EXECUTION

3.1 STORAGE

- A. Laminated members shall be stored above the ground on adequate supports to prevent excessive deflection.
- B. All members shall be protected from the weather. Any covering torn or removed during shipment shall be patched or replaced.

3.2 ERECTION

- A. Laminated members shall be erected plumb and true to the lines and elevations on the drawings.
- B. Temporary connections shall be adequate to take care of all dead load and erection tolerances.

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- C. All protective coverings shall be removed after a member is erected.
- D. Temporary bracing shall be provided as required to hold the members in alignment until final connections are made.
 - 1. Bracing shall not mar the exposed surfaces of the wood.

END OF SECTION

SECTION 062013 - EXTERIOR FINISH CARPENTRY

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Exterior wood trim.
2. Exterior wood siding.
3. Exterior wood benches.

B. Related Requirements:

1. Section 061000 "Rough Carpentry" for furring, blocking, and other carpentry work not exposed to view and for framing exposed to view.
2. Section 062023 "Interior Finish Carpentry" for wood benches.

1.2 ACTION 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.

1. For products receiving a waterborne treatment, include statement that moisture content of treated materials was reduced before shipment to Project site to levels specified.

B. Samples for Verification:

1. For each species and cut of lumber and panel products, with half of exposed surface finished; 50 sq. in. for lumber and 8 by 10 inches for panels.
2. For engineered wood siding and soffits, 50 sq. in. for board types and 8 by 10 inches for panels.

1.3 DELIVERY, STORAGE, AND HANDLING

A. Stack lumber, plywood, and other panels flat with spacers between each bundle to provide air circulation.

1. Protect materials from weather by covering them with waterproof sheeting, securely anchored.
2. Provide for air circulation around stacks and under coverings.

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1.4 FIELD CONDITIONS

- A. Weather Limitations: Proceed with installation only when existing and forecast weather conditions permit work to be performed and at least one coat of specified finish can be applied without exposure to rain, snow, or dampness.
- 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.

1.5 WARRANTY

- A. Manufacturer's Warranty for Engineered Wood Siding and Trim: Manufacturer agrees to repair or replace components that fail in materials or workmanship within specified warranty period.
 - 1. Failures include, but are not limited to, deformation or deterioration beyond normal weathering.
 - 2. Warranty Period for Factory-Applied Finish: Five years from date of Substantial Completion.
 - 3. Warranty Period for Siding, Soffits and Trim (Excluding Finish): 25 years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 MATERIALS, GENERAL

- A. Lumber: DOC PS 20 and applicable rules of grading agencies indicated. If no grading agency is indicated, comply with applicable rules of any rules-writing agency certified by the American Lumber Standard Committee's (ALSC) Board of Review. Grade lumber by an agency certified by the ALSC's Board of Review to inspect and grade lumber under the rules indicated.
 - 1. **For exposed lumber, mark grade stamp on end or back of each piece, or omit grade stamp and provide certificates of grade compliance issued by inspection agency.**
- B. Softwood Plywood: DOC PS 1.

2.2 EXTERIOR TRIM

- A. Lumber Trim for Semi-transparent Stained Finish:
 - 1. Species and Grade: Eastern White Pine; NeLMA Standard Grade.
 - 2. Maximum Moisture Content: 15 percent.
 - 3. Finger Jointing: Not allowed.
 - 4. Face Surface: Surfaced (smooth).

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2.3 LUMBER SIDING

- A. Basis-of-Design: Robbins Lumber, Searsmont, Maine. “Log Siding Shiplap”.
 - 1. Provide kiln-dried lumber siding complying with DOC PS 20.
 - 2. Species and Grade: Northern White Cedar or Eastern White Pine; NeLMA, Premium.
 - 4. Pattern: Log Profile, T&G siding, SIS2E, actual overall dimensions of 1-3/8 inch x 5-1/2 inch, (2x6 nominal) measured on the face and thick edge.

2.4 EXTERIOR WOOD BENCHES

- A. Lumber for Semi-transparent Stained Finish:
 - 1. Species and Grade: Northern White Cedar; NLGA, WCLIB, WWPA, #1 & Better Grade.
 - 2. Maximum Moisture Content: 15 percent.
 - 3. Finger Jointing: Not allowed.
 - 4. Face Surface: Surfaced (smooth).

2.5 MISCELLANEOUS MATERIALS

- A. Fasteners for Exterior Finish Carpentry: Provide nails or screws, in sufficient length to penetrate not less than 1-1/2 inches into wood substrate.
 - 1. For face-fastening siding, provide manufacturers recommended fastener or hot-dip galvanized-steel siding nails unless otherwise indicated.
 - 2. For applications not otherwise indicated, provide hot-dip galvanized-steel fasteners, as indicated on drawings.
- B. Wood Glue: Waterproof resorcinol glue recommended by manufacturer for exterior carpentry use.
- C. Flashing: Comply with requirements in Section 076200 "Sheet Metal Flashing and Trim" for flashing materials installed in exterior finish carpentry.

2.6 FABRICATION

- A. Back out or kerf backs of standing and running trim wider than 5 inches, except members with ends exposed in finished work.
- B. 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.

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PART 3 - EXECUTION

3.1 EXAMINATION

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

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 exterior finish carpentry level, plumb, true, and aligned with adjacent materials.
 - 1. Use concealed shims where necessary for alignment.
 - 2. Scribe and cut exterior finish carpentry to fit adjoining work.
 - 3. Refinish and seal cuts as recommended by manufacturer.
 - 4. Install to tolerance of 1/8 inch in 96 inches for level and plumb. Install adjoining exterior finish carpentry with 1/32-inch maximum offset for flush installation and 1/16-inch maximum offset for reveal installation.
 - 5. Coordinate exterior finish carpentry with materials and systems in or adjacent to it.
 - 6. Provide cutouts for mechanical and electrical items that penetrate exterior finish carpentry.

3.4 INSTALLATION OF STANDING AND RUNNING TRIM

- A. Install flat-grain lumber with bark side exposed to weather.
- B. Install trim with minimum number of joints as is practical, using full-length pieces from maximum lengths of lumber available. Do not use pieces less than 24 inches long, except where necessary.
 - 1. Use scarf joints for end-to-end joints.
 - 2. Stagger end joints in adjacent and related members.
- C. Fit exterior joints to exclude water.

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1. Cope at returns and miter at corners to produce tight-fitting joints, with full-surface contact throughout length of joint.
 2. Plane backs of casings to provide uniform thickness across joints, where necessary for alignment.
- D. Where face fastening is unavoidable, countersink fasteners, fill surface flush, and sand unless otherwise indicated.

3.5 INSTALLATION OF SIDING

- A. Install siding to comply with manufacturer's written instruction and warranty requirements.
- B. Vertical Lumber Siding:
1. Begin application at corner, with tongue edge in the direction of installation.
 2. Install subsequent courses with lap edges tightly fitted together.
 3. Leave 1/8-inch gap at trim and corners unless otherwise recommended by manufacturer and apply sealant.
 4. Butt joints only over framing or blocking, nailing top and bottom on each side and staggering joints in subsequent courses.
 5. Install siding boards at outside corners to create butt lap corner.
- C. Flashing: Install metal flashing as indicated on Drawings and as recommended by siding manufacturer.
- D. Finish: Apply finish within two weeks of installation.

3.6 ADJUSTING

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

3.7 CLEANING

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

3.8 PROTECTION

- A. Protect installed products from damage from weather and other causes during construction.

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- B. 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 062013

SECTION 062023 - INTERIOR FINISH CARPENTRY

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Interior trim.
2. Interior plywood sheathing.
3. Interior wood benches.
4. Wood shelving.

B. Related Requirements:

1. Section 061000 "Rough Carpentry" for furring, blocking, and other carpentry work not exposed to view.

1.2 ACTION 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.

1. For products receiving a waterborne treatment, include statement that moisture content of treated materials was reduced before shipment to Project site to levels specified.

B. Samples for Verification:

1. For each species and cut of lumber and panel products with non-factory-applied finish, with half 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.

1.3 DELIVERY, STORAGE, AND HANDLING

A. Stack lumber, plywood, and other panels flat with spacers between each bundle to provide air circulation.

1. Protect materials from weather by covering them with waterproof sheeting, securely anchored.
2. Provide for air circulation around stacks and under coverings.

B. Deliver interior finish carpentry materials only when environmental conditions comply with requirements specified for installation areas. If interior finish carpentry materials must be stored in other than installation areas, store only where environmental conditions comply with requirements specified for installation areas.

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1.4 FIELD 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.
- 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 rules of grading agencies indicated. If no grading agency is indicated, comply with applicable rules of any rules-writing agency certified by the American Lumber Standard Committee's (ALSC) Board of Review. Grade lumber by an agency certified by the ALSC's 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. **For exposed lumber, mark grade stamp on end or back of each piece or omit grade stamp and provide certificates of grade compliance issued by grading agency.**
- B. Softwood Plywood: DOC PS 1.

2.2 INTERIOR TRIM

- A. Softwood Lumber Trim for Transparent Finish (Stain or Clear Finish):
 - 1. Species and Grade: Eastern white pine, Select or No. 1; NeLMA or NLGA.
 - 2. Species and Grade: Poplar; B finish; NHLA.
 - 3. Species and Grade: Western red cedar; NLGA, WCLIB, or WWPA Grade A.
 - 4. Maximum Moisture Content: 15 percent.
 - 5. Finger Jointing: Not allowed.
 - 6. Face Surface: Surfaced (smooth).

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2.3 INTERIOR PLYWOOD SHEATHING

- A. Sande Plywood for Transparent Finish (Stain or Clear Finish):
 - 1. Species: Birch veneer.
 - 2. Size: 12mm (0.472 inches) minimum 3-ply.
 - 3. Veneer Grade: B2, Hardwood.
 - 4. Mill stamp on edge only.

2.4 INTERIOR WOOD BENCH

- A. Softwood Lumber Trim for Transparent Finish (Stain or Clear Finish):
 - 1. Species and Grade: Western red cedar or Eastern white cedar; NLGA, WCLIB, or WWPA Grade A.
 - 2. Maximum Moisture Content: 15 percent.
 - 3. Finger Jointing: Not allowed.
 - 4. Face Surface: Surfaced (smooth).

2.5 WOOD SHELVING

- A. Storage Shelving: Made from the following material:
 - 1. Plywood: 3/4"; Grade A-C.
- B. Shelf Cleats: 3/4-by-3-1/2-inch boards, eastern white pine as specified above for shelving.
- C. Vertical Shelf Supports: 2x4 SPF;

2.6 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.
- B. Low-Emitting Materials: Adhesives shall comply with testing and product requirements of the California Department of Public Health's "Standard Method for the Testing and Evaluation of Volatile Organic Chemical Emissions from Indoor Sources Using Environmental Chambers."
- C. Glue: Aliphatic-resin, polyurethane, or resorcinol wood glue recommended by manufacturer for general carpentry use.
- D. Multipurpose Construction Adhesive: Formulation, complying with ASTM D3498, that is recommended for indicated use by adhesive manufacturer.

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2.7 FABRICATION

- A. Back out or kerf backs of the following members, except those with ends exposed in finished work:
 - 1. Interior standing and running trim, except shoe and crown molds.
- B. 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 of the Work.
- 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; too small to fabricate with proper jointing arrangements; or with defective surfaces, sizes, or patterns.
- B. Install interior finish carpentry level, plumb, true, and aligned with adjacent materials.
 - 1. Use concealed shims where necessary for alignment.
 - 2. Scribe and cut interior finish carpentry to fit adjoining work. Refinish and seal cuts as recommended by manufacturer.
 - 3. Where face fastening is unavoidable, countersink fasteners, fill surface flush, and sand unless otherwise indicated.
 - 4. 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.

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5. 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 trim with minimum number of joints as is practical, using full-length pieces from maximum lengths of lumber available.
 1. Do not use pieces less than 24 inches long, except where necessary.
 2. Stagger joints in adjacent and related standing and running trim.
 3. Miter at returns, miter at outside corners, and cope at inside corners to produce tight-fitting joints with full-surface contact throughout length of joint.
 4. Use scarf joints for end-to-end joints.
 5. Plane backs of casings to provide uniform thickness across joints where necessary for alignment.
 6. Match color and grain pattern of trim for transparent finish (stain or clear finish) across joints.
 7. Install without splitting; drill pilot holes before fastening where necessary to prevent splitting.
 8. Fasten to prevent movement or warping.
 9. Countersink fastener heads on exposed carpentry work and fill holes.

3.5 SHELVING INSTALLATION

- A. Cut shelf cleats at ends of shelves about 1/2 inch less than width of shelves and sand exposed ends smooth.
 1. Install shelf cleats by fastening to framing or backing with finish nails or trim screws, set below face and filled.
 2. Space fasteners not more than 16 inches o.c. Use two fasteners at each framing member or fastener location for cleats 4 inches nominal in width and wider.
 3. Apply a bead of multipurpose construction adhesive to back of shelf cleats before installing.
 4. Remove adhesive that is squeezed out after fastening shelf cleats in place.
- B. Install shelf brackets spaced not more than 32 inches o.c. Fasten to framing members, blocking, or metal backing, or use toggle bolts or hollow wall anchors.
- C. Cut shelves to neatly fit openings with only enough gap to allow shelves to be removed and reinstalled.
 1. Install shelves, fully seated on cleats, brackets, and supports.
 2. Fasten shelves to cleats with finish nails or trim screws, set flush.

3.6 WOOD BENCH INSTALLATION

- A. Cut bench planks to size, notched to fit between CMU supports, anchored as detailed and edges eased.

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- B. Bench planks to be bolted to end caps and anchored to CMU supports.

3.7 ADJUSTING

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

3.8 CLEANING

- A. Clean interior finish carpentry on exposed and semi-exposed surfaces.
- B. Restore damaged or soiled areas and touch up factory-applied finishes if any.

3.9 PROTECTION

- A. Protect installed products from damage from weather and other causes during construction.
- B. 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 062023

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SECTION 072500 - WEATHER BARRIERS

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Building wrap.

1.2 ACTION SUBMITTALS

A. Product Data: For each type of product.

1. For building wrap, include data on air and water-vapor permeance based on testing according to referenced standards.

B. Shop Drawings: Show details of building wrap at terminations, openings, and penetrations. Show details of flexible flashing applications.

PART 2 - PRODUCTS

2.1 SELF-ADHERING WATER-RESISTIVE WEATHER BARRIER

A. Weather Barrier: Self-adhered vapor permeable air barrier sheet membrane consisting of multiple layers of UV stabilized spun-bonded polypropylene having the following properties:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. Delta; Delta-Vent SA.
 - b. Henry Company; Blueskin SA.
 - c. VaproShield L.L.C.; WrapShield SA.
2. Thickness, nominal: 40 mils (1.0mm)
3. Air Leakage: <0.04 CFM/ft² @ 1.57 lbs/ft² when tested in accordance with ASTM E2178
4. Water Vapor Permeance tested to ASTM E 96 Method A: Minimum 30 perms.
5. Water Resistance:
 - a. Tested to AATCC 127, 550 mm hydrostatic head for 5 hours: No leakage.
 - b. Or, pass ICC-ES AC 38.
6. Water Penetration Resistance around Nails: Pass when tested to AAMA 711-05 & ASTM D 1970 modified
7. Tensile Strength tested to ASTM D 882: min. 34 lbf/inch, machine direction; 25 lbf/inch, cross-machine direction.

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8. Application Temperature: Ambient temperature must be above 40 degrees F.
9. Surface Burning Characteristics tested to ASTM E 84: Class A, Flame-spread index of less than 10, Smoke-development index of less than 15.
10. Allowable UV Exposure Time: Not less than three months.

PART 3 - EXECUTION

3.1 WATER-RESISTIVE BARRIER INSTALLATION

- A. Cover exposed exterior surface of sheathing with water-resistive barrier securely fastened to framing immediately after sheathing is installed.
- B. Cover sheathing with water-resistive barrier as follows:
 1. Cut back barrier 1/2 inch on each side of the break in supporting members at expansion- or control-joint locations.
 2. Apply barrier to cover vertical flashing with a minimum 4-inch overlap unless otherwise indicated.
- C. Building Wrap: Comply with manufacturer's written instructions and warranty requirements.
 1. Seal seams, edges, fasteners, and penetrations with tape.
 2. Extend into jambs of openings and seal corners with tape.

3.2 DRAINAGE MATERIAL INSTALLATION

- A. Install drainage material over building wrap and flashing to comply with manufacturer's written instructions.

3.3 VENTING SYSTEM INSTALLATION

- A. Install venting system over building wrap and flashing to comply with manufacturer's written instructions.

END OF SECTION 072500

SECTION 076100 - SHEET METAL ROOFING

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Custom-fabricated, standing-seam sheet metal roofing.

B. Related Requirements:

1. Section 076200 "Sheet Metal Flashing and Trim" for manufactured roof accessories.
2. Section 079200 "Joint Sealants" for field-applied sealants adjoining sheet metal roofing and not otherwise specified in this Section.

1.2 COORDINATION

A. Coordinate sheet metal roofing layout and seams with sizes and locations of roof penetrations.

B. Coordinate sheet metal roofing installation with rain drainage work, flashing, trim, and construction of roofing substrate, walls, and other adjoining work to provide leak proof, secure, and noncorrosive installation.

1.3 PREINSTALLATION MEETINGS

A. Preinstallation Conference: Conduct conference at Project site.

1. Meet with Owner, Architect, roofing Installer.
2. Review construction schedule. Verify availability of materials, Installer's personnel, equipment, and facilities needed to make progress and avoid delays.
3. Review structural loading limitations of substrates during and after roofing installation.
4. Review vapor retarder and underlayment requirements.
5. Review flashings, special roofing details, roof drainage, roof penetrations, and condition of other construction that affect sheet metal roofing such as solar array rack connections.
6. Review requirements for insurance and certificates if applicable.

1.4 ACTION SUBMITTALS

A. Product Data: For each of the following:

1. Roofing sheet metal.
2. Underlayment materials.
3. Fasteners.
4. Sealant tape.
5. Butyl sealant.

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- B. Shop Drawings: Provide “Project Specific” shop drawings for roofing system.
 - 1. Include fabrication and installation layouts of metal panels; details of edge conditions, joints, panel profiles, corners, anchorages, attachment system, trim, flashings, closures, and accessories; and special details.
 - 2. Accessories: Include details of the flashing, trim, and anchorage systems, at a scale of not less than 1-1/2 inches per 12 inches.
 - 3. Indicate work to be field fabricated or field assembled.
 - a. Flashing and trim.
- C. Samples for Verification: For each type of exposed finish.
 - 1. Sheet Metal Roofing: 12 inches long by actual width of unit, including finished seam and in required profile. Include fasteners, cleats, and other attachments.
 - 2. Trim and Metal Closures: 12 inches long and in required profile. Include fasteners and other exposed accessories.

1.5 INFORMATIONAL SUBMITTALS

- A. Coordination Drawings: Roof plans, drawn to scale, on which the following items are shown and coordinated with each other, using input from installers of the items involved:
 - 1. Sheet metal roofing, seam locations, and attachments.
 - 2. Equipment supports, pipe supports, and details for penetrations.
- B. Qualification Data: For Installer.
 - 1. Include listing of completed projects of comparable scale of this Project, including name, address, telephone, and contact person for Architect, and name, address, telephone number, and contact person for building Owner.
- C. Evaluation Reports: For self-adhering, high-temperature sheet underlayment, from ICC-ES.
- D. Sample Warranties: For special warranties.

1.6 CLOSEOUT SUBMITTALS

- A. Maintenance Data: For roofing sheet metals and accessories to include in maintenance manuals.
- B. Special warranties.

1.7 QUALITY ASSURANCE

- A. Sheet Metal Roofing Fabricator Qualifications: Employs skilled workers who custom fabricate sheet metal roofing similar to that required for this Project and whose products have a record of successful in-service performance.
- B. Installer Qualifications: Company with at least three years of documented experience.

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1. MCA Roof Installation Certificate of Completion.
- C. Source Limitations: Obtain all components for roofing system from or approved by roofing system manufacturer.
- D. 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 mockup of typical roof area and eave, including fascia as shown on Drawings, including, underlayment, attachments, and accessories.
 - a. Size: Approximately 12 feet long by 6 feet.
 - b. Include each type of exposed seam and seam termination, fascia, soffit, and rake.
 2. Approval of mockups does not constitute approval of deviations from the Contract Documents contained in mockups unless Architect specifically approves such deviations in writing.
 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. Deliver components, metal panels, and other manufactured items so as not to be damaged or deformed. Package metal panels for protection during transportation and handling.
- B. Unload, store, and erect metal panels in a manner to prevent bending, warping, twisting, and surface damage.
- C. Stack metal panels horizontally on platforms or pallets, covered with suitable weathertight and ventilated covering. Store metal panels on Project site as recommended by manufacturer to minimize damage, ensure dryness, with positive slope for drainage of water. Do not store metal panels in contact with other materials that might cause staining, denting, or other surface damage.
- D. Retain strippable protective covering on metal panels and trims during installation for removal immediately after installation.

1.9 FIELD CONDITIONS

- A. Weather Limitations: Proceed with installation only when existing and forecasted weather conditions permit assembly of metal panels to be performed in accordance with manufacturers' written instructions and warranty requirements.

1.10 COORDINATION

- A. Coordinate sizes and locations of solar equipment supports and roof penetrations with actual equipment provided.

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- B. Coordinate metal panel installation with rain drainage work, flashing, trim, construction of soffits, and other adjoining work to provide a leakproof, secure, and noncorrosive installation.

1.11 WARRANTY

- A. Special Warranty: Warranty form at end of this Section in which Installer agrees to repair or replace components of sheet metal roofing that fail in materials or workmanship within specified warranty period.

- 1. Failures include, but are not limited to, the following:

- a. Structural failures, including, but not limited to, rupturing, cracking, or puncturing.
- b. Wrinkling or buckling.
- c. Loose parts.
- d. Failure to remain weathertight, including uncontrolled water leakage.
- e. Deterioration of metals, metal finishes, and other materials beyond normal weathering, including nonuniformity of color or finish.
- f. Galvanic action between sheet metal roofing and dissimilar materials.

- 2. Warranty Period: Twenty (20) years from date of Substantial Completion.

- B. Special Warranty on Finishes: Manufacturer agrees to repair finish or replace sheet metal roofing that shows evidence of deterioration of factory-applied finishes within specified warranty period.

- 1. Exposed Panel Finish: Deterioration includes, but is not limited to, the following:

- a. Color fading more than 5 Delta E units when tested according to ASTM D2244.
- b. Chalking in excess of a No. 8 rating when tested according to ASTM D4214.
- c. Cracking, checking, peeling, or failure of paint to adhere to bare metal.

- 2. Finish Warranty Period: 30 years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

- A. General Performance: Sheet metal roofing system, including, but not limited to, metal roof panels, cleats, anchors and fasteners, sheet metal flashing integral with sheet metal roofing, fascia panels, trim, underlayment, and accessories, shall comply with requirements without failure due to defective manufacture, fabrication, or installation, or due to other defects in construction. Sheet metal roofing shall remain watertight.
- B. Sheet Metal Roofing Standard: Comply with SMACNA's "Architectural Sheet Metal Manual" unless more stringent requirements are specified or indicated on Drawings.
- C. Energy Performance: Provide sheet metal roofing according to one of the following when tested according to CRRC-1:

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1. Three-year, aged, solar reflectance of not less than 0.55 and emissivity of not less than 0.75.
- D. Comply with ANSI/MCA FTS-1-2019, "Test Method for Wind Load Resistance of Flashings Used with Metal Roof Systems."
- E. Wind-Uplift Resistance: Provide metal roof panel assemblies that comply with UL 580 for wind-uplift-resistance class indicated.
 1. Uplift Rating UL 580 and UL 60 verify the designation as Class vs. UL or with supplemental testing of UL 1897 to failure beyond UL 580 Class 90 designation.
- F. Thermal Movements: Allow for thermal movements from ambient and surface temperature changes to prevent buckling, opening of joints, overstressing of components, failure of joint sealants, failure of connections, and other detrimental effects.
 1. Temperature Change: 120 deg F, ambient; 180 deg F, material surfaces.

2.2 ROOFING SHEET METALS

- A. Protect mechanical and other finishes on exposed surfaces from damage by applying strippable, temporary protective film before shipping.
 1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
 2. Basis-of-Design Product: Subject to compliance with requirements, provide ATAS International Inc. Dutch Seam – Panel MRD or comparable product by one of the following:
 - a. CENTRIA Architectural Systems.
 - b. Firestone
 - c. MBCI, Cornerstone Building Brands Inc.
- B. Aluminum Sheet: ASTM B209 alloy as standard with manufacturer for finish required, with temper as required to suit forming operations and performance required; with stiffened rib, smooth surface.
 1. Thickness: 0.032 inch unless otherwise indicated.
 2. Seam Height: 1-1/2"
 3. Texture: Smooth
 4. Exposed Coil-Coated Finish:
 - a. Three-Coat Fluoropolymer: AAMA 2605. Fluoropolymer finish containing not less than 70 percent polyvinylidene fluoride (PVDF) resin by weight in both color coat and clear topcoat. Prepare, pretreat, and apply coating to exposed metal surfaces to comply with coating and resin manufacturers' written instructions.
 - b. Kynar 500 / Hylar 5000

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5. Color: Dark Bronze
6. Concealed Finish: Pretreat with manufacturer's standard white or light-colored acrylic or polyester-backer finish, consisting of prime coat and wash coat with minimum total dry film thickness of 0.5 mil.

2.3 UNDERLAYMENT MATERIALS

- A. Self-Adhering, High-Temperature Sheet Underlayment: Minimum 30 mils thick, consisting of a slip-resistant polyethylene- or polypropylene-film top surface laminated to a layer of butyl- or SBS-modified asphalt adhesive, with release-paper backing; specifically designed to withstand high metal temperatures beneath metal roofing. Provide primer according to written recommendations of underlayment manufacturer.
 1. Basis-of-Design Product: Subject to compliance with requirements, provide ATAS International Inc. ATA Guard synthetic underlayment overall and ATA Shield self-adhering underlayment on edges, valleys and ridge or comparable product by one of the following:
 - a. GCP Applied Technologies Inc., Grace Ultra.
 - b. Owens Corning; Titanium PSU30 Roof Underlayment.
 2. Thermal Stability: ASTM D1970/D1970M; stable after testing at 240 deg F or higher.
 3. Low-Temperature Flexibility: ASTM D1970/D1970M; passes after testing at minus 20 deg F or lower.
- B. Mechanically Fastened Roofing Underlayment: Provide mechanically fastened roofing underlayment without sealed seams; woven polypropylene with anti-slip polyolefin coating on both sides, minimum thickness 30 mils (.76 mm); meeting or exceeding requirements of ASTM D226/D226M.
 1. Basis-of-Design Product: Subject to compliance with requirements, provide ATAS International, Inc.; ATA-Guard Underlayment or comparable product by one of the following:
 - a. GCP Applied Technologies, Inc., Tri-Flex XT Synthetic Underlayment.
 - b. Owens Corning, Titanium UDL50.

2.4 MISCELLANEOUS MATERIALS

- A. Provide materials and types of fasteners, protective coatings, sealants, and other miscellaneous items as required for complete roofing system and as recommended by primary sheet metal manufacturer unless otherwise indicated.
- B. Fasteners: Pancake head screws, minimum 1-inch, self-tapping screws, self-locking rivets and bolts, and other suitable fasteners designed to withstand design loads.
 1. General:

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- a. Fasteners for Flashing and Trim: Blind fasteners or self-drilling screws, gasketed; with hex-washer head.
 - b. Blind Fasteners: High-strength aluminum or stainless-steel rivets suitable for metal being fastened.
2. Fasteners for Aluminum Sheet: Aluminum or Series 300 stainless steel.
- C. Flashing and Trim: Provide factory-formed flashing and trim formed from same material as metal panels, 144 inches (3658 mm) minimum, as required to seal against weather and to provide finished appearance. Locations include, but are not limited to, eaves, rakes, corners, bases, framed openings, ridges, fasciae, and fillers. Finish flashing and trim with same finish system as adjacent metal panels.
- D. Sealant Tape: Pressure-sensitive, 100 percent solids, polyisobutylene compound sealant tape with release-paper backing. Provide permanently elastic, nonsag, nontoxic, nonstaining tape 1/2 inch wide and 1/8 inch thick.
- E. Elastomeric Sealant: ASTM C920, elastomeric silicone polymer sealant; of type, grade, class, and use classifications required to seal joints in sheet metal roofing and remain watertight.
- F. Butyl Sealant: ASTM C1311, single-component, solvent-release butyl rubber sealant; polyisobutylene plasticized; heavy bodied for hooked-type expansion joints with limited movement.

2.5 ACCESSORIES

- A. Sheet Metal Accessories: Provide components required for complete sheet metal roofing assembly, including trim, fascia, corner units, clips, flashings, sealants, gaskets, fillers, metal closures, closure strips, and similar items. Match material and finish of sheet metal roofing unless otherwise indicated.
1. Cleats: Intermittent and continuous attachment devices for mechanically seaming into joints and formed from the following materials and thicknesses unless otherwise indicated:
 - a. Aluminum Roofing: 0.0250-inch thick stainless steel.
 2. Expansion-Type Cleats: Cleats of a design that allows longitudinal movement of roof panels without stressing panel seams; of same material as other cleats.
 3. Backing Plates: Plates at roofing splices, fabricated from material recommended by SMACNA's "Architectural Sheet Metal Manual."
 4. Closure Strips: Closed-cell, expanded, cellular, rubber or crosslinked, polyolefin foam or closed-cell laminated polyethylene; minimum 1-inch-thick, flexible-closure strips; cut or premolded to match sheet metal roofing profile. Provide closure strips where necessary to ensure weathertight construction.
 5. Flashing and Trim: Formed from same material and with same finish as sheet metal roofing, minimum 0.018 inch thick.
- B. Pipe Flashing: Premolded, EPDM pipe collar with flexible aluminum ring bonded to base.

2.6 FABRICATION

- A. Custom fabricate sheet metal roofing to comply with details shown and recommendations in SMACNA's "Architectural Sheet Metal Manual" that apply to design, dimensions (panel width and seam height), geometry, metal thickness, and other characteristics of installation. Fabricate sheet metal roofing and accessories in shop to greatest extent possible.
 - 1. Dutch Seam Roofing: Form standing-seam panels with finished seam height of 1-1/2 inches.
- B. Fabrication Tolerances: Fabricate sheet metal roofing that is capable of installation to a tolerance of 1/4 inch in 20 feet on slope and location lines indicated on Drawings and within 1/8-inch offset of adjoining faces and of alignment of matching profiles.
- C. Fabrication Tolerances: Fabricate sheet metal roofing that is capable of installation to tolerances specified in MCA's "Metal Roof Installation Manual."
- D. Form exposed sheet metal work to fit substrates with little oil canning; free of buckling and tool marks; true to line, levels, and slopes; and with exposed edges folded back to form hems.
 - 1. Lay out sheet metal roofing, so transverse seams, if required, are made in direction of flow, with higher panels overlapping lower panels.
 - 2. Offset transverse seams from each other 12 inches minimum.
 - 3. Fold and cleat eaves and transverse seams in shop.
 - 4. Form and fabricate sheets, seams, strips, cleats, valleys, ridges, edge treatments, integral flashings, and other components of metal roofing to profiles, patterns, and drainage arrangements indicated on Drawings and as required for leakproof construction.
- E. Expansion Provisions: Fabricate sheet metal roofing to allow for expansion in running work sufficient to prevent leakage, damage, and deterioration of the Work.
 - 1. Form expansion joints of intermeshing hooked flanges, not less than 1 inch deep, filled with butyl sealant concealed within joints.
 - 2. Use lapped expansion joints only where indicated on Drawings.
- F. Sealant Joints: Where movable, nonexpansion-type joints are required, form metal to provide for proper installation of elastomeric sealant according to SMACNA's "Architectural Sheet Metal Manual."
- G. Sheet Metal Accessories: Custom fabricate flashings and trim to comply with recommendations in SMACNA's "Architectural Sheet Metal Manual" that apply to design, dimensions, metal, and other characteristics of item required. Obtain field measurements for accurate fit before shop fabrication.
 - 1. Form exposed sheet metal accessories without excessive oil canning, buckling, and tool marks; true to line, levels, and slopes; and with exposed edges folded back to form hems.
 - 2. Seams: Fabricate nonmoving seams with flat-lock seams. Form seams and seal with elastomeric sealant unless otherwise recommended by sealant manufacturer.
 - 3. Sealed Joints: Form nonexpansion, but movable, joints in metal to accommodate elastomeric sealant.

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4. Conceal fasteners and expansion provisions where possible. Do not use exposed fasteners on faces of accessories exposed to view.
5. Fabricate cleats and attachment devices of sizes recommended by SMACNA's "Architectural Sheet Metal Manual" for application, but not less than thickness of metal being secured.

PART 3 - EXECUTION

3.1 EXAMINATION

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

3.2 INSTALLATION OF UNDERLAYMENT

A. Coated Woven Synthetic Underlayment

Basis-of-Design: ATAS, ATA Guard.

- a. GCP Applied Technologies, Inc., Tri-Flex XT Synthetic Underlayment.
 - b. Owens Corning, Titanium UDL50.
2. Mechanically attach sheet underlayment over the entire roof, wrinkle free.
 3. Prime substrate if recommended by underlayment manufacturer.
 4. Comply with temperature restrictions of underlayment manufacturer for installation.
 5. Apply in shingle fashion to shed water, with end laps of not less than 6 inches staggered 24 inches between courses.
 6. Overlap side edges not less than 3-1/2 inches.
 7. Roll laps and edges with roller.
 8. Cover underlayment within 14 days of installation.

B. Self-Adhering High-Temperature Sheet Underlayment

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Basis-of-Design: ATAS, ATA Shield – nominal 30 mils thickness.

- a. GCP Applied Technologies Inc., Grace Ultra.
 - b. Owens Corning; Titanium PSU30 Roof Underlayment.
2. Install self-adhering high-temperature underlayment at the following locations
- a. Roof perimeter for a distance up from eaves of 36-inches.
 - b. Valleys, from lowest to highest point, for a distance on each side of 18-inches.
 - c. Rake edges for a distance of 18-inches.
 - d. Hips and ridges for a distance on each side of 12-inches.
 - e. Roof-to-wall intersections for a distance from wall of 18-inches.
 - f. Around penetrating elements for a distance from element of 18-inches.
 - g. Below or down the wall and up from eaves a minimum of 36-inches.
 - h. Directional transitions for a distance of 12-inches in each direction.

3.3 INSTALLATION, GENERAL

- A. Install sheet metal roofing to comply with details shown and recommendations in SMACNA's "Architectural Sheet Metal Manual" that apply to installation characteristics required unless otherwise indicated on Drawings.
1. Install fasteners, protective coatings, separators, sealants, and other miscellaneous items as required for complete roofing system.
 2. Install sheet metal roofing true to line, levels, and slopes. Provide uniform, neat seams with minimum exposure of sealant.
 3. Anchor sheet metal roofing and other components of the Work securely in place, with provisions for thermal and structural movement.
 4. Do not field cut sheet metal roofing by torch.
 5. Provide metal closures at rake edges, rake walls, eaves, and each side of ridge caps.
 6. Flash and seal sheet metal roofing with closure strips at eaves, rakes, and perimeter of all openings. Fasten with self-tapping screws.
 7. Locate and space fastenings in uniform vertical and horizontal alignment. Predrill panels for fasteners.
 8. Install ridge caps as sheet metal roofing work proceeds.
 9. Lap metal flashing over sheet metal roofing to direct moisture to run over and off roofing.
 10. Do not use graphite pencils to mark metal surfaces.
- B. Thermal Movement: Rigidly fasten metal roof panels to structure at only one location for each panel.
1. Allow remainder of panel to move freely for thermal expansion and contraction.
 2. Point of Fixity: Fasten each panel along a single common line of fixing located at locations indicated on Drawings.
 3. Avoid attaching accessories through roof panels in a manner that inhibits thermal movement.
- C. Fasteners: Use fastener sizes that penetrate wood blocking or sheathing not less than 1-inch for wood screws.

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- D. Metal Protection: Where dissimilar metals contact each other, or where metal contacts pressure-treated wood or other corrosive substrates, protect against galvanic action or corrosion by painting contact surfaces with bituminous coating, by applying self-adhering sheet underlayment to each contact surface, or by other permanent separation as recommended in SMACNA's "Architectural Sheet Metal Manual."
 - 1. Coat concealed side of uncoated-aluminum sheet metal roofing with bituminous coating where roofing contacts wood, ferrous metal, or cementitious construction.
- E. Conceal fasteners and expansion provisions where possible in exposed work and locate to minimize possibility of leakage. Cover and seal fasteners and anchors as required for a tight installation.
- F. Fascia:
 - 1. Align bottom of sheet metal roofing and fasten with blind rivets, bolts, or self-tapping screws.
 - 2. Flash and seal sheet metal roofing with closure strips where fasciae meet soffits, along lower panel edges, and at perimeter of all openings.

3.4 INSTALLATION OF CUSTOM-FABRICATED SHEET METAL ROOFING

- A. Dutch-Seam Roofing:
 - 1. Attach Dutch-seam metal panels to substrate with double-fastened cleats spaced at 12-inches o.c.
 - 2. Install panels reaching from eave to ridge before moving to adjacent panels.
 - a. Where transverse joints are required, stagger joints in adjacent panels not less than 48 inches.
 - 3. Before panels are interlocked, apply continuous bead of sealant to top of flange of lower panel.
 - 4. Lock Dutch seams by snapping over end flange, so cleat and panel edges are completely engaged.
 - 5. Lock each panel to panel below with sealed transverse seam.
 - 6. Loose-lock panels at eave edges to continuous cleats and flanges at roof edge down wall.
 - 7. Loose-lock panels at eave edges to continuous edge flashing exposed 24 inches from roof edge.
 - a. Attach edge flashing to face of roof edge with continuous cleat fastened to roof substrate at 12-inch o.c. spacing.
 - b. Lock panels to edge flashing.
 - 8. Leave seams upright after locking at ridges and hips.

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3.5 INSTALLATION OF ACCESSORIES

- A. Install accessories with positive anchorage to building and weathertight mounting and provide for thermal expansion.
 - 1. Coordinate installation with flashings and other components.
 - 2. Install components required for complete sheet metal roofing assembly, including trim, seam covers, flashings, sealants, gaskets, fillers, metal closures, closure strips, and similar items.
 - 3. Install accessories integral to sheet metal roofing that are specified in Section 076200 "Sheet Metal Flashing and Trim" to comply with that Section's requirements.

- B. Flashing and Trim: Comply with performance requirements and SMACNA's "Architectural Sheet Metal Manual."
 - 1. Provide concealed fasteners where possible, and install units true to line, levels, and slopes.
 - 2. Install work with laps, joints, and seams that are permanently watertight and weather resistant.
 - 3. Install flashing and trim as required to seal against weather and to provide finished appearance, including, but are not limited to, eaves, rakes, corners, bases, framed openings, ridges, fasciae, and fillers.
 - 4. Install continuous strip of self-adhering underlayment at edge of continuous flashing overlapping self-adhering underlayment, where "continuous seal strip" is indicated in SMACNA's "Architectural Sheet Metal Manual" and on Drawings.
 - 5. Install exposed flashing and trim without excessive oil canning, buckling, and tool marks; true to line, levels, and slopes; and with exposed edges folded back to form hems.
 - 6. Install sheet metal flashing and trim to fit substrates, and to result in waterproof and weather-resistant performance.
 - 7. Expansion Provisions: Provide for thermal expansion of exposed flashing and trim.
 - a. Space expansion joints at maximum of 10 feet with no joints within 24 inches of corner or intersection.
 - b. Form expansion joints of intermeshing hooked flanges, not less than 1 inch deep, and filled with butyl sealant concealed within joints.
 - c. Use lapped expansion joints only where indicated on Drawings.

- C. Pipe Flashing: Form flashing around pipe penetration and sheet metal roofing. Fasten and seal to sheet metal roofing as recommended in SMACNA's "Architectural Sheet Metal Manual."

3.6 INSTALLATION TOLERANCES

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

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3.7 CLEANING

- A. Clean exposed metal surfaces of substances that interfere with uniform oxidation and weathering.
- B. On completion of sheet metal roofing installation, clean finished surfaces as recommended by sheet metal roofing manufacturer.
- C. Clean off excess sealants.

3.8 PROTECTION

- A. Remove temporary protective coverings and strippable films as sheet metal roofing is installed unless otherwise indicated in manufacturer's written installation instructions.
- B. Prohibit traffic of any kind on installed sheet metal roofing.
- C. Maintain sheet metal roofing in clean condition during construction.
- D. Replace sheet metal roofing components that have been damaged or have deteriorated beyond successful repair by finish touchup or similar minor repair procedures, as determined by Architect.

END OF SECTION 076100

SECTION 076200 - SHEET METAL FLASHING AND TRIM

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Formed low-slope roof sheet metal fabrications.
2. Formed wall sheet metal fabrications.

B. Related Requirements:

1. Section 077200 "Roof Accessories" for materials and installation of sheet metal flashing and trim integral with roofing.

1.2 COORDINATION

- A. Coordinate sheet metal flashing and trim layout and seams with sizes and locations of penetrations to be flashed, and joints and seams in adjacent materials.
- B. Coordinate sheet metal flashing and trim installation with adjoining roofing and wall materials, joints, and seams to provide leakproof, secure, and noncorrosive installation.

1.3 PREINSTALLATION MEETINGS

A. Preinstallation Conference:

1. Meet with Owner, Architect, metal flashing installer, and installers whose work interfaces with or affects metal flashing.
2. Review construction schedule. Verify availability of materials, Installer's personnel, equipment, and facilities needed to make progress and avoid delays.
3. Review special roof details, roof-penetration flashing, and condition of other construction that affect sheet metal flashing and trim.

1.4 ACTION SUBMITTALS

A. Product Data: For each of the following

1. Underlayment materials.
2. Elastomeric sealant.
3. Butyl sealant.
4. Epoxy seam sealer.

B. Shop Drawings: Provide project specific shop drawings for sheet metal flashing and trim.

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1. Include plans, elevations, sections, and attachment details.
2. Detail fabrication and installation layouts, expansion-joint locations, and keyed details. Distinguish between shop- and field-assembled Work.
3. Include identification of material, thickness, weight, and finish for each item and location in Project.
4. Include details for forming, including profiles, shapes, seams, and dimensions.
5. Include details for joining, supporting, and securing, including layout and spacing of fasteners, cleats, clips, and other attachments. Include pattern of seams.
6. Include details of termination points and assemblies.
7. Include details of expansion joints including showing direction of expansion and contraction from fixed points.
8. Include details of roof-penetration flashing.
9. Include details of edge conditions, including eaves, ridges, valleys, rakes, and flashings.
10. Include details of connections to adjoining work.
11. Detail formed flashing and trim at scale of not less than 1-1/2 inches per 12 inches.

C. Samples for Verification: For each type of exposed finish.

1. Sheet Metal Flashing: 12 inches long by actual width of unit, including finished seam and in required profile. Include fasteners, cleats, clips, closures, and other attachments.
2. Trim, Metal Closures, Expansion Joints, Joint Intersections, and Miscellaneous Fabrications: 12 inches long and in required profile. Include fasteners and other exposed accessories.

1.5 INFORMATIONAL SUBMITTALS

- A. Sample Warranty: For special warranty.

1.6 CLOSEOUT SUBMITTALS

- A. Maintenance Data: For sheet metal flashing and trim, and its accessories, to include in maintenance manuals.
- B. Special warranty.

1.7 QUALITY ASSURANCE

- A. Fabricator Qualifications: Employs skilled workers who custom fabricate sheet metal flashing and trim similar to that required for this Project and whose products have a record of successful in-service performance.
- 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 mockup of typical roof edge, eave, including fascia, fascia trim, apron flashing, approximately 10 feet long, including supporting construction cleats, seams, attachments, underlayment, and accessories.

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2. Approval of mockups does not constitute approval of deviations from the Contract Documents contained in mockups unless Owner specifically approves such deviations in writing.
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. Do not store sheet metal flashing and trim materials in contact with other materials that might cause staining, denting, or other surface damage.
 1. Store sheet metal flashing and trim materials away from uncured concrete and masonry.
 2. Protect stored sheet metal flashing and trim from contact with water.
- B. Protect strippable protective covering on sheet metal flashing and trim from exposure to sunlight and high humidity, except to extent necessary for period of sheet metal flashing and trim installation.

1.9 WARRANTY

- A. Special Warranty on Finishes: Manufacturer agrees to repair finish or replace sheet metal flashing and trim that shows evidence of deterioration of factory-applied finishes within specified warranty period.
 1. Exposed Panel Finish: Deterioration includes, but is not limited to, the following:
 - a. Color fading more than 5 Delta E units when tested in accordance with ASTM D2244.
 - b. Chalking in excess of a No. 8 rating when tested in accordance with ASTM D4214.
 - c. Cracking, checking, peeling, or failure of paint to adhere to bare metal.
 2. Finish Warranty Period: 20 years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

- A. Sheet metal flashing and trim assemblies, including cleats, anchors, and fasteners, shall withstand wind loads, structural movement, thermally induced movement, and exposure to weather without failure due to defective manufacture, fabrication, installation, or other defects in construction. Completed sheet metal flashing and trim shall not rattle, leak, or loosen, and shall remain watertight.
- B. Sheet Metal Standard for Flashing and Trim: Comply with SMACNA's "Architectural Sheet Metal Manual" requirements for dimensions and profiles shown unless more stringent requirements are indicated.

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- C. Thermal Movements: Allow for thermal movements from ambient and surface temperature changes to prevent buckling, opening of joints, overstressing of components, failure of joint sealants, failure of connections, and other detrimental effects. Base calculations on surface temperatures of materials due to both solar heat gain and nighttime-sky heat loss.

- 1. Temperature Change: 120 deg F, ambient; 180 deg F, material surfaces.

2.2 SHEET METALS

- A. Protect mechanical and other finishes on exposed surfaces from damage by applying strippable, temporary protective film before shipping.
- B. Aluminum Sheet: ASTM B209, alloy as standard with manufacturer for finish required, with temper as required to suit forming operations and performance required; with smooth, flat surface.

- 1. Basis-of-Design Product: Subject to compliance with requirements, provide ATAS International Inc. sheet metal and fabricated forms, or comparable product by one of the following:

- a. CENTRIA Architectural Systems.
 - b. IMETCO.
 - c. MBCI, Cornerstone Building Brands Inc.

- 2. Exposed Coil-Coated Finish:
 - a. Three-Coat Fluoropolymer: AAMA 2605. Fluoropolymer finish containing not less than 70 percent polyvinylidene fluoride (PVDF) resin by weight in both color coat and clear topcoat. Prepare, pretreat, and apply coating to exposed metal surfaces to comply with coating and resin manufacturers' written instructions.
 - 3. Color: As follows:
 - a. Wall panel flashing and trim color: Dark Bronze (match roof panel).
 - b. Roof flashing and trim color: Dark Bronze (match roof panel).
 - 4. Concealed Finish: Pretreat with manufacturer's standard white or light-colored acrylic or polyester backer finish, consisting of prime coat and wash coat with minimum total dry film thickness of 0.5 mil.

2.3 UNDERLAYMENT MATERIALS

- A. Self-Adhering, High-Temperature Sheet Underlayment: Minimum 30 mils thick, consisting of a slip-resistant polyethylene- or polypropylene-film top surface laminated to a layer of butyl- or SBS-modified asphalt adhesive, with release-paper backing; specifically designed to withstand high metal temperatures beneath metal roofing. Provide primer in accordance with underlayment manufacturer's written instructions.

- 1. Basis-of-Design Product: Subject to compliance with requirements, provide ATAS International Inc. ATA Guard synthetic underlayment overall and ATA Shield self-

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adhering underlayment on edges, valleys and ridge or comparable product by one of the following:

- a. GCP Applied Technologies Inc., Grace Ultra.
- b. Owens Corning; Titanium PSU30 Roof Underlayment.

2.4 MISCELLANEOUS MATERIALS

- A. Provide materials and types of fasteners, protective coatings, sealants, and other miscellaneous items as required for complete sheet metal flashing and trim installation and as recommended by manufacturer of primary sheet metal or manufactured item unless otherwise indicated.
- B. Fasteners: Self-tapping screws, self-locking rivets and bolts, and other suitable fasteners designed to withstand design loads and recommended by manufacturer of primary sheet metal or manufactured item.
 1. General: Blind fasteners or self-drilling screws, gasketed, with hex-washer head.
 - a. Exposed Fasteners: Heads matching color of sheet metal using factory-applied coating. Provide metal-backed EPDM or PVC sealing washers under heads of exposed fasteners bearing on weather side of metal.
 - b. Blind Fasteners: High-strength aluminum or stainless-steel rivets suitable for metal being fastened.
 2. Fasteners for Aluminum Sheet: Aluminum or Series 300 stainless steel.
- C. Sealant Tape: Pressure-sensitive, 100 percent solids, polyisobutylene compound sealant tape with release-paper backing. Provide permanently elastic, nonsag, nontoxic, nonstaining tape 1/2 inch wide and 1/8 inch thick.
- D. Elastomeric Sealant: ASTM C920, elastomeric silicone polymer sealant; of type, grade, class, and use classifications required to seal joints in sheet metal flashing and trim and remain watertight.
- E. Butyl Sealant: ASTM C1311, single-component, solvent-release butyl rubber sealant; polyisobutylene plasticized; heavy bodied for hooked-type expansion joints with limited movement.

2.5 LOW-SLOPE ROOF SHEET METAL FABRICATIONS

- A. Roof Edge Flashing and Fascia Cap: Source from same manufacturer of metal wall and roof panels. Fabricate in minimum 96-inch-long, but not exceeding 12-foot-long sections. Furnish with 6-inch-wide, joint cover plates. Shop fabricate interior and exterior corners.
 1. Joint Style: Overlapped, 4 inches wide.
 2. Fabricate from the following materials:
 - a. Aluminum: 0.050 inch thick.

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- B. Copings: Fabricate in minimum 96-inch-long, but not exceeding 12-foot-long, sections. Fabricate joint plates of same thickness as copings. Furnish with continuous cleats to support the edge of external leg and drill elongated holes for fasteners on interior leg. Miter corners, fasten and seal watertight. Shop fabricate interior and exterior corners.
1. Coping Profile in accordance with SMACNA's "Architectural Sheet Metal Manual."
 2. Joint Style: Butted with expansion space and 6-inch-wide, concealed backup plate.
 3. Fabricate from the following materials:
 - a. Aluminum: 0.050 inch thick.
- C. Roof-to-Wall Transition: Shop fabricate interior and exterior corners. Fabricate from the following materials:
1. Aluminum: 0.050 inch thick.
- D. Base Flashing: Shop fabricate interior and exterior corners. Fabricate from the following materials:
1. Aluminum: 0.040 inch thick.
- E. Counter flashing: Shop fabricate interior and exterior corners. Fabricate from the following materials:
1. Aluminum: 0.032 inch thick.
- F. Flashing Receivers: Fabricate from the following materials:
1. Aluminum: 0.032 inch thick.
 2. Stainless Steel: 0.0156 inch thick.
- G. Roof-Penetration Flashing: Fabricate from the following materials:
1. Stainless Steel: 0.0188 inch thick.
 2. Copper-Clad Stainless Steel: 0.018 inch thick.
- H. Through-Wall Flashing: Fabricate continuous flashings in minimum 96-inch-long, but not exceeding 12-foot-long, sections, under copings, and at shelf angles. Fabricate discontinuous lintel, sill, and similar flashings to extend 6 inches beyond each side of wall openings; and form with 2-inch-high, end dams. Fabricate from the following materials:
1. Stainless Steel: 0.0156 inch thick.
 2. Copper-Clad Stainless Steel: 0.016 inch thick.
- I. Opening Flashings in Frame Construction: Fabricate head, sill, jamb, and similar flashings to extend 4 inches beyond wall openings. Form head and sill flashing with 2-inch-high, end dams. Fabricate from the following materials:
1. Aluminum: 0.032 inch thick.
 2. Stainless Steel: 0.0156 inch thick.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates, areas, and conditions, with installer present, for compliance with requirements for installation tolerances, substrate, and other conditions affecting performance of the Work.
 - 1. Verify compliance with requirements for installation tolerances of substrates.
 - 2. Verify that substrate is sound, dry, smooth, clean, sloped for drainage, and securely anchored.
 - 3. Verify that air- or water-resistant barriers have been installed over sheathing or backing substrate to prevent air infiltration or water penetration.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION OF UNDERLAYMENT

- A. Self-Adhering, High-Temperature Sheet Underlayment:
 - 1. Install self-adhering, high-temperature sheet underlayment; wrinkle free.
 - 2. Prime substrate if recommended by underlayment manufacturer.
 - 3. Comply with temperature restrictions of underlayment manufacturer for installation; use primer for installing underlayment at low temperatures.
 - 4. Apply in shingle fashion to shed water, with end laps of not less than 6 inches staggered 24 inches between courses.
 - 5. Overlap side edges not less than 3-1/2 inches. Roll laps and edges with roller.
 - 6. Roll laps and edges with roller.
 - 7. Cover underlayment within 14 days.

3.3 INSTALLATION, GENERAL

- A. Install sheet metal flashing and trim to comply with details indicated and recommendations of cited sheet metal standard that apply to installation characteristics required unless otherwise indicated on Drawings.
 - 1. Install fasteners, protective coatings, separators, sealants, and other miscellaneous items as required to complete sheet metal flashing and trim system.
 - 2. Install sheet metal flashing and trim true to line, levels, and slopes. Provide uniform, neat seams with minimum exposure of sealant.
 - 3. Anchor sheet metal flashing and trim and other components of the Work securely in place, with provisions for thermal and structural movement.
 - 4. Install sheet metal flashing and trim to fit substrates and to result in watertight performance.
 - 5. Install continuous cleats with fasteners spaced not more than 12 inches o.c.
 - 6. Space individual cleats not more than 12 inches apart. Attach each cleat with at least two fasteners. Bend tabs over fasteners.

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7. Install exposed sheet metal flashing and trim with limited oil-canning, and free of buckling and tool marks.
 8. Do not field cut sheet metal flashing and trim with a torch.
 9. Do not use graphite pencils to mark metal surfaces.
- B. Metal Protection: Where dissimilar metals contact each other, or where metal contacts pressure-treated wood or other corrosive substrates, protect against galvanic action or corrosion by painting contact surfaces with bituminous coating or by other permanent separation as recommended by sheet metal manufacturer or cited sheet metal standard.
1. Coat concealed side of uncoated-aluminum and stainless steel sheet metal flashing and trim with bituminous coating where flashing and trim contact wood, ferrous metal, or cementitious construction.
- C. Expansion Provisions: Provide for thermal expansion of exposed flashing and trim.
1. Space movement joints at maximum of 10 feet with no joints within 24 inches of corner or intersection.
 2. Form expansion joints of intermeshing hooked flanges, not less than 1 inch deep, filled with sealant concealed within joints.
 3. Use lapped expansion joints only where indicated on Drawings.
- D. Fasteners: Use fastener sizes that penetrate wood blocking or sheathing not less than 1-inch for wood screws.
- E. Conceal fasteners and expansion provisions where possible in exposed work and locate to minimize possibility of leakage. Cover and seal fasteners and anchors as required for a tight installation.
- F. Seal joints as required for watertight construction.
1. Use sealant-filled joints unless otherwise indicated.
 - a. Embed hooked flanges of joint members not less than 1 inch into sealant.
 - b. Form joints to completely conceal sealant.
 - c. When the ambient temperature at time of installation is between 40 and 70 deg F, set joint members for 50 percent movement each way.
 - d. Adjust setting proportionately for installation at higher ambient temperatures.
 - 1) Do not install sealant-type joints at temperatures below 40 deg F.
 2. Prepare joints and apply sealants to comply with requirements in Section 079200 "Joint Sealants."
- G. Rivets: Rivet joints in uncoated aluminum where necessary for strength.

3.4 INSTALLATION OF ROOF FLASHINGS

- A. Install sheet metal flashing and trim to comply with performance requirements, sheet metal manufacturer's written installation instructions, and cited sheet metal standard.

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1. Provide concealed fasteners where possible, and set units true to line, levels, and slopes.
2. Install work with laps, joints, and seams that are permanently watertight and weather resistant.

B. Roof Edge Flashing:

1. Install roof edge flashings in accordance with ANSI/SPRI/FM 4435/ES-1.
2. Anchor to resist uplift and outward forces in accordance with recommendations in cited sheet metal standard unless otherwise indicated. Interlock bottom edge of roof edge flashing with continuous cleat anchored to substrate at staggered 3-inch centers.

C. Pipe or Post Counter flashing: Install counter flashing umbrella with close-fitting collar with top edge flared for elastomeric sealant, extending minimum of 4 inches over base flashing. Install stainless steel draw band and tighten.

D. Roof-Penetration Flashing: Coordinate installation of roof-penetration flashing with installation of roofing and other items penetrating roof. Seal with butyl sealant and clamp flashing to pipes that penetrate roof.

3.5 INSTALLATION OF WALL FLASHINGS

- A. Install sheet metal wall flashing to intercept and exclude penetrating moisture in accordance with cited sheet metal standard unless otherwise indicated. Coordinate installation of wall flashing with installation of wall-opening louvers.
- B. Opening Flashings in Frame Construction: Install continuous head, sill, jamb, and similar flashings to extend 4 inches beyond wall openings.

3.6 INSTALLATION TOLERANCES

- A. Installation Tolerances: Shim and align sheet metal flashing and trim within installed tolerance of 1/4 inch in 20 feet on slope and location lines indicated on Drawings and within 1/8-inch offset of adjoining faces and of alignment of matching profiles.

3.7 CLEANING

- A. Clean exposed metal surfaces of substances that interfere with uniform oxidation and weathering.
- B. Clean and neutralize flux materials. Clean off excess solder.
- C. Clean off excess sealants.

3.8 PROTECTION

- A. Remove temporary protective coverings and strippable films as sheet metal flashing and trim are installed unless otherwise indicated in manufacturer's written installation instructions.

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- B. On completion of sheet metal flashing and trim installation, remove unused materials and clean finished surfaces as recommended in writing by sheet metal flashing and trim manufacturer.
- C. Maintain sheet metal flashing and trim in clean condition during construction.
- D. Replace sheet metal flashing and trim that have been damaged or that have deteriorated beyond successful repair by finish touchup or similar minor repair procedures, as determined by Architect.

END OF SECTION 076200

SECTION 078413 - PENETRATION FIRESTOPPING

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Penetration firestopping systems for the following applications:
 - a. Penetrations in fire-resistance-rated walls.
 - b. Penetrations in horizontal assemblies.

1.2 ACTION SUBMITTALS

A. Product Data: For each type of product.

B. Product Schedule: For each penetration firestopping system. Include location, illustration of firestopping system, and design designation of qualified testing and inspecting agency.

1. Engineering Judgments: Where Project conditions require modification to a qualified testing and inspecting agency's illustration for a particular penetration firestopping system, submit illustration, with modifications marked, approved by penetration firestopping system manufacturer's fire-protection engineer as an engineering judgment or equivalent fire-resistance-rated assembly. Obtain approval of authorities having jurisdiction prior to submittal.

1.3 INFORMATIONAL SUBMITTALS

A. Qualification Data: For Installer. Provide a list of at least 3 completed projects with name and contact information for contractor.

B. Product Test Reports: For each penetration firestopping system, for tests performed by a qualified testing agency.

1.4 CLOSEOUT SUBMITTALS

A. Installer Certificates: From Installer indicating that penetration firestopping systems have been installed in compliance with requirements and manufacturer's written instructions.

1.5 QUALITY ASSURANCE

A. Installer Qualifications: A person experienced in installing through-penetration firestop systems similar in material, design, and extent to that indicated for this Project, whose work has resulted in construction with a record of successful performance. Qualifications include having the

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necessary experience, staff, and training to install manufacturer's products per specified requirements. Manufacturer's willingness to sell its through-penetration firestop system products to Contractor or to Installer engaged by Contractor does not in itself confer qualification on buyer.

- B. Preinstallation Conference: Conduct conference at Project site.
- C. Special Inspections: Allow for 1 of each type of firestopping system to be removed and inspected for conformance with approved submittals. All firestopping shall be inspected prior to the installation of ceilings.
- D. Above Ceiling review: Prior to the installation of ceilings, a review of construction completion shall be conducted for firestopping and other items that will not be visible when the ceilings have been installed.

1.6 PROJECT CONDITIONS

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

1.7 COORDINATION

- A. Coordinate construction of openings and penetrating items to ensure that penetration firestopping systems can be installed according to specified firestopping system design.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

- A. Fire-Test-Response Characteristics:
 - 1. Perform penetration firestopping system tests by a qualified testing agency acceptable to authorities having jurisdiction.
 - 2. Test per testing standards referenced in "Penetration Firestopping Systems" Article. Provide rated systems complying with the following requirements:
 - a. Penetration firestopping systems shall bear classification marking of a qualified testing agency.
 - 1) UL in its "Fire Resistance Directory."
 - 2) Intertek Group in its "Directory of Listed Building Products."

2.2 PENETRATION FIRESTOPPING SYSTEMS

- A. Penetration Firestopping Systems: Systems that resist spread of fire, passage of smoke and other gases, and maintain original fire-resistance rating of construction penetrated. Penetration firestopping systems shall be compatible with one another, with the substrates forming openings, and with penetrating items if any.
 - 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. 3M Fire Protection Products.
 - b. A/D Fire Protection Systems Inc.
 - c. Tremco, Inc.
- B. Penetrations in Fire-Resistance-Rated Walls: Penetration firestopping systems with ratings determined per ASTM E814 or UL 1479, based on testing at a positive pressure differential of 0.01-inch wg.
 - 1. F-Rating: Not less than the fire-resistance rating of constructions penetrated.
- C. Penetrations in Horizontal Assemblies: Penetration firestopping systems with ratings determined per ASTM E814 or UL 1479, based on testing at a positive pressure differential of 0.01-inch wg.
 - 1. F-Rating: At least one hour, but not less than the fire-resistance rating of constructions penetrated.
- D. Accessories: Provide components for each penetration firestopping system that are needed to install fill materials and to maintain ratings required. Use only those components specified by penetration firestopping system manufacturer and approved by qualified testing and inspecting agency for conditions indicated.
 - 1. Permanent forming/damming/backing materials.
 - 2. Substrate primers.
 - 3. Collars.
 - 4. Steel sleeves.

2.3 FILL MATERIALS

- A. Latex Sealants: Single-component latex formulations that do not re-emulsify after cure during exposure to moisture.
- B. Intumescent Putties: Nonhardening, water-resistant, intumescent putties containing no solvents or inorganic fibers.
- C. Silicone Foams: Multicomponent, silicone-based liquid elastomers that, when mixed, expand and cure in place to produce a flexible, nonshrinking foam.
- D. Silicone Sealants: Single-component, silicone-based, neutral-curing elastomeric sealants.

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2.4 MIXING

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

PART 3 - EXECUTION

3.1 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: Before installing penetration firestopping systems, clean out openings immediately to comply with manufacturer's written instructions and with the following requirements:
 - 1. Remove from surfaces of opening substrates and from penetrating items foreign materials that could interfere with adhesion of penetration firestopping materials.
 - 2. Clean opening substrates and penetrating items to produce clean, sound surfaces capable of developing optimum bond with penetration firestopping materials. Remove loose particles remaining from cleaning operation.
 - 3. Remove laitance and form-release agents from concrete.
- B. 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.

3.3 INSTALLATION

- A. General: Install penetration firestopping systems to comply with manufacturer's written installation instructions and published drawings for products and applications.
- 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.
 - 1. After installing fill materials and allowing them to fully cure, remove combustible forming materials and other accessories not forming permanent components of firestopping.

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- C. Install fill materials by proven techniques to produce the following results:
 - 1. Fill voids and cavities formed by openings, forming materials, accessories and penetrating items to achieve required fire-resistance ratings.
 - 2. Apply materials so they contact and adhere to substrates formed by openings and penetrating items.
 - 3. For fill materials that will remain exposed after completing the Work, finish to produce smooth, uniform surfaces that are flush with adjoining finishes.

3.4 FIELD QUALITY CONTROL

- A. Owner will engage a qualified testing agency to perform tests and inspections according to ASTM E2174.
- B. Where deficiencies are found or penetration firestopping system is damaged or removed because of testing, repair or replace penetration firestopping system to comply with requirements.
- C. Proceed with enclosing penetration firestopping systems with other construction only after inspection reports are issued and installations comply with requirements.

3.5 CLEANING AND PROTECTION

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

END OF SECTION 078413

SECTION 078443 - JOINT FIRESTOPPING

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Joints in or between fire-resistance-rated constructions.

1.2 ACTION SUBMITTALS

A. Product Data: For each type of product.

B. Product Schedule: For each joint firestopping system. Include location, illustration of firestopping system, and design designation of qualified testing agency.

1. Engineering Judgments: Where Project conditions require modification to a qualified testing agency's illustration for a particular joint firestopping system condition, submit illustration, with modifications marked, approved by joint firestopping system manufacturer's fire-protection engineer as an engineering judgment or equivalent fire-resistance-rated assembly.

1.3 INFORMATIONAL SUBMITTALS

A. Product Test Reports: For each joint firestopping system, for tests performed by a qualified testing agency.

1.4 CLOSEOUT SUBMITTALS

A. Installer Certificates: From Installer indicating that joint firestopping systems have been installed in compliance with requirements and manufacturer's written instructions.

1.5 QUALITY ASSURANCE

A. Installer Qualifications: A firm experienced in installing fire-resistive joint systems similar in material, design, and extent to that indicated for this Project, whose work has resulted in construction with a record of successful performance. Qualifications include having the necessary experience, staff, and training to install manufacturer's products per specified requirements. Manufacturer's willingness to sell its fire-resistive joint system products to Contractor or to Installer engaged by Contractor does not in itself confer qualification on buyer.

B. Preinstallation Conference: Conduct conference at Project site.

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- C. Special Inspections: Allow for 1 of each type of joint firestopping system to be removed and inspected for conformance with approved submittals.
- D. Above Ceiling review: Prior to the installation of ceilings, a review of construction completion shall be conducted for joint firestopping and other items that will not be visible when the ceilings have been installed.

1.6 PROJECT CONDITIONS

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

1.7 COORDINATION

- A. Coordinate construction of joints to ensure that joint firestopping systems can be installed according to specified firestopping system design.
- B. Coordinate sizing of joints to accommodate joint firestopping systems.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

- A. Fire-Test-Response Characteristics:
 - 1. Perform joint firestopping system tests by a qualified testing agency acceptable to authorities having jurisdiction.
 - 2. Test per testing standards referenced in "Joint Firestopping Systems" Article. Provide rated systems complying with the following requirements:
 - a. Joint firestopping systems shall bear classification marking of a qualified testing agency.
 - 1) UL in its "Fire Resistance Directory."
 - 2) Intertek Group in its "Directory of Listed Building Products."

2.2 JOINT FIRESTOPPING SYSTEMS

- A. Joint Firestopping Systems: Systems that resist spread of fire, passage of smoke and other gases, and maintain original fire-resistance rating of assemblies in or between which joint firestopping systems are installed. Joint firestopping systems shall accommodate building movements without impairing their ability to resist the passage of fire and hot gases.

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- B. Joints in or between Fire-Resistance-Rated Construction: Provide joint firestopping systems with ratings determined per ASTM E1966 or UL 2079.
 - 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. 3M Fire Protection Products.
 - b. W.R. Grace & Co., Construction Products Division.
 - c. Nelson Firestop; a brand of Emerson Industrial Automation.
 - d. Tremco, Inc.
 - 2. Fire-Resistance Rating: Equal to or exceeding the fire-resistance rating of the wall, floor, or roof in or between which it is installed.
- C. Joints at Wall/Floor Intersections: Provide joint firestopping systems with rating determined per ASTM E2307.
 - 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. 3M Fire Protection Products.
 - b. W.R. Grace & Co., Construction Products Division.
 - c. Nelson Firestop; a brand of Emerson Industrial Automation.
 - d. Tremco, Inc.
 - 2. F-Rating: Equal to or exceeding the fire-resistance rating of the floor assembly.
- D. Exposed Joint Firestopping Systems: Flame-spread and smoke-developed indexes of less than 25 and 450, respectively, as determined per ASTM E84.

2.3 ACCESSORIES

- A. Provide components of fire-resistive joint systems, including primers and forming materials, that are needed to install elastomeric fill materials and to maintain ratings required. Use only components specified by joint firestopping system manufacturer and approved by the qualified testing agency for conditions indicated.
 - 1. Permanent forming/damming/backing materials.
 - 2. Substrate primers.
- B. Filler at Top of Walls: 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 2.5 to 2.8 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:

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- a. EMSEAL Joint System, Ltd.
- b. Roxul-Rockwool: AFB.
- c. Owens Corning; Thermafiber SAFB.

PART 3 - EXECUTION

3.1 EXAMINATION

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

3.2 PREPARATION

- A. Surface Cleaning: Before installing joint firestopping systems, clean joints immediately to comply with fire-resistive joint system manufacturer's written instructions and the following requirements:
 1. Remove from surfaces of joint substrates foreign materials that could interfere with adhesion of elastomeric fill materials or compromise fire-resistive rating.
 2. Clean joint substrates to produce clean, sound surfaces capable of developing optimum bond with elastomeric fill materials. Remove loose particles remaining from cleaning operation.
 3. Remove laitance and form-release agents from concrete.
- B. Prime substrates where recommended in writing by joint firestopping system manufacturer using that manufacturer's recommended products and methods. Confine primers to areas of bond; do not allow spillage and migration onto exposed surfaces.

3.3 INSTALLATION

- A. General: Install joint firestopping systems to comply with manufacturer's written installation instructions and published drawings for products and applications indicated.
- B. Install forming materials and other accessories of types required to support elastomeric fill materials during their application and in position needed to produce cross-sectional shapes and depths required to achieve fire ratings indicated.
 1. After installing elastomeric fill materials and allowing them to fully cure, remove combustible forming materials and other accessories not indicated as permanent components of fire-resistive joint system.
- C. Install elastomeric fill materials for joint firestopping systems by proven techniques to produce the following results:
 1. Elastomeric fill voids and cavities formed by joints and forming materials as required to achieve fire-resistance ratings indicated.

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2. Apply elastomeric fill materials so they contact and adhere to substrates formed by joints.
3. For elastomeric fill materials that will remain exposed after completing the Work, finish to produce smooth, uniform surfaces that are flush with adjoining finishes.

3.4 IDENTIFICATION

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

3.5 FIELD QUALITY CONTROL

- A. Inspecting Agency: Owner will engage a qualified testing agency to perform tests and inspections according to ASTM E2393.
- B. Where deficiencies are found or joint firestopping systems are damaged or removed due to testing, repair or replace joint firestopping systems so they comply with requirements.
- C. Proceed with enclosing joint firestopping systems with other construction only after inspection reports are issued and installations comply with requirements.

3.6 CLEANING AND PROTECTION

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

3.7 JOINT FIRESTOPPING SYSTEM SCHEDULE

- A. Where UL-classified systems are indicated, they refer to system numbers in UL's "Fire Resistance Directory" under product Category XHBN or Category XHDG.

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- B. Where Intertek Group-listed systems are indicated, they refer to design numbers in Intertek Group's "Directory of Listed Building Products" under product category Firestop Systems.
- C. Floor-to-Roof, Joint Firestopping Systems:
 - 1. UL-Classified Systems: FF-S 4000-4999.
- D. Head-of-Wall, Fire-Resistive Joint Firestopping Systems:
 - 1. UL-Classified Systems: Provide one of the following as applicable:
 - a. HW-D-0099. (fireproofing at deck - parallel)
 - b. HW-D-0252. (fireproofing at beam - parallel)
- E. Bottom-of-Wall, Joint Firestopping Systems:
 - 1. UL-Classified Systems: Provide one of the following as applicable:
 - a. BW-S-0003. (stud wall)
- F. Wall-to-Wall, Joint Firestopping Systems Intended for Use as Corner Guards:
 - 1. UL-Classified Systems: CG-S 4000-4999.

END OF SECTION 078443

SECTION 079200 - JOINT SEALANTS

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Non-staining silicone joint sealants.
2. Urethane joint sealants.
3. Mildew-resistant joint sealants.
4. Butyl joint sealants.

1.2 ACTION SUBMITTALS

A. Product Data: For each joint-sealant product.

B. Samples for Verification: For each kind and color of joint sealant required, provide Samples with joint sealants in 1/2-inch-wide joints formed between two 6-inch-long strips of material matching the appearance of exposed surfaces adjacent to joint sealants.

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. Field-Adhesion-Test Reports: For each sealant application tested.

E. Sample Warranties: For special warranties.

1.3 QUALITY ASSURANCE

A. 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.

1.4 FIELD CONDITIONS

A. Do not proceed with installation of joint sealants under the following conditions:

1. When ambient and substrate temperature conditions are outside limits permitted by joint-sealant manufacturer or are below 40 deg F.
2. When joint substrates are wet.

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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.

1.5 WARRANTY

- A. Special Installer's Warranty: 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.

PART 2 - PRODUCTS

2.1 JOINT SEALANTS, GENERAL

- A. Compatibility: Provide joint sealants, backings, and other related materials that are compatible with one another and with joint substrates under conditions of service and application, as demonstrated by joint-sealant manufacturer, based on testing and field experience.
- B. Colors of Exposed Joint Sealants: Clear

2.2 NON-STAINING SILICONE JOINT SEALANTS

- A. Nonstaining Joint Sealants: No staining of substrates when tested according to ASTM C1248.
- B. Sealant Type 1A: Single-component, nonsag, plus 50 percent and minus 50 percent movement capability, nontraffic-use, neutral-curing silicone joint sealant; ASTM C 920, Type S, Grade NS, Class 50, Use NT.
 1. Stain-Test-Response Characteristics: Nonstaining to porous substrates per ASTM C 1248.
 2. Products: Subject to compliance with requirements, provide one of the following:
 - a. Dow Corning Corporation; 756 SMS (VOC 87).
 - b. GE Advanced Materials - Silicones; SilPruf LM SCS2700 (VOC 27).
 - c. Pecora Corporation; 890NST (VOC 98).

2.3 URETHANE JOINT SEALANTS

- A. Sealant Type 5: Single-component, nonsag, nontraffic-use, plus 25 percent and minus 25 percent movement capability, urethane joint sealant; ASTM C 920, Type S, Grade NS, Class 25, Use NT.
 1. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:

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- a. BASF Building Systems; “Sonolastic NP1”.
- b. Bostik, Inc.; “Chem-Calk 900”.
- c. Sherwin-Williams; “Loxon 1K Smooth”.
- d. Sika Corporation, Construction Products Division; “Sikaflex - 1A”.

2.4 MISCELLANEOUS JOINT SEALANTS

- A. Sealant Type 9 - Exterior Trim and Siding Sealant: Single component, elastomeric sealant; ASTM C 920; Type S, Grade NS, Class 25, Use NT, M, G and A; as applicable to joint substrates indicated. Provide sealant to match prefinished products. Sealant shall be paintable for use with field-finished products.

1. Products for Color Matched Sealants:

- a. OSI Sealants, Inc.; Quad Advanced Formula Sealant for Windows, Doors & Siding.
- b. Franklin International; Titebond Weathermaster Sealant for Siding, Windows and Doors.
- c. Geocel Corporation; ProColor SWD Tripolymer Sealant.

2. Colors: Clear.

2.5 BUTYL JOINT SEALANTS

- A. Butyl-Rubber-Based Joint Sealants: ASTM C1311.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

- a. Pecora Corporation; BC-158

2.6 JOINT - SEALANT BACKING

- A. Sealant Backing Material, General: Nonstaining; compatible with joint substrates, sealants, primers, and other joint fillers; and approved for applications indicated by sealant manufacturer based on field experience and laboratory testing.
- B. Cylindrical Sealant Backings: ASTM C1330, 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.

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2.7 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.

PART 3 - EXECUTION

3.1 EXAMINATION

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

3.2 PREPARATION

- A. Surface Cleaning of Joints: Clean out joints immediately before installing joint sealants to comply with joint-sealant manufacturer's written instructions and the following requirements:
 - 1. Remove all foreign material from joint substrates that could interfere with adhesion of joint sealant, including dust, paints (except for permanent, protective coatings tested and approved for sealant adhesion and compatibility by sealant manufacturer), old joint sealants, oil, grease, waterproofing, water repellents, water, surface dirt, and frost.
 - 2. Clean porous joint substrate surfaces by brushing, grinding, mechanical abrading, or a combination of these methods to produce a clean, sound substrate capable of developing optimum bond with joint sealants. Porous joint substrates include the following:
 - a. Concrete.
 - b. Masonry.
 - 3. Remove laitance and form-release agents from concrete.
- B. Joint Priming: Prime joint substrates where recommended by joint-sealant manufacturer or as indicated by preconstruction joint-sealant-substrate tests or prior experience. Apply primer to comply with joint-sealant manufacturer's written instructions. Confine primers to areas of joint-sealant bond; do not allow spillage or migration onto adjoining surfaces.

3.3 INSTALLATION OF JOINT SEALANTS

- A. General: Comply with joint-sealant manufacturer's written installation instructions for products and applications indicated unless more stringent requirements apply.
- B. Sealant Installation Standard: Comply with recommendations in ASTM C1193 for use of joint sealants as applicable to materials, applications, and conditions indicated.
- C. Install sealant backings of kind indicated to support sealants during application and at position required to produce cross-sectional shapes and depths of installed sealants relative to joint widths that allow optimum sealant movement capability.
 - 1. Do not leave gaps between ends of sealant backings.
 - 2. Do not stretch, twist, puncture, or tear sealant backings.
 - 3. Remove absorbent sealant backings that have become wet before sealant application and replace them with dry materials.
- D. Install sealants using proven techniques that comply with the following and at the same time backings are installed:
 - 1. Place sealants so they directly contact and fully wet joint substrates.
 - 2. Completely fill recesses in each joint configuration.
 - 3. Produce uniform, cross-sectional shapes and depths relative to joint widths that allow optimum sealant movement capability.
- E. Tooling of Nonsag Sealants: Immediately after sealant application and before skinning or curing begins, tool sealants according to requirements specified in subparagraphs below to form smooth, uniform beads of configuration indicated; to eliminate air pockets; and to ensure contact and adhesion of sealant with sides of joint.
 - 1. Remove excess sealant from surfaces adjacent to joints.
 - 2. Use tooling agents that are approved in writing by sealant manufacturer and that do not discolor sealants or adjacent surfaces.
 - 3. Provide concave joint profile per Figure 8A in ASTM C1193 unless otherwise indicated.

3.4 FIELD QUALITY CONTROL

- A. Field-Adhesion Testing: Field test joint-sealant adhesion to joint substrates as follows:
 - 1. Extent of Testing: Test completed and cured sealant joints as follows:
 - a. Perform 3 tests for the first 100 feet of joint length for each kind of sealant and joint substrate.
 - 2. Test Method: Test joint sealants according to Method A, Field-Applied Sealant Joint Hand Pull Tab, in Appendix X1 in ASTM C1193 or Method A, Tail Procedure, in ASTM C1521.
 - a. For joints with dissimilar substrates, verify adhesion to each substrate separately; extend cut along one side, verifying adhesion to opposite side. Repeat procedure for opposite side.

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3. Inspect tested joints and report on the following:
 - a. Whether sealants filled joint cavities and are free of voids.
 - b. Whether sealant dimensions and configurations comply with specified requirements.
 - c. Whether sealants in joints connected to pulled-out portion failed to adhere to joint substrates or tore cohesively. Include data on pull distance used to test each kind of product and joint substrate. Compare these results to determine if adhesion complies with sealant manufacturer's field-adhesion hand-pull test criteria.
 4. Record test results in a field-adhesion-test log. Include dates when sealants were installed, names of persons who installed sealants, test dates, test locations, whether joints were primed, adhesion results and percent elongations, sealant material, sealant configuration, and sealant dimensions.
 5. Repair sealants pulled from test area by applying new sealants following same procedures used originally to seal joints. Ensure that original sealant surfaces are clean and that new sealant contacts original sealant.
- B. Evaluation of Field-Adhesion-Test Results: Sealants not evidencing adhesive failure from testing or noncompliance with other indicated requirements will be considered satisfactory. Remove sealants that fail to adhere to joint substrates during testing or to comply with other requirements. Retest failed applications until test results prove sealants comply with indicated requirements.

3.5 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.

3.6 PROTECTION

- A. Protect joint sealants during and after curing period from contact with contaminating substances and from damage resulting from construction operations or other causes so sealants are without deterioration or damage at time of Substantial Completion. If, despite such protection, damage or deterioration occurs, cut out, remove, and repair damaged or deteriorated joint sealants immediately so installations with repaired areas are indistinguishable from original work.

3.7 JOINT-SEALANT SCHEDULE

- A. Exterior Isolation and Contraction Joints in Cast-in-place Concrete Slabs.
 1. Silicone Joint Sealant: Sealant Type 3.
 2. Urethane Joint Sealant: Sealant Type 6.
 3. Joint-Sealant Color: As selected by Architect from manufacturer's full range of colors.
- B. Exterior Control and Soft Joints in Masonry and Between Masonry and Adjacent Work.
 1. Silicone Joint Sealant: Sealant Type 1.
 2. Urethane Joint Sealant: Sealant Type 5.

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3. Joint-Sealant Color: As selected by Architect from manufacturer's full range of colors.
- C. Exterior Control, Expansion, and Soft Joints Between Masonry and Metal Door Frames.
1. Silicone Joint Sealant: Sealant Type 1.
 2. Urethane Joint Sealant: Sealant Type 5.
 3. Joint-Sealant Color: As selected by Architect from manufacturer's full range of colors.
- D. Under Exterior Door Thresholds.
1. Silicone Joint Sealant: Sealant Type 1.
 2. Urethane Joint Sealant: Sealant Type 5.
 3. Joint-Sealant Color: As selected by Architect from manufacturer's full range of colors.
- E. Interior Isolation and Contraction Joints in Cast-In-Place Concrete Slabs.
1. Silicone Joint Sealant: Sealant Type 3.
 2. Urethane Joint Sealant: Sealant Type 6.
 3. Joint-Sealant Color: As selected by Architect from manufacturer's full range of colors.
- F. Exposed Interior Perimeter Joints of Exterior Openings.
1. Latex Joint Sealant: Sealant Type 9.
 2. Joint-Sealant Color: As selected by Architect from manufacturer's full range of colors.
- G. Vertical Joints on Exposed Surfaces of Interior Unit Masonry, Concrete, Walls, and Partitions.
1. Latex Joint Sealant: Sealant Type 9.
 2. Joint-Sealant Color: As selected by Architect from manufacturer's full range of colors.
- H. Joints between Plumbing Fixtures and Walls and Floors and Between Countertops and Walls.
1. Silicone Joint Sealant: Sealant Type 4.
 2. Joint-Sealant Color: As selected by Architect from manufacturer's full range of colors.

END OF SECTION 079200

SECTION 080671 – DOOR HARDWARE SCHEDULE

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. This Section references specification sections relating to commercial door hardware for the following:
 - 1. Swinging doors.
 - 2. Other doors to the extent indicated.
- B. Commercial door hardware includes, but is not necessarily limited to, the following:
 - 1. Mechanical door hardware.
 - 2. Cylinders specified for doors in other sections.
- C. Related Sections:
 - 1. Division 08 Section “Door Hardware”.
- D. Codes and References: Comply with the version year adopted by the Authority Having Jurisdiction.
 - 1. ANSI A117.1 - Accessible and Usable Buildings and Facilities.
 - 2. ICC/IBC - International Building Code.
 - 3. NFPA 80 - Fire Doors.
 - 4. NFPA 101 - Life Safety Code.
 - 5. State Building Codes, Local Amendments.
- E. Standards: Reference Related Sections for requirements regarding compliance with applicable industry standards.

1.3 SUBMITTALS

- A. Product Data: Manufacturer's product data sheets including installation details, material descriptions, dimensions of individual components and profiles, operational descriptions and finishes.
- B. Door Hardware Schedule: Prepared by or under the supervision of supplier, detailing fabrication and assembly of door hardware, as well as procedures and diagrams. Coordinate the final Door

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Hardware Schedule with doors, frames, and related work to ensure proper size, thickness, hand, function, and finish of door hardware.

1. Format: Comply with scheduling sequence and vertical format in DHI's "Sequence and Format for the Hardware Schedule."
 2. Organization: Organize the Door Hardware Schedule into door hardware sets indicating complete designations of every item required for each door or opening. Organize door hardware sets in same order as in the Door Hardware Sets at the end of Part 3. Submittals that do not follow the same format and order as the Door Hardware Sets will be rejected and subject to resubmission.
 3. Content: Include the following information:
 - a. Type, style, function, size, label, hand, and finish of each door hardware item.
 - b. Manufacturer of each item.
 - c. Fastenings and other pertinent information.
 - d. Location of door hardware set, cross-referenced to Drawings, both on floor plans and in door and frame schedule.
 - e. Explanation of abbreviations, symbols, and codes contained in schedule.
 - f. Mounting locations for door hardware.
 - g. Door and frame sizes and materials.
 4. Submittal Sequence: Submit the final Door Hardware Schedule at the earliest possible date, particularly where approval of the Door Hardware Schedule must precede fabrication of other work that is critical in the Project construction schedule. Include Product Data, Samples, Shop Drawings of other work affected by door hardware, and other information essential to the coordinated review of the Door Hardware Schedule.
- C. Keying Schedule: Prepared under the supervision of the Owner, separate schedule detailing final keying instructions for locksets and cylinders in writing. Include keying system explanation, door numbers, key set symbols, hardware set numbers and special instructions. Owner to approve submitted keying schedule prior to the ordering of permanent cylinders.
- D. Product Test Reports: Indicating compliance with cycle testing requirements, based on evaluation of comprehensive tests performed by manufacturer, and witnessed by a qualified independent testing agency.
- E. Operating and Maintenance Manuals: Provide manufacturers operating and maintenance manuals for each item comprising the complete door hardware installation in quantity as required in Division 01, Closeout Submittals. The manual to include the name, address, and contact information of the manufacturers providing the hardware and their nearest service representatives. The final copies delivered after completion of the installation test to include "as built" modifications made during installation, checkout, and acceptance.
- F. Warranties and Maintenance: Special warranties and maintenance agreements specified in the Related Sections.

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1.4 DELIVERY, STORAGE, AND HANDLING

- A. Inventory door hardware on receipt and provide secure lock-up and shelving for door hardware delivered to Project site. Do not store electronic access control hardware, software or accessories at Project site without prior authorization.
- B. Tag each item or package separately with identification related to the final Door Hardware Schedule and include basic installation instructions with each item or package.
- C. Deliver, as applicable, permanent keys, cylinders, cores, access control credentials, and related accessories directly to Owner via registered mail or overnight package service. Instructions for delivery to the Owner shall be established at the "Keying Conference".

1.5 WARRANTY

- A. General Warranty: Reference Division 01, General Requirements. Special warranties specified in this Article shall not deprive Owner of other rights Owner may have under other provisions of the Contract Documents and shall be in addition to, and run concurrent with, other warranties made by Contractor under requirements of the Contract Documents.

1.6 MAINTENANCE SERVICE

- A. Maintenance Tools and Instructions: Furnish a complete set of specialized tools and maintenance instructions as needed for Owner's continued adjustment, maintenance, and removal and replacement of door hardware.

PART 2 - PRODUCTS

2.1 SCHEDULED DOOR HARDWARE

- A. Refer to "PART 3 – EXECUTION" for required specification sections.

PART 3 - EXECUTION

3.1 DOOR HARDWARE SETS

- A. The door hardware sets represent the design intent and direction of the owner and architect. They are a guideline only and should not be considered a detailed hardware schedule. Discrepancies, conflicting hardware, and missing items should be brought to the attention of the architect with corrections made prior to the bidding process. Omitted items not included in a hardware set should be scheduled with the appropriate additional hardware required for proper application and functionality.
 - 1. Quantities listed are for each pair of doors, or for each single door.
 - 2. The supplier is responsible for handing and sizing all products.

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3. Where multiple options for a piece of hardware are given in a single line item, the supplier shall provide the appropriate application for the opening.
 4. At existing openings with new hardware, the supplier shall field inspect existing conditions prior to the submittal stage to verify the specified hardware will work as required. Provide alternate solutions and proposals as needed.
- B. Products listed in the hardware sets shall be supplied by and in accordance with the requirements described in the specification section as noted for each item.
1. Section 08 71 00 – Door Hardware.
- C. Manufacturer’s Abbreviations:

1. MK - McKinney
2. PE - Pemko
3. RO - Rockwood
4. SA - SARGENT
5. RF - Rixson
6. OT - Other

Hardware Sets

Set: 1.0

Doors: 16 Doors: 30 [Similar hardware only for 4’x8’ double doors]

6 Hinge, Full Mortise, Ext	TA2314 [NRP]	US32D	MK	087100
2 Flush Bolt	555 (12", 72" A.F.F.)	US26D	RO	087100
1 Dust Proof Strike	570	US26D	RO	087100
1 Storeroom Lock	ML2057 PSF CT6R	626	RU	087100
1 Permanent Core	To Match Existing System	626	RU	087100
2 Heavy Conc OH Stop	1-_36	652	RF	087100
1 Surface Closer	DC6210 A3	689	RU	087100
2 Kick Plate	K1050 8" high CSK BEV	US32D	RO	087100
2 Astragal	303APK		PE	087100
1 Gasketing	Integral In Frame Assembly		OT	
1 Rain Guard	346C (Omit at Overhang)		PE	087100
2 Sweep	18061CNB		PE	087100
1 Threshold	273x224AFGT		PE	087100

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Set: 2.0

Doors: 10

3 Hinge, Full Mortise, Ext	TA2314 [NRP]	US32D	MK	087100
1 Storeroom Lock	ML2057 PSF CT6R	626	RU	087100
1 Permanent Core	To Match Existing System	626	RU	087100
1 Heavy Conc OH Stop	1-_36	652	RF	087100
1 Surface Closer	DC6210 A3	689	RU	087100
1 Kick Plate	K1050 8" high CSK BEV	US32D	RO	087100
1 Gasketing	Integral In Frame Assembly		OT	
1 Rain Guard	346C (Omit at Overhang)		PE	087100
1 Sweep	18061CNB		PE	087100
1 Threshold	273x224AFGT		PE	087100

Set: 3.0

Doors: 11, 12, 13, 14, 15, 17, 18, 19, 20, 21, 22

3 Hinge, Full Mortise, Ext	TA2314 [NRP]	US32D	MK	087100
1 Dormitory Lock	ML2065 PSF M34 V21 CT6R	626	RU	087100
1 Permanent Core	To Match Existing System	626	RU	087100
1 Surface Closer	DC6200 A10	689	RU	087100
1 Wall/Floor Stop	409 [OR] 441	US26D	RO	087100
1 Kick Plate	K1050 8" high CSK BEV	US32D	RO	087100
1 Gasketing	Integral In Frame Assembly		OT	
1 Sweep	18061CNB		PE	087100
1 Threshold	273x224AFGT		PE	087100

Set: 4.0

Doors: 23

3 Hinge, Full Mortise, Int	TA2714 [NRP]	US26D	MK	087100
1 Passage Latch	ML2010 PSF	626	RU	087100
1 Conc Overhead Stop	5-_36	652	RF	087100
1 Surface Closer	DC6200 A10	689	RU	087100
1 Kick Plate	K1050 8" high CSK BEV	US32D	RO	087100
1 Gasketing	S88BL		PE	087100

END OF SECTION 080671

SECTION 081113 - HOLLOW METAL DOORS AND FRAMES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section Includes:

1. Standard and custom hollow metal doors and frames.
2. Louvers installed in hollow metal doors.

B. Related Sections:

1. Division 01 Section "General Conditions".
2. Division 04 Section "Unit Masonry" for embedding anchors for hollow metal work into masonry construction.
3. Division 08 Section "Door Hardware".
4. Division 09 Sections "Exterior Painting" and "Interior Painting" for field painting hollow metal doors and frames.

C. Codes and References: Comply with the version year adopted by the Authority Having Jurisdiction.

1. ANSI/SDI A250.8 - Recommended Specifications for Standard Steel Doors and Frames.
2. ANSI/SDI A250.4 - Test Procedure and Acceptance Criteria for Physical Endurance for Steel Doors, Frames, Frames Anchors and Hardware Reinforcing.
3. ANSI/SDI A250.6 - Recommended Practice for Hardware Reinforcing on Standard Steel Doors and Frames.
4. ANSI/SDI A250.10 - Test Procedure and Acceptance Criteria for Prime Painted Steel Surfaces for Steel Doors and Frames.
5. ANSI/SDI A250.11 - Recommended Erection Instructions for Steel Frames.
6. ASTM A1008 - Standard Specification for Steel Sheet, Cold-Rolled, Carbon, Structural, High-Strength Low-Alloy and High-Strength Low-Alloy with Improved Formability.
7. ASTM A653 - Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process.
8. ANSI/BHMA A156.115 - Hardware Preparation in Steel Doors and Frames.
9. ANSI/SDI 122 - Installation and Troubleshooting Guide for Standard Steel Doors and Frames.

1.3 QUALITY ASSURANCE

- A. Source Limitations: Obtain hollow metal doors and frames through one source from a single manufacturer wherever possible.

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- B. Quality Standard: In addition to requirements specified, furnish SDI-Certified manufacturer products that comply with ANSI/SDI A250.8, latest edition, "Recommended Specifications for Standard Steel Doors and Frames".
- C. Fire-Rated Door Assemblies: Assemblies complying with NFPA 80 that are listed and labeled by a qualified testing agency, for fire-protection ratings indicated, based on testing at positive pressure according to UL10C (neutral pressure at 40" above sill) or UL 10C.

1.4 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 non-vented plastic.
- B. Deliver welded frames with two removable spreader bars across bottom of frames, tack welded to jambs and mullions.
- C. Store hollow metal work 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. Door and frames to be stacked in a vertical upright position.

1.5 PROJECT CONDITIONS

- A. Field Measurements: Verify actual dimensions of openings by field measurements before fabrication.

1.6 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.

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.
- B. Warranty includes installation and finishing that may be required due to repair or replacement of defective doors.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Manufacturers: Subject to compliance with requirements, provide steel doors and frames from a SDI Certified manufacturer:

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1. CECO Door Products (C).
2. Curries Company (CU).

2.2 MATERIALS

- A. Cold-Rolled Steel Sheet: ASTM A 1008/A 1008M, Commercial Steel (CS), Type B; suitable for exposed applications.
- B. Metallic-Coated Steel Sheet: ASTM A 653/A 653M, Commercial Steel (CS), Type B; with minimum G60 (Z180) or A60 (ZF180) metallic coating.
- C. Frame Anchors: ASTM A 653/A 653M, Commercial Steel (CS), Commercial Steel (CS), Type B; with minimum G60 (Z180) or A60 (ZF180) metallic coating.

2.3 HOLLOW METAL DOORS

- A. General: Provide 1-3/4 inch 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 and ANSI/NAAMM HMMA 867.
- B. Exterior Doors (Energy Efficient): Face sheets fabricated of commercial quality hot-dipped zinc coated steel that complies with ASTM A924 A60. Provide doors complying with requirements indicated below by referencing ANSI/SDI A250.8 for level and model, ANSI/SDI A250.4 for physical performance level, and HMMA 867 for door construction.
 1. Design: Flush panel.
 2. Core Construction: Foamed in place polyurethane and steel stiffened laminated core with no stiffener face welds, in compliance with HMMA 867 “Laminated Core”.
 - a. Provide 22-gauge steel stiffeners at 6 inches on-center internally welded at 5" on-center to integral core assembly, foamed in place polyurethane core chemically bonded to all interior surfaces. No stiffener face welding is permitted.
 - b. Thermal properties to rate at a fully operable minimum U-Factor 0.37 and R-Value 2.7, including insulated door, thermal-break frame and threshold.
 - c. Kerf Type Frames: Thermal properties to rate at a fully operable minimum U-Factor 0.38 and R-Value 2.6, including insulated door, kerf type frame, and threshold.
 3. Level/Model: Level 3 and Physical Performance Level A (Extra Heavy Duty), Minimum 16 gauge (0.053 inch - 1.3-mm) thick steel, Model 2.
 4. Vertical Edges: Vertical edges to be mechanically interlocked with hairline seam. Beveled Lock Edge, 1/8 inch in 2 inches (3 mm in 50 mm).
 5. Top and Bottom Edges: Reinforce tops and bottoms of doors with a continuous steel channel not less than 16 gauge, extending the full width of the door and welded to the face sheet. Doors with an inverted top channel to include a steel closure channel, screw attached, with the web of the channel flush with the face sheets of the door. Plastic or composite channel fillers are not acceptable.
 6. Hinge Reinforcement: Minimum 7 gauge (3/16") plate 1-1/4" x 9".
 7. Hardware Reinforcements: Fabricate according to ANSI/SDI A250.6 with reinforcing plates from same material as door face sheets.

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- C. Interior Doors: Face sheets fabricated of commercial quality cold rolled steel that complies with ASTM A 1008/A 1008M. 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. Design: Flush panel.
 2. Core Construction: Manufacturer's standard kraft-paper honeycomb, or one-piece polystyrene core, securely bonded to both faces.
 - a. Fire Door Core: As required to provide fire-protection and temperature-rise ratings indicated.
 3. Level/Model: Level 2 and Physical Performance Level B (Heavy Duty), Minimum 18 gauge (0.042-inch - 1.0-mm) thick steel, Model 2.
 4. Vertical Edges: Vertical edges to have the face sheets spot welded and filled full height with an epoxy filler. Welds are to be ground, filled and dressed smooth. Beveled Lock Edge, 1/8 inch in 2 inches (3 mm in 50 mm).
 5. Top and Bottom Edges: Reinforce tops and bottoms of doors with a continuous steel channel not less than 16 gauge, extending the full width of the door and welded to the face sheet.
 6. Hinge Reinforcement: Minimum 7 gauge (3/16") plate 1-1/4" x 9" or minimum 14 gauge continuous channel with pierced holes, drilled and tapped.
 7. Hardware Reinforcements: Fabricate according to ANSI/SDI A250.6 with reinforcing plates from same material as door face sheets.
- D. Manufacturers Basis of Design:
1. Curries Company (CU) - Polystyrene Core - 707 Series.
 2. Curries Company (CU) - Energy Efficient - 777 Trio-E Series.

2.4 HOLLOW METAL FRAMES

- A. General: Comply with ANSI/SDI A250.8 and with details indicated for type and profile.
- B. Thermal Break Frames: Subject to the same compliance standards and requirements as standard hollow metal frames. Tested for thermal performance in accordance with NFRC 102, and resistance to air infiltration in accordance with NFRC 400. Where indicated provide thermally broken frame profiles available for use in both masonry and drywall construction. Fabricate with 1/16" positive thermal break and integral vinyl weatherstripping.
- C. Exterior Frames: Fabricated of hot-dipped zinc coated steel that complies with ASTM A 653/A 653M, Coating Designation A60.
1. Fabricate frames with mitered or coped corners. Profile as indicated on drawings.
 2. Frames: Minimum 14 gauge (0.067-inch -1.7-mm) thick steel sheet.
 3. Manufacturers Basis of Design:
 - a. Curries Company (CU) – Thermal Break TQ Series.

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- D. Interior Frames: Fabricated from cold-rolled steel sheet that complies with ASTM A 1008/A 1008M.
 - 1. Fabricate frames with mitered or coped corners. Profile as indicated on drawings.
 - 2. Frames: Minimum 16 gauge (0.053-inch -1.3-mm) thick steel sheet.
 - 3. Manufacturers Basis of Design:
 - a. Curries Company (CU) - M Series.
- E. Fire rated frames: Fabricate frames in accordance with NFPA 80, listed and labeled by a qualified testing agency, for fire-protection ratings indicated.
- F. Hardware Reinforcement: Fabricate according to ANSI/SDI A250.6 Table 4 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, formed from A60 metallic coated material, 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 and not less than 0.042 inch thick.
- B. Floor Anchors: Floor anchors to be provided at each jamb, formed from A60 metallic coated material, not less than 0.042 inches thick.
- C. Mortar Guards: Formed from same material as frames, not less than 0.016 inches thick.

2.6 LOUVERS

- A. Metal Louvers: Unless otherwise indicated provide louvers to meet the following requirements.
 - 1. Blade Type: Vision proof inverted V or inverted Y.
 - 2. Metal and Finish: Galvanized steel, 0.040 inch thick, factory primed for paint finish with baked enamel or powder coated finish. Match pre-finished door paint color where applicable.
- B. Louvers for Fire Rated Doors: Metal louvers with fusible link and closing device, listed and labeled for use in doors with fire protection rating of 1-1/2 hours and less.
 - 1. Manufacturers: Subject to compliance with requirements, provide louvers to meet rating indicated.
 - 2. Metal and Finish: Galvanized steel, 0.040 inch thick, factory primed for paint finish with baked enamel or powder coated finish. Match pre-finished door paint color where applicable.

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2.7 ACCESSORIES

- A. Mullions and Transom Bars: Join to adjacent members by welding or rigid mechanical anchors.
- B. Grout Guards: Formed from same material as frames, not less than 0.016 inches thick.

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. When shipping limitations so dictate, frames for large openings are to be fabricated in sections for splicing or splining in the field by others.
- B. Tolerances: Fabricate hollow metal work to tolerances indicated in ANSI/SDI A250.8.
- C. Hollow Metal Doors:
 - 1. Exterior Doors: Provide optional weep-hole openings in bottom of exterior doors to permit moisture to escape where specified.
 - 2. Louvers: Factory cut openings in door and install louvers into prepared openings where indicated.
 - 3. Astragals: Provide overlapping astragals as noted in door hardware sets in Division 08 Section "Door Hardware" on one leaf of pairs of doors where required by NFPA 80 for fire-performance rating or where indicated. Extend minimum 3/4 inch beyond edge of door on which astragal is mounted.
- D. Hollow Metal Frames:
 - 1. Shipping Limitations: 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.
 - 2. Welded Frames: Weld flush face joints continuously; grind, fill, dress, and make smooth, flush, and invisible.
 - a. Welded frames are to be provided with two steel spreaders temporarily attached to the bottom of both jambs to serve as a brace during shipping and handling. Spreader bars are for bracing only and are not to be used to size the frame opening.
 - 3. High Frequency Hinge Reinforcement: Provide high frequency hinge reinforcements at door openings 48-inches and wider with mortise butt type hinges at top hinge locations.
 - 4. Provide countersunk, flat- or oval-head exposed screws and bolts for exposed fasteners unless otherwise indicated for removable stops, provide security screws at exterior locations.
 - 5. Mortar Guards: Provide guard boxes at back of hardware mortises in frames at all hinges and strike preps regardless of grouting requirements.
 - 6. Floor Anchors: Weld anchors to bottom of jambs and mullions with at least four spot welds per anchor.
 - 7. Jamb Anchors: Provide number and spacing of anchors as follows:

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- a. Masonry Type: Locate anchors not more than 18 inches from top and bottom of frame. Space anchors not more than 32 inches o.c. and as follows:
 - 1) Two anchors per jamb up to 60 inches high.
 - 2) Three anchors per jamb from 60 to 90 inches high.
 - 3) Four anchors per jamb from 90 to 120 inches high.
 - 4) Four anchors per jamb plus 1 additional anchor per jamb for each 24 inches or fraction thereof above 120 inches high.
 - b. Stud Wall Type: Locate anchors not more than 18 inches from top and bottom of frame. Space anchors not more than 32 inches o.c. and as follows:
 - 1) Three anchors per jamb up to 60 inches high.
 - 2) Four anchors per jamb from 60 to 90 inches high.
 - 3) Five anchors per jamb from 90 to 96 inches high.
 - 4) Five anchors per jamb plus 1 additional anchor per jamb for each 24 inches or fraction thereof above 96 inches high.
 - 5) Two anchors per head for frames above 42 inches wide and mounted in metal stud partitions.
 8. Door Silencers: Except on weatherstripped or gasketed doors, drill stops to receive door silencers. Silencers to be supplied by frame manufacturer regardless if specified in Division 08 Section "Door Hardware".
 9. Bituminous Coating: Where frames are fully grouted with an approved Portland Cement based grout or mortar, coat inside of frame throat with a water based bituminous or asphaltic emulsion coating to a minimum thickness of 3 mils DFT, tested in accordance with UL 10C and applied to the frame under a 3rd party independent follow-up service procedure.
- E. Hardware Preparation: Factory prepare hollow metal work to receive template 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-template, 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 Finishes: Doors and frames to be cleaned, and chemically treated to insure maximum finish paint adhesion. Surfaces of the door and frame exposed to view to receive a factory applied coat of rust inhibiting shop primer.
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; and compatible with substrate and field-applied coatings.

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. General Contractor to verify the accuracy of dimensions given to the steel door and frame manufacturer for existing openings or existing frames (strike height, hinge spacing, hinge back set, etc.).
- 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 square, level, twist, and plumb condition.
- C. Tolerances shall comply with SDI-117 "Manufacturing Tolerances Standard Steel Doors and Frames."
- D. Drill and tap doors and frames to receive non-template, mortised, and surface-mounted door hardware.
- E. Verify tolerances against manufacturers installations instructions for tornado and hurricane storm shelter openings.

3.3 INSTALLATION

- A. General: Install hollow metal work plumb, rigid, properly aligned, and securely fastened in place; comply with Drawings and manufacturer's written instructions.
- B. Hollow Metal Frames: Install hollow metal frames of size and profile indicated. Comply with ANSI/SDI A250.11 and NFPA 80 at fire rated openings.
 - 1. Set frames accurately in position, plumbed, leveled, aligned, and braced securely until permanent anchors are set. After wall construction is complete and frames properly set and secured, remove temporary braces, leaving surfaces smooth and undamaged. Shim as necessary to comply with installation tolerances.
 - 2. Floor Anchors: Provide floor anchors for each jamb and mullion that extends to floor, and secure with post-installed expansion anchors.
 - 3. Masonry Walls: Coordinate installation of frames to allow for solidly filling space between frames and masonry with mortar.
 - 4. Grout Requirements: Do not grout head of frames unless reinforcing has been installed in head of frame. Do not grout vertical or horizontal closed mullion members.

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- C. Hollow Metal Doors: Fit hollow metal doors accurately in frames, within clearances specified below. Shim as necessary.
 - 1. Non-Fire-Rated Standard Steel Doors:
 - a. Jamb 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.

3.4 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 and Painted Finish Touchup: Immediately after erection, sand smooth rusted or damaged areas of prime coat, or painted finishes, and apply touchup of compatible air drying, rust-inhibitive primer, zinc rich primer (exterior and galvanized openings) or finish paint.

3.5 FIELD QUALITY CONTROL

- A. Field Inspection (Punch Report): Reference Division 01 Sections “Closeout Procedures”. Produce project punch report for each installed door opening indicating compliance with approved submittals and verification hardware is properly installed, operating and adjusted. Include list of items to be completed and corrected, indicating the reasons or deficiencies causing the Work to be incomplete or rejected.
 - 1. Organization of List: Include separate Door Opening and Deficiencies and Corrective Action Lists organized by Mark, Opening Remarks and Comments, and related Opening Images and Video Recordings.

END OF SECTION 081113

SECTION 083113 - ACCESS DOORS AND FRAMES

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes the following:

1. Access doors and frames for walls and ceilings, unless specified elsewhere.

1.2 ACTION SUBMITTALS

A. Product Data: For each type of product.

1. Include construction material descriptions, dimensions of individual components and profiles, and finishes.

1.3 COORDINATION

- A. Verification: Determine specific locations and sizes for access doors needed to gain access to concealed plumbing, mechanical, electrical, or other concealed work, and indicate in the schedule specified in "Submittals" Article.
- B. Where access doors are required for access to electrical junction boxes or panels located above non-accessible ceilings, the subcontractor installing the boxes or panels will be responsible for furnishing access doors or relocate boxes and panels to accessible locations.

PART 2 - PRODUCTS

2.1 ACCESS DOORS AND FRAMES

A. Flush Access Doors with Concealed Flanges (For gypsum board wall):

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. Acudor Products, Inc.
 - b. Larsens Manufacturing Company.
 - c. Milcor; Commercial Products Group of Hart & Cooley, Inc.
 - d. Nystrom, Inc.
2. Basis-of-Design Product: Acudor DW-5040.
3. Description: Face of door flush with frame; with concealed flange for gypsum board installation and concealed hinge.

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4. Locations: Wall (within Elec. Rm on chase wall).
5. Door Size: 24 inches by 36 inches.
6. Aluminum Sheet for Door: Aluminum extrusion 6063-T6. Nominal 0.045 inch, with mill finish to receive wall paint color.
7. Frame Material: Aluminum extrusion 6063-T6 concealed.
8. Latch and Lock: Cylinder lock & key.

2.2 MATERIALS

- A. Aluminum Extrusions: ASTM B221, Alloy 6063.
- B. Aluminum Sheet: ASTM B209, alloy and temper recommended by aluminum producer and finisher for type of use and finish indicated.
- C. Frame Anchors: Same material as door face.
- D. Inserts, Bolts, and Anchor Fasteners: Hot-dip galvanized steel according to ASTM A153/A153M or ASTM F2329.

2.3 FABRICATION

- A. General: Provide access door and frame assemblies manufactured as integral units ready for installation.
- B. Metal Surfaces: For metal surfaces exposed to view in the completed Work, provide materials with smooth, flat surfaces without blemishes. Do not use materials with exposed pitting, seam marks, roller marks, rolled trade names, or roughness.
- C. Doors and Frames: Grind exposed welds smooth and flush with adjacent surfaces. Furnish mounting holes, attachment devices and fasteners of type required to secure access doors to types of supports indicated.
 1. For concealed flanges with drywall bead, provide edge trim for gypsum panels securely attached to perimeter of frames.
- D. Latch and Lock Hardware:
 1. Quantity: Furnish number of latches and locks required to hold doors tightly closed.

2.4 FINISHES

- A. Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for recommendations for applying and designating finishes.
- B. Painted Finishes: Comply with coating manufacturer's written instructions for cleaning, conversion coating, and applying and baking finish.

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1. Factory Primed: Apply manufacturer's standard, lead- and chromate-free, universal primer immediately after surface preparation and pretreatment. Color: White to receive room wall paint finish color.

PART 3 - EXECUTION

3.1 EXAMINATION

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

3.2 INSTALLATION

- A. Comply with manufacturer's written instructions for installing access doors and frames.

3.3 FIELD QUALITY CONTROL

- A. Repair or remove and replace installations where inspections indicate that they do not comply with specified requirements.
- B. Reinspect repaired or replaced installations to determine if replaced or repaired door assembly installations comply with specified requirements.

3.4 ADJUSTING

- A. Adjust doors and hardware, after installation, for proper operation.

END OF SECTION 083113

SECTION 087100 - DOOR HARDWARE

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. This Section includes commercial door hardware for the following:
 - 1. Swinging doors.
 - 2. Other doors to the extent indicated.
- B. Door hardware includes, but is not necessarily limited to, the following:
 - 1. Mechanical door hardware.
 - 2. Cylinders specified for doors in other sections.
- C. Related Sections:
 - 1. Division 08 Section “Hollow Metal Doors and Frames”.
- D. Codes and References: Comply with the version year adopted by the Authority Having Jurisdiction.
 - 1. ANSI A117.1 - Accessible and Usable Buildings and Facilities.
 - 2. ICC/IBC - International Building Code.
 - 3. NFPA 80 - Fire Doors and Windows.
 - 4. NFPA 101 - Life Safety Code.
 - 5. NFPA 105 - Installation of Smoke Door Assemblies.
 - 6. State Building Codes, Local Amendments.
- E. Standards: All hardware specified herein shall comply with the following industry standards as applicable. Any undated reference to a standard shall be interpreted as referring to the latest edition of that standard:
 - 1. ANSI/BHMA Certified Product Standards - A156 Series.
 - 2. UL10C - Positive Pressure Fire Tests of Door Assemblies.
 - 3. ANSI/UL 294 - Access Control System Units.
 - 4. UL 305 - Panic Hardware.
 - 5. ANSI/UL 437- Key Locks.

1.3 SUBMITTALS

- A. Product Data: Manufacturer's product data sheets including installation details, material descriptions, dimensions of individual components and profiles, operational descriptions and finishes.
- B. Door Hardware Schedule: Prepared by or under the supervision of supplier, detailing, fabrication and assembly of door hardware, as well as procedures and diagrams. Coordinate the final Door Hardware Schedule with doors, frames, and related work to ensure proper size, thickness, hand, function, and finish of door hardware.
 - 1. Format: Comply with scheduling sequence and vertical format in DHI's "Sequence and Format for the Hardware Schedule."
 - 2. Organization: Organize the Door Hardware Schedule into door hardware sets indicating complete designations of every item required for each door or opening. Organize door hardware sets in same order as in the Door Hardware Sets at the end of Part 3. Submittals that do not follow the same format and order as the Door Hardware Sets will be rejected and subject to resubmission.
 - 3. Content: Include the following information:
 - a. Type, style, function, size, label, hand, and finish of each door hardware item.
 - b. Manufacturer of each item.
 - c. Fastenings and other pertinent information.
 - d. Location of door hardware set, cross-referenced to Drawings, both on floor plans and in door and frame schedule.
 - e. Explanation of abbreviations, symbols, and codes contained in schedule.
 - f. Mounting locations for door hardware.
 - g. Door and frame sizes and materials.
 - h. Warranty information for each product.
 - 4. Submittal Sequence: Submit the final Door Hardware Schedule at earliest possible date, particularly where approval of the Door Hardware Schedule must precede fabrication of other work that is critical in the Project construction schedule. Include Product Data, Samples, Shop Drawings of other work affected by door hardware, and other information essential to the coordinated review of the Door Hardware Schedule.
- C. Keying Schedule: After a keying meeting with the Owner has taken place prepare a separate keying schedule detailing final instructions. Submit the keying schedule in electronic format. Include keying system explanation, door numbers, key set symbols, hardware set numbers and special instructions. Owner must approve submitted keying schedule prior to the ordering of permanent cylinders/cores.
- D. Product Test Reports: Indicating compliance with cycle testing requirements, based on evaluation of comprehensive tests performed by manufacturer and witnessed by a qualified independent testing agency.
- E. Operating and Maintenance Manuals: Provide manufacturers operating and maintenance manuals for each item comprising the complete door hardware installation in quantity as required in Division 01, Closeout Procedures.

- F. Warranties and Maintenance: Special warranties and maintenance agreements specified in the Related Sections.

1.4 QUALITY ASSURANCE

- A. Manufacturers Qualifications: Engage qualified manufacturers with a minimum 5 years of documented experience in producing hardware and equipment similar to that indicated for this Project and that have a proven record of successful in-service performance.
- B. Certified Products: Where specified, products must maintain a current listing in the Builders Hardware Manufacturers Association (BHMA) Certified Products Directory (CPD).
- C. Installer Qualifications: A minimum 3 years documented experience installing standard door hardware similar in material, design, and extent to that indicated for this Project and whose work has resulted in construction with a record of successful in-service performance.
- D. Door Hardware Supplier Qualifications: Experienced commercial door hardware distributors with a minimum 5 years documented experience supplying both mechanical and electromechanical hardware installations comparable in material, design, and extent to that indicated for this Project. Supplier recognized as a factory direct distributor by the manufacturers of the primary materials with a warehousing facility in Project's vicinity. Supplier to have on staff a certified Architectural Hardware Consultant (AHC) available during the course of the Work to consult with Contractor, Architect, and Owner concerning standard door hardware and keying.
- E. Source Limitations: Obtain each type and variety of door hardware specified in this section from a single source unless otherwise indicated.
- F. Each unit to bear third party permanent label indicating compliance with the referenced testing standards.
- G. Keying Conference: Conduct conference to comply with requirements in Division 01 Section "Project Meetings." Keying conference to incorporate the following criteria into the final keying schedule document:
 - 1. Function of building, purpose of each area and degree of security required.
 - 2. Plans for existing and future key system expansion.
 - 3. Requirements for key control storage and software.
 - 4. Installation of permanent keys, cylinder cores and software.
 - 5. Address and requirements for delivery of keys.
- H. At completion of installation, provide written documentation that components were applied according to manufacturer's instructions and recommendations and according to approved schedule.

1.5 DELIVERY, STORAGE AND HANDLING

- A. Inventory door hardware on receipt and provide secure lock-up and shelving for door hardware delivered to Project site.

- B. Tag each item or package separately with identification related to the final Door Hardware Schedule, and include basic installation instructions with each item or package.
- C. Deliver, as applicable, permanent keys, cylinders, cores, access control credentials, and related accessories directly to Owner via registered mail or overnight package service. Instructions for delivery to the Owner shall be established at the "Keying Conference".

1.6 COORDINATION

- A. Templates: Obtain and distribute to the parties involved templates for doors, frames, and other work specified to be factory prepared for installing standard hardware. Check Shop Drawings of other work to confirm that adequate provisions are made for locating and installing hardware to comply with indicated requirements.
- B. Door and Frame Preparation: Doors and corresponding frames are to be prepared and reinforced to receive the installation of the specified hardware without additional in-field modifications.

1.7 WARRANTY

- A. General Warranty: Reference Division 01, General Requirements. Special warranties specified in this Article shall not deprive Owner of other rights Owner may have under other provisions of the Contract Documents and shall be in addition to, and run concurrent with, other warranties made by Contractor under requirements of the Contract Documents.
- B. Warranty Period: Written warranty, executed by manufacturer(s), agreeing to repair or replace components of standard and electrified door hardware that fails in materials or workmanship within specified warranty period after final acceptance by the Owner. Failures include, but are not limited to, the following:
 - 1. Structural failures including excessive deflection, cracking, or breakage.
 - 2. Faulty operation of the hardware.
 - 3. Deterioration of metals, metal finishes, and other materials beyond normal weathering.

Warranty Period: Unless otherwise indicated, warranty shall be one year from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 SCHEDULED DOOR HARDWARE

- A. General: Provide door hardware for each door to comply with requirements in Door Hardware Sets and each referenced section that products are to be supplied under.
- B. Designations: Requirements for quantity, item, size, finish or color, grade, function, and other distinctive qualities of each type of door hardware are indicated in the Door Hardware Sets at the end of Part 3. Products are identified by using door hardware designations, as follows:

1. Named Manufacturer's Products: Product designation and manufacturer are listed for each door hardware type required for the purpose of establishing requirements. Manufacturers' names are abbreviated in the Door Hardware Schedule.
- C. Substitutions: Requests for substitution and product approval for inclusive mechanical and electromechanical door hardware in compliance with the specifications must be submitted in writing and in accordance with the procedures and time frames outlined in Division 01, Substitution Procedures. Approval of requests is at the discretion of the architect, Owner, and their designated consultants.

2.2 BUTT HINGES

- A. Hinges: ANSI/BHMA A156.1 butt hinges with number of hinge knuckles and other options as specified in the Door Hardware Sets.
 1. Quantity: Provide the following hinge quantity:
 - a. Two Hinges: For doors with heights up to 60 inches.
 - b. Three Hinges: For doors with heights 61 to 90 inches.
 - c. Four Hinges: For doors with heights 91 to 120 inches.
 - d. For doors with heights more than 120 inches, provide 4 hinges, plus 1 hinge for every 30 inches of door height greater than 120 inches.
 2. Hinge Size: Provide the following, unless otherwise indicated, with hinge widths sized for door thickness and clearances required:
 - a. Widths up to 3'0": 4-1/2" standard or heavy weight as specified.
 - b. Sizes from 3'1" to 4'0": 5" standard or heavy weight as specified.
 3. Hinge Weight and Base Material: Unless otherwise indicated, provide the following:
 - a. Exterior Doors: Heavy weight, non-ferrous, ball bearing or oil impregnated bearing hinges unless Hardware Sets indicate standard weight.
 - b. Interior Doors: Standard weight, steel, ball bearing or oil impregnated bearing hinges unless Hardware Sets indicate heavy weight.
 4. Hinge Options: Comply with the following:
 - a. Non-removable Pins: With the exception of electric through wire hinges, provide set screw in hinge barrel that, when tightened into a groove in hinge pin, prevents removal of pin while door is closed; for the all out-swinging lockable doors.
 5. Manufacturers:
 - a. McKinney (MK) - TA/T4A Series, 5-knuckle.

2.3 DOOR OPERATING TRIM

- A. Flush Bolts and Surface Bolts: Provide products conforming to ANSI/BHMA A156.3 and A156.16, Grade 1.
 - 1. Flush bolts to be furnished with top rod of sufficient length to allow bolt retraction device location approximately six feet from the floor.
 - 2. Furnish dust proof strikes for bottom bolts.
 - 3. Surface bolts to be minimum 8” in length and U.L. listed for labeled fire doors and U.L. listed for windstorm components where applicable.
 - 4. Provide related accessories (mounting brackets, strikes, coordinators, etc.) as required for appropriate installation and operation.
 - 5. Manufacturers:
 - a. Rockwood (RO).

2.4 CYLINDERS AND KEYING

- A. General: Cylinder manufacturer to have minimum (10) years of experience designing secured master key systems and have on record a published security keying system policy.
- B. Cylinder Types: Original manufacturer cylinders able to supply the following cylinder formats and types:
 - 1. Threaded mortise cylinders with rings and cams to suit hardware application.
 - 2. Rim cylinders with back plate, flat-type vertical or horizontal tailpiece, and raised trim ring.
 - 3. Bored or cylindrical lock cylinders with tailpieces as required to suit locks.
 - 4. Tubular deadlocks and other auxiliary locks.
 - 5. Mortise and rim cylinder collars to be solid and recessed to allow the cylinder face to be flush and be free spinning with matching finishes.
 - 6. Keyway: Match Facility Standard.
- C. Large Format Interchangeable Cores: Provide removable cores (LFIC) as specified, core insert, removable by use of a special key, and for use with only the core manufacturer's cylinder and door hardware.
- D. Keying System: Each type of lock and cylinders to be factory keyed.
 - 1. Supplier shall conduct a "Keying Conference" to define and document keying system instructions and requirements.
 - 2. Furnish factory cut, nickel-silver large bow permanently inscribed with a visual key control number as directed by Owner.
 - 3. Existing System: Field verify and key cylinders to match Owner's existing system.
- E. Key Quantity: Provide the following minimum number of keys:
 - 1. Change Keys per Cylinder: Two (2)
 - 2. Master Keys (per Master Key Level/Group): Five (5).

3. Construction Control Keys (where required): Two (2).
4. Permanent Control Keys (where required): Two (2).

F. Construction Keying: Provide temporary keyed construction cores.

G. Key Registration List (Bitting List):

1. Provide keying transcript list to Owner's representative in the proper format for importing into key control software.
2. Provide transcript list in writing or electronic file as directed by the Owner.

2.5 MORTISE LOCKS AND LATCHING DEVICES

A. Mortise Locksets, Grade 1 (Heavy Duty): Provide ANSI/BHMA A156.13, Series 1000, Operational Grade 1 Certified Products Directory (CPD) listed mortise locksets. Listed manufacturers shall meet all functions and features as specified herein.

1. Manufacturers:
 - a. Corbin Russwin Hardware (RU) - ML2000 Series.

2.6 DEADLOCKS AND LATCHES

A. Mortise Deadlocks, Small Case: ANSI/BHMA A156.36, Grade 1, small case mortise type deadlocks constructed of heavy gauge wrought corrosion resistant steel. Steel or stainless steel bolts with a 1" throw and hardened steel roller pins. Deadlocks to be products of the same source manufacturer and keyway as other specified locksets.

1. Manufacturers:
 - a. Corbin Russwin Hardware (RU) - DL4000 Series.

2.7 LOCK AND LATCH STRIKES

A. Strikes: Provide manufacturer's standard strike with strike box for each latch or lock bolt, with curved lip extended to protect frame, finished to match door hardware set, unless otherwise indicated, and as follows:

1. Flat-Lip Strikes: For locks with three-piece antifriction latchbolts, as recommended by manufacturer.
2. Extra-Long-Lip Strikes: For locks used on frames with applied wood casing trim.
3. Aluminum-Frame Strike Box: Provide manufacturer's special strike box fabricated for aluminum framing.
4. Double-lipped strikes: For locks at double acting doors. Furnish with retractable stop for rescue hardware applications.

B. Standards: Comply with the following:

1. Strikes for Mortise Locks and Latches: BHMA A156.13.

2. Strikes for Bored Locks and Latches: BHMA A156.2.
3. Strikes for Auxiliary Deadlocks: BHMA A156.36.
4. Dustproof Strikes: BHMA A156.16.

2.8 DOOR CLOSERS

A. All door closers specified herein shall meet or exceed the following criteria:

1. General: Door closers to be from one manufacturer, matching in design and style, with the same type door preparations and templates regardless of application or spring size. Closers to be non-handed with full sized covers.
2. Standards: Closers to comply with UL-10C for Positive Pressure Fire Test and be U.L. listed for use of fire rated doors.
3. Size of Units: Comply with manufacturer's written recommendations for sizing of door closers depending on size of door, exposure to weather, and anticipated frequency of use. Where closers are indicated for doors required to be accessible to the Americans with Disabilities Act, provide units complying with ANSI ICC/A117.1.
4. Closer Arms: Provide heavy duty, forged steel closer arms unless otherwise indicated in Hardware Sets.
5. Closers shall not be installed on exterior side of doors; where possible install closers on door for optimum aesthetics.
6. Closer Accessories: Provide door closer accessories including custom templates, special mounting brackets, spacers and drop plates as required for proper installation. Provide through-bolt and security type fasteners as specified in the hardware sets.

B. Door Closers, Surface Mounted (Commercial Duty): ANSI/BHMA 156.4, Grade 1 Certified Products Directory (CPD) listed surface mounted, institutional grade door closers with complete spring power adjustment, sizes 1 thru 6; and fully operational adjustable according to door size, frequency of use, and opening force. Closers to be rack and pinion type, one piece cast iron or aluminum alloy body construction, with adjustable backcheck, closing sweep, and latch speed control valves. Provide non-handed units standard.

1. Manufacturers:
 - a. Corbin Russwin Hardware (RU) - DC6000 Series.

2.9 ARCHITECTURAL TRIM

A. Door Protective Trim

1. General: Door protective trim units to be of type and design as specified below or in the Hardware Sets.
2. Size: Fabricate protection plates (kick, armor, or mop) not more than 2" less than door width (LDW) on stop side of single doors and 1" LDW on stop side of pairs of doors, and not more than 1" less than door width on pull side. Coordinate and provide proper width and height as required where conflicting hardware dictates. Height to be as specified in the Hardware Sets.

3. Where plates are applied to fire rated doors with the top of the plate more than 16” above the bottom of the door, provide plates complying with NFPA 80. Consult manufacturer’s catalog and template book for specific requirements for size and applications.
4. Protection Plates: ANSI/BHMA A156.6 protection plates (kick, armor, or mop), fabricated from the following:
 - a. Stainless Steel: 300 grade, 050-inch thick.
5. Options and fasteners: Provide manufacturer's designated fastener type as specified in the Hardware Sets. Provide countersunk screw holes.
6. Manufacturers:
 - a. Rockwood (RO).

2.10 DOOR STOPS AND HOLDERS

- A. General: Door stops and holders to be of type and design as specified below or in the Hardware Sets.
- B. Door Stops and Bumpers: ANSI/BHMA A156.16, Grade 1 door stops and wall bumpers. Provide wall bumpers, either convex or concave types with anchorage as indicated, unless floor or other types of door stops are specified in Hardware Sets. Do not mount floor stops where they will impede traffic. Where floor or wall bumpers are not appropriate, provide overhead type stops and holders.
 1. Manufacturers:
 - a. Rockwood (RO).
- C. Overhead Door Stops and Holders: ANSI/BHMA A156.8, Grade 1 Certified Products Directory (CPD) listed overhead stops and holders to be surface or concealed types as indicated in Hardware Sets. Track, slide, arm and jamb bracket to be constructed of extruded bronze and shock absorber spring of heavy tempered steel. Provide non-handed design with mounting brackets as required for proper operation and function.
 1. Manufacturers:
 - a. Norton Rixson (RF).

2.11 ARCHITECTURAL SEALS

- A. General: Thresholds, weatherstripping, and gasket seals to be of type and design as specified below or in the Hardware Sets. Provide continuous weatherstrip gasketing on exterior doors and provide smoke, light, or sound gasketing on interior doors where indicated. At exterior applications provide non-corrosive fasteners and elsewhere where indicated.
- B. Fire Labeled Gasketing: Assemblies complying with NFPA 80 that are listed and labeled by a testing and inspecting agency acceptable to authorities having jurisdiction, for fire ratings indicated, based on testing according to UL-10C.

1. Provide intumescent seals as indicated to meet UL10C Standard for Positive Pressure Fire Tests of Door Assemblies, and NFPA 252, Standard Methods of Fire Tests of Door Assemblies.

C. Replaceable Seal Strips: Provide only those units where resilient or flexible seal strips are easily replaceable and readily available from stocks maintained by manufacturer.

D. Manufacturers:

1. Pemko (PE).

2.12 FABRICATION

A. Fasteners: Provide door hardware manufactured to comply with published templates generally prepared for machine, wood, and sheet metal screws. Provide screws according to manufacturers recognized installation standards for application intended.

2.13 FINISHES

A. Standard: Designations used in the Hardware Sets and elsewhere indicate hardware finishes complying with ANSI/BHMA A156.18, including coordination with traditional U.S. finishes indicated by certain manufacturers for their products.

B. Provide quality of finish, including thickness of plating or coating (if any), composition, hardness, and other qualities complying with manufacturer's standards, but in no case less than specified by referenced standards for the applicable units of hardware

C. Protect mechanical finishes on exposed surfaces from damage by applying a strippable, temporary protective covering before shipping.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine scheduled openings, with Installer present, for compliance with requirements for installation tolerances, labeled fire door assembly construction, wall and floor construction, and other conditions affecting performance.

B. Notify architect of any discrepancies or conflicts between the door schedule, door types, drawings and scheduled hardware. Proceed only after such discrepancies or conflicts have been resolved in writing.

3.2 PREPARATION

A. Hollow Metal Doors and Frames: Comply with ANSI/DHI A115 series.

3.3 INSTALLATION

- A. Install each item of mechanical hardware to comply with manufacturer's written instructions and according to specifications.
 - 1. Installers are to be trained and certified by the manufacturer on the proper installation and adjustment of fire, life safety, and security products including: hanging devices; locking devices; closing devices; and seals.
- B. Mounting Heights: Mount door hardware units at heights indicated in following applicable publications, unless specifically indicated or required to comply with governing regulations:
 - 1. Standard Steel Doors and Frames: DHI's "Recommended Locations for Architectural Hardware for Standard Steel Doors and Frames."
 - 2. DHI TDH-007-20: Installation Guide for Doors and Hardware.
 - 3. Where indicated to comply with accessibility requirements, comply with ANSI A117.1 "Accessibility Guidelines for Buildings and Facilities."
 - 4. Provide blocking in drywall partitions where wall stops or other wall mounted hardware is located.
- C. Retrofitting: Install door hardware to comply with manufacturer's published templates and written instructions. Where cutting and fitting are required to install door hardware onto or into surfaces that are later to be painted or finished in another way, coordinate removal, storage, and reinstallation of surface protective trim units with finishing work specified in Division 9 Sections. Do not install surface-mounted items until finishes have been completed on substrates involved.
- D. Thresholds: Set thresholds for exterior and acoustical doors in full bed of sealant complying with requirements specified in Division 7 Section "Joint Sealants."
- E. Storage: Provide a secure lock up for hardware delivered to the project but not yet installed. Control the handling and installation of hardware items so that the completion of the work will not be delayed by hardware losses before and after installation.

3.4 FIELD QUALITY CONTROL

- A. Field Inspection (Punch Report): Reference Division 01 Sections "Closeout Procedures". Produce project punch report for each installed door opening indicating compliance with approved submittals and verification hardware is properly installed, operating and adjusted. Include list of items to be completed and corrected, indicating the reasons or deficiencies causing the Work to be incomplete or rejected.
 - 1. Organization of List: Include separate Door Opening and Deficiencies and Corrective Action Lists organized by Mark, Opening Remarks and Comments, and related Opening Images and Video Recordings.

3.5 ADJUSTING

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

3.6 CLEANING AND PROTECTION

- A. Protect all hardware stored on construction site in a covered and dry place. Protect exposed hardware installed on doors during the construction phase. Install any and all hardware at the latest possible time frame.
- B. Clean adjacent surfaces soiled by door hardware installation.
- C. Clean operating items as necessary to restore proper finish. Provide final protection and maintain conditions that ensure door hardware is without damage or deterioration at time of owner occupancy.

3.7 DEMONSTRATION

- A. Instruct Owner's maintenance personnel to adjust, operate, and maintain mechanical door hardware.

3.8 DOOR HARDWARE SETS

- A. The hardware sets represent the design intent and direction of the Owner and architect. They are a guideline only and should not be considered a detailed hardware schedule. Discrepancies, conflicting hardware and missing items should be brought to the attention of the architect with corrections made prior to the bidding process. Omitted items not included in a hardware set should be scheduled with the appropriate additional hardware required for proper application and functionality.
 - 1. Quantities listed are for each pair of doors, or for each single door.
 - 2. The supplier is responsible for handing and sizing all products.
 - 3. Where multiple options for a piece of hardware are given in a single line item, the supplier shall provide the appropriate application for the opening.
 - 4. At existing openings with new hardware the supplier shall field inspect existing conditions prior to the submittal stage to verify the specified hardware will work as required. Provide alternate solutions and proposals as needed.

END OF SECTION 087100

SECTION 089119 - FIXED LOUVERS

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. Fixed extruded-aluminum louvers.

1.3 ACTION SUBMITTALS

- A. Product Data: For each type of product.
 - 1. For louvers specified to bear AMCA seal, include printed catalog pages showing specified models with appropriate AMCA Certified Ratings Seals.
- B. Shop Drawings: For louvers and accessories. Include plans, elevations, sections, details, and attachments to other work. Show frame profiles and blade profiles, angles, and spacing.
 - 1. Show weep paths, gaskets, flashings, sealants, and other means of preventing water intrusion.
 - 2. Show mullion profiles and locations.
- C. Samples: For each type of metal finish required.
- D. Delegated-Design Submittal: For louvers indicated to comply with structural performance requirements and design criteria, including analysis data signed and sealed by the qualified professional engineer responsible for their preparation.

1.4 INFORMATIONAL SUBMITTALS

- A. Product Test Reports: Based on evaluation of comprehensive tests performed according to AMCA 500-L by a qualified testing agency or by manufacturer and witnessed by a qualified testing agency, for each type of louver and showing compliance with performance requirements specified.
- B. Windborne-debris-impact-resistance test reports.
- C. Sample Warranties: For manufacturer's special warranties.

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1.5 QUALITY ASSURANCE

A. Welding Qualifications: Qualify procedures and personnel according to the following:

1. AWS D1.2/D1.2M, "Structural Welding Code - Aluminum."

1.6 FIELD CONDITIONS

A. Field Measurements: Verify actual dimensions of openings by field measurements before fabrication.

1.7 WARRANTY

A. Special Finish Warranty: Manufacturer agrees to repair or replace components on which finishes fail in materials or workmanship within specified warranty period.

1. Deterioration includes, but is not limited to, the following:
 - a. Color fading more than 5 Hunter units when tested according to ASTM D2244.
 - b. Chalking in excess of a No. 8 rating when tested according to ASTM D4214.
 - c. Cracking, checking, peeling, or failure of paint to adhere to bare metal.
2. Warranty Period: 10 years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Source Limitations: Obtain fixed louvers from single source from a single manufacturer where indicated to be of same type, design, or factory-applied color finish to match metal roof color.

B. Basis-of-Design Products:

1. Wind-driven Rain Louver Series, Model E4WH, by Architectural Louvers, Cincinnati, OH; Contact: (888) 568-8371.

2.2 PERFORMANCE REQUIREMENTS

A. Delegated Design: Design louvers, including comprehensive engineering analysis by a qualified professional engineer, using structural performance requirements and design criteria indicated.

B. Structural Performance: Louvers shall withstand the effects of gravity loads and the following loads and stresses within limits and under conditions indicated without permanent deformation of louver components, noise or metal fatigue caused by louver-blade rattle or flutter, or permanent damage to fasteners and anchors. Wind pressures shall be considered to act normal to the face of the building.

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1. Wind Loads: Determine loads based on pressures as indicated on Drawings.
 2. Wind Loads: Determine loads based on a uniform pressure of 20 lbf/sq. ft. (957 Pa) acting inward or outward.
- C. Windborne-Debris-Impact Resistance: Louvers located within 30 feet (9.1 m) of grade shall pass basic protection, when tested according to AMCA 540.
- D. Louver Performance Ratings: Provide louvers complying with requirements specified, as demonstrated by testing manufacturer's stock units identical to those provided, except for length and width according to AMCA 500-L.
- E. Thermal Movements: Allow for thermal movements from ambient and surface temperature changes.
1. Temperature Change (Range): 120 deg F (67 deg C), ambient.
- F. SMACNA Standard: Comply with recommendations in SMACNA's "Architectural Sheet Metal Manual" for fabrication, construction details, and installation procedures.

2.3 FIXED EXTRUDED-ALUMINUM LOUVERS

- A. Horizontal, Wind-Driven-Rain-Resistant and Sight-Proof Louver:
1. Basis-of-Design: Model 4WH: Architectural Louvers, Cincinnati, OH.
 2. Louver Depth: 4 inches (100 mm).
 3. Frame and Blade Nominal Thickness: Not less than 0.060 inch (1.52 mm) for blades and 0.080 inch (2.03 mm) for frames.
 4. Louver Performance Ratings:
 - a. Free Area: Not less than 50% for 84-inch- (2134-mm-) wide by 18-inch- (457-mm) high louver.
 - b. Air Performance: Not more than 0.25-inch wg (62-Pa) static pressure drop at 1200 fpm free-area intake velocity.
 - c. Wind-Driven Rain Performance: Not less than 99 percent effectiveness when subjected to a rainfall rate of 3 inches (75 mm) per hour and a wind speed of 29 mph (13 m/s) at a core-area intake velocity of 1250 pfm.
 5. AMCA Seal: Mark units with AMCA Certified Ratings Seal.

2.4 LOUVER SCREENS

- A. General: Provide screen at each exterior louver.
1. Screen Location for Fixed Louvers: Interior face.
 2. Screening Type: Bird and Insect screening.
- B. Secure screen frames to louver frames with machine screws with heads finished to match louver, spaced a maximum of 6 inches (150 mm) from each corner and at 12 inches (300 mm) o.c.
- C. Louver Screen Frames: Fabricate with mitered corners to louver sizes indicated.

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1. Metal: Same type and form of metal as indicated for louver to which screens are attached.
2. Finish: Mill finish unless otherwise indicated.
3. Type: Rewirable frames with a driven spline or insert.

D. Louver Screening for Aluminum Louvers:

1. Bird Screening: Aluminum, 3/4-inch- (19-mm-) square mesh, 0.063-inch (1.60-mm) wire.
2. Insect Screening: Aluminum, 18-by-16 (1.4-by-1.6-mm) mesh, 0.012-inch (0.30-mm) wire.

2.5 MATERIALS

- A. Aluminum Extrusions: ASTM B221 (ASTM B221M), Alloy 6063-T5, T-52, or T6.
- B. Aluminum Sheet: ASTM B209 (ASTM B209M), Alloy 3003 or 5005, with temper as required for forming, or as otherwise recommended by metal producer for required finish.
- C. Fasteners: Use types and sizes to suit unit installation conditions.
 1. Use hex-head or Phillips pan-head screws for exposed fasteners unless otherwise indicated.
 2. For fastening aluminum, use aluminum or 300 series stainless-steel fasteners.
 3. For fastening stainless steel, use 300 series stainless-steel fasteners.
 4. For color-finished louvers, use fasteners with heads that match the color of louvers.

2.6 FABRICATION

- A. Factory assemble louvers to minimize field splicing and assembly. Disassemble units as necessary for shipping and handling limitations. Clearly mark units for reassembly and coordinated installation.
- B. Maintain equal louver blade spacing, to produce uniform appearance.
- C. Fabricate frames, including integral sills, to fit in openings of sizes indicated, with allowances made for fabrication and installation tolerances, adjoining material tolerances, and perimeter sealant joints.
 1. Frame Type: Exterior flange unless otherwise indicated.
- D. Include supports, anchorages, and accessories required for complete assembly.
- E. Provide vertical mullions of type and at spacings indicated, but not more than is recommended by manufacturer, or 72 inches (1830 mm) o.c., whichever is less.
 1. Exposed Mullions: Where indicated, provide units with exposed mullions of same width and depth as louver frame. Where length of louver exceeds fabrication and handling limitations, provide interlocking split mullions designed to permit expansion and contraction.
- F. Provide subsills made of same material as louvers for recessed louvers.

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- G. Join frame members to each other and to fixed louver blades with fillet welds as standard with louver manufacturer unless otherwise indicated or size of louver assembly makes bolted connections between frame members necessary.

2.7 ALUMINUM FINISHES

- A. Finish louvers after assembly.
- B. High-Performance Organic Finish: Two-coat fluoropolymer finish complying with AAMA 2605 and containing not less than 70 percent PVDF resin by weight in color coat. Prepare, pretreat, and apply coating to exposed metal surfaces to comply with coating and resin manufacturers' written instructions.
 - 1. Color and Gloss: As selected by Architect from manufacturer's full range and to match roof metal and break metal trim color.

PART 3 - EXECUTION

3.1 EXAMINATION

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

3.2 PREPARATION

- A. Coordinate setting drawings, diagrams, templates, instructions, and directions for installation of anchorages that are to be embedded in concrete or masonry construction. Coordinate delivery of such items to Project site.

3.3 INSTALLATION

- A. Locate and place louvers level, plumb, and at indicated alignment with adjacent work.
- B. Use concealed anchorages where possible. Provide brass washers fitted to screws where required to protect metal surfaces.
- C. Form closely fitted joints with exposed connections accurately located and secured.
- D. Provide perimeter reveals and openings of uniform width for sealants and joint fillers, as indicated.
- E. Protect unpainted galvanized- and nonferrous-metal surfaces that are in contact with concrete, masonry, or dissimilar metals from corrosion and galvanic action by applying a heavy coating of bituminous paint or by separating surfaces with waterproof gaskets or nonmetallic flashing.

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- F. Install concealed gaskets, flashings, joint fillers, and insulation as louver installation progresses, where weather-tight louver joints are required. Comply with Section 079200 "Joint Sealants" for sealants applied during louver installation.

3.4 ADJUSTING AND CLEANING

- A. Clean exposed louver surfaces that are not protected by temporary covering, to remove fingerprints and soil during construction period. Do not let soil accumulate during construction period.
- B. Before final inspection, clean exposed surfaces with water and a mild soap or detergent not harmful to finishes. Thoroughly rinse surfaces and dry.
- C. Restore louvers damaged during installation and construction, so no evidence remains of corrective work. If results of restoration are unsuccessful, as determined by Architect, remove damaged units, and replace with new units.
 - 1. Touch up minor abrasions in finishes with air-dried coating that matches color and gloss of, and is compatible with, factory-applied finish coating.

END OF SECTION 089119

SECTION 092900 - GYPSUM BOARD

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Fire-Rated, Mold & Moisture-Resistant Gypsum Board for interior application.

1.2 ACTION SUBMITTALS

A. Product Data: For the following:

1. Glass-mat, mold- and water-resistant, fire-rated gypsum board.
2. Interior trim.
3. Joint treatment materials.

B. Drawings: Submit drawings indicating locations of control joints.

C. Samples for Verification: For the following products:

1. Trim Accessories: Full-size Sample in 12-inch-long length for each trim accessory indicated.

1.3 DELIVERY, STORAGE AND HANDLING

- A. Store materials inside under cover and keep them dry and protected against weather, condensation, direct sunlight, construction traffic, and other potential causes of damage. Stack panels flat and supported on risers on a flat platform to prevent sagging.

1.4 FIELD CONDITIONS

- A. Environmental Limitations: Comply with ASTM C840 requirements or gypsum board manufacturer's written instructions, whichever are more stringent.

1. Room temperature shall be maintained at not less than 40 °F (4 °C) during application of gypsum board except when adhesive is used for the attachment of gypsum board. For the bonding of adhesive, joint treatment, texturing, and decoration, the room temperature shall be maintained at not less than 50 °F (10 °C) for 48 h prior to application and continuously thereafter until completely dry.
2. Adequate ventilation shall be maintained in the working area during the installation and curing period.
3. Gypsum board shall be protected from direct exposure to rain, snow, sunlight, or other excessive weather conditions.

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4. Where manufacturers' recommendations differ from the above, follow their recommendations.
- B. Do not install panels that are wet, moisture damaged, and mold damaged.
1. Indications that panels are wet, or moisture damaged include, but are not limited to, discoloration, sagging, or irregular shape.
 2. Indications that panels are mold damaged include, but are not limited to, fuzzy or splotchy surface contamination and discoloration.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
1. CertainTeed Corp.
 2. Georgia-Pacific.
 3. National Gypsum Company.
 4. USG Corporation.

2.2 PERFORMANCE REQUIREMENTS

- A. Fire-Resistance-Rated Assemblies: For fire-resistance-rated assemblies, provide materials and construction identical to those tested in assembly indicated according to ASTM E119 by an independent testing agency.

2.3 GYPSUM BOARD, GENERAL

- A. Size: Provide maximum lengths and widths available that will minimize joints in each area and that correspond with the support system indicated.

2.4 INTERIOR GYPSUM BOARD

- A. Fire-Rated, Mold-Resistant, Glass Mat Gypsum Board: ASTM C1396/C1396M. With moisture- and mold-resistant core and fiberglass mat surfaces both sides.
1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. CertainTeed Corporation; GlasRoc TypeX Sheathing.
 - b. Georgia-Pacific; ToughRock TypeX.
 - c. National Gypsum Company; Gold Bond EXP Extended Exposure Sheathing.
 - d. United States Gypsum Company; Securock FirecodeX Sheathing.

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2. Material.
 - a. Core: 5/8 inch.
 - b. Long Edges: Tapered.
 - c. Mold Resistance: ASTM D3273, score of 10 as rated according to ASTM D3274.

2.5 TRIM ACCESSORIES

- A. Interior Trim: ASTM C1047.
 1. Material:
 - a. Galvanized or aluminum-coated steel sheet or rolled zinc.
 2. Shapes:
 - a. Cornerbead.
 - b. LC-Bead: J-shaped; exposed long flange receives joint compound.
 - c. L-Bead: L-shaped; exposed long flange receives joint compound.
 - d. Expansion (control) joint. Similar to ClarkDietrich vinyl 093 control joint.
- B. Drywall End Closure: For installation to cap end of partition;
 1. No. 6095 (3 1/2-inch studs) by Armstrong World Industries, Inc.
 2. Drywall Molding End Closure by Fry Reglet, number DMEC-4875.

2.6 JOINT TREATMENT MATERIALS

- A. General: Comply with ASTM C475/C475M.
- B. Joint Tape:
 1. Glass-Mat Gypsum Sheathing Board: 10-by-10 fiberglass mesh.
- C. Joint Compound for Exterior or Interior High-humidity Applications:
 1. Glass-Mat Gypsum Sheathing Board: As recommended by sheathing board manufacturer.

2.7 AUXILIARY MATERIALS

- A. Provide auxiliary materials that comply with referenced installation standards and manufacturer's written instructions.
- B. Steel Drill Screws: ASTM C1002 unless otherwise indicated.
 1. Use screws complying with ASTM C954 for fastening panels to steel members from 0.033 to 0.112 inch thick.

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2. For fastening cementitious backer units, use screws of type and size recommended by panel manufacturer.
- C. Fire-Resistive Joint Systems: As specified in Division 07 Section “Fire-Resistive Joint Systems.”

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine areas and substrates including wood frames and support framing, with Installer present, for compliance with requirements and other conditions affecting performance of the Work.
- B. Examine panels before installation. Reject panels that are wet, moisture damaged, and mold damaged.
- C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION AND FINISHING OF PANELS, GENERAL

- A. Comply with ASTM C840.
- B. Airtight Drywall Approach: Drywall shall be installed to comply with BSC Information Sheet 401 – Air Barriers – Airtight Drywall Approach. Sheet 401 attached at the end of this section.
- C. Install panels with face side out. Butt panels together for a light contact at edges and ends with not more than 1/16 inch of open space between panels. Do not force into place.
- D. Locate edge and end joints over supports. Do not place tapered edges against cut edges or ends. Stagger vertical joints on opposite sides of partitions. Do not make joints other than control joints at corners of framed openings.
- E. Form control and expansion joints with space between edges of adjoining gypsum panels.
- F. Cover both faces of support framing with gypsum panels in concealed spaces.
 1. Unless concealed application is indicated or required for sound, fire, air, or smoke ratings, coverage may be accomplished with scraps of not less than 8 sq. ft. in area.
 2. Fit gypsum panels around pipes and conduits.
 3. Where partitions intersect structural members projecting below underside of floor/roof slabs and decks, cut gypsum panels to fit profile formed by structural members; allow 1/4- to 3/8-inch-wide joints to install sealant.
- G. Isolate perimeter of gypsum board applied to non-load-bearing partitions at structural abutments. 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 fire-resistant sealant.

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- H. Wood Framing: Install gypsum panels over wood framing, with floating internal corner construction. Do not attach gypsum panels across the flat grain of wide-dimension lumber, including floor joists and headers. Float gypsum panels over these members or provide control joints to counteract wood shrinkage.
- I. Fire-Resistance-Rated Gypsum Board Assemblies: Provide fire-resistive joint system at the top of fire-resistance-rated gypsum board assemblies. Provide firestop system around any structural penetration of wall assembly.

3.3 INSTALLATION OF INTERIOR GYPSUM BOARD

- A. Install interior gypsum board in the following locations:
 - 1. Wallboard Type: As indicated on Drawings.
- B. Single-Layer Application:
 - 1. On partition walls, apply gypsum panels horizontally (perpendicular 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.
 - 2. Fastening Methods: Apply gypsum panels to supports with steel drill screws.

3.4 INSTALLATION OF TRIM ACCESSORIES

- A. General: For trim with back flanges intended for fasteners, attach to framing with same fasteners used for panels. Otherwise, attach trim according to manufacturer's written instructions.
- B. Control Joints: Install control joints at locations indicated on approved Shop Drawings and according to ASTM C840.
- C. Interior Trim: Install in the following locations:
 - 1. Cornerbead: Use at outside corners unless otherwise indicated.
 - 2. LC-Bead: Use at exposed panel edges.
 - 3. L-Bead: Use where indicated.
- D. Aluminum Trim: Install in locations indicated on Drawings.

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 paint finish. Promptly remove residual joint compound from adjacent surfaces.
- B. Prefill open joints and damaged surface areas.

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- C. Apply joint tape over gypsum board joints, except for trim products specifically indicated as not intended to receive tape.
- D. Gypsum Board Finish Levels: Finish interior panels to levels indicated below and according to ASTM C840:
 - 1. Level 4: At panel surfaces that will be exposed to view unless otherwise indicated.
- E. Glass-Mat Gypsum Sheathing Board: Provide level 4 finish.

3.6 PROTECTION

- A. Protect adjacent surfaces from drywall compound and promptly remove them from floors and other non-drywall surfaces. Repair surfaces stained, marred, or otherwise damaged during drywall application.
- B. Protect installed products from damage from weather, condensation, direct sunlight, construction, and other causes during remainder of the construction period.
- C. Remove and replace panels that are wet, moisture damaged, and mold damaged.
 - 1. Indications that panels are wet or moisture damaged include, but are not limited to, discoloration, sagging, or irregular shape.
 - 2. Indications that panels are mold damaged include, but are not limited to, fuzzy or splotchy surface contamination and discoloration.

END OF SECTION 092900

SECTION 099113 - EXTERIOR PAINTING

PART 1 - GENERAL

1.1 SUMMARY

- A. Section includes surface preparation and the application of paint systems on the following exterior finish materials:

- 1. Doors and Frames.

1.2 ACTION SUBMITTALS

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

- 1. Indicate VOC content.

- B. Product List: Cross-reference to paint system and locations of application areas. Use same designations indicated on Drawings and in schedules. Include color designations.

1.3 MAINTENANCE MATERIAL SUBMITTALS

- A. Coating Maintenance Manual: Upon conclusion of the project, the Contractor or paint manufacturer/supplier shall furnish a coating maintenance manual, such as Sherwin-Williams “Custodian Project Color and Product Information” report or equal. Manual shall include an Area Summary with finish schedule, Area Detail designating where each product/color/finish was used, product data pages, Material Safety Data Sheets, care and cleaning instructions, touch-up procedures, and color samples of each color and finish used.

- B. Furnish extra materials, from the same product run, that match products installed and that opened and left over and identified with labels describing contents.

- C. Furnish extra materials, from the same product run, that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.

- 1. Paint: 5 percent, but not less than 1 gallon of each material and color applied.

1.4 DELIVERY, STORAGE, AND HANDLING

- A. Store materials not in use in tightly covered containers in well-ventilated areas with ambient temperatures continuously maintained at not less than 45 deg F.

- 1. Maintain containers in clean condition, free of foreign materials and residue.
- 2. Remove rags and waste from storage areas daily.

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1.5 FIELD CONDITIONS

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

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Manufacturers: Basis-of-design subject to compliance with requirements, provide products by Sherwin-Williams Company or comparable product by one of the following:
 - 1. Benjamin Moore & Co.
 - 2. PPG Architectural Finishes, Inc. (Pittsburgh Paints, Glidden Professional, Flood Stains)
- B. Products: Subject to compliance with requirements, provide one of the products listed in the Exterior Painting Schedule for the paint category indicated.

2.2 PAINT, GENERAL

- A. Material Compatibility:
 - 1. Materials for use within each paint system shall be 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, products shall be recommended in writing by topcoat manufacturers for use in paint system and on substrate indicated.
- B. Colors: As selected by Architect from manufacturer's full range.
 - 1. Allow for up to 3 different color selections.

2.3 METAL PRIMERS

- A. Ferrous-Metal Primer: Factory-formulated rust-inhibitive metal primer for exterior application. Sherwin-Williams: Spot Prime as required. B66W01310 – Pro Industrial Pro-Cryl Universal Acrylic Primer.
 - 1. Benjamin Moore; Moore's IMC Acrylic Metal Primer No. M04.
 - 2. Pittsburgh Paints: 90-712 Pitt-Tech One Pack Interior/Exterior Primer Finish DTM Industrial Enamel. (123 g/L)

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2.4 EXTERIOR URETHANE PAINTS

- A. All Doors and Frames [Inside & Outside Surfaces: 2 Finish Coats: Sherwin-Williams B65W01121 – Pro Industrial Pre-Catalyzed Water based Urethane, Color: **SW 6175 Sagey**.

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. Proceed with coating application only after unsatisfactory conditions have been corrected.
 - 1. Application of coating indicates acceptance of surfaces and conditions.

3.2 PREPARATION

- A. Comply with manufacturer's written instructions and recommendations in "MPI Architectural Painting Specification Manual" applicable to substrates and paint systems indicated.
- B. Clean substrates of substances that could impair the bond of paints, including dust, dirt, oil, grease, and incompatible paints and encapsulants.
 - 1. Remove incompatible primers and reprime substrate with compatible primers or apply tie coat as required to produce paint systems indicated.
- C. Steel Substrates: Remove rust, loose mill scale, and shop primer if any. Clean using methods recommended in writing by paint manufacturer.
- D. Shop-Primed Steel Substrates: Clean field welds, fasteners, and areas where shop paint is abraded. Paint exposed areas with the same material as used for shop priming to comply with SSPC-PA 1 for touching up shop-primed surfaces.

3.3 APPLICATION

- A. Apply paints according to manufacturer's written instructions and recommendations in "MPI Architectural Painting Specification Manual."
 - 1. Use applicators and techniques suited for paint and substrate indicated.
 - 2. Primers specified in painting schedules may be omitted on items that are factory primed or factory finished if acceptable to topcoat manufacturers.
- B. 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.

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3.4 CLEANING AND PROTECTION

- A. At the end of each workday, remove rubbish, empty cans, rags, and other discarded materials from the 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 EXTERIOR PAINTING SCHEDULE

- A. Steel Doors and Frames:
 - 1. Water based Urethane System:
 - a. Prime Coat: Acrylic primer, rust inhibitive, water based. Apply over shop primer.
 - b. Intermediate Coat: Water based pigmented urethane, matching topcoat.
 - c. Topcoat: Water based pigmented urethane.

END OF SECTION 099113

SECTION 099123 - INTERIOR PAINTING

PART 1 - GENERAL

1.1 SUMMARY

- A. Section includes surface preparation and the application of paint systems on the following interior substrates:
 - 1. Gypsum board.
- B. Related Requirements:
 - 1. Section 099300 "Staining and Transparent Finishing" for surface preparation and the application of wood stains and transparent finishes on interior wood substrates.

1.2 ACTION SUBMITTALS

- A. Product Data: For each type of product. Include preparation requirements and application instructions.
 - 1. Indicate VOC content.
- B. Samples for Verification: For each type of paint system and in each color and gloss of topcoat.
 - 1. Submit Samples on rigid backing, 8 inches square.
 - 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.
- C. Product List: Cross-reference to paint system and locations of application areas. Use same designations indicated on Drawings and in schedules. Include color designations.

1.3 MAINTENANCE MATERIAL SUBMITTALS

- A. Coating Maintenance Manual: Upon conclusion of the project, the Contractor or paint manufacturer/supplier shall furnish a coating maintenance manual, such as Sherwin-Williams "Custodian Project Color and Product Information" report or equal. Manual shall include an Area Summary with finish schedule, Area Detail designating where each product/color/finish was used, product data pages, Material Safety Data Sheets, care and cleaning instructions, touch-up procedures, and color samples of each color and finish used.
- B. Furnish extra materials, from the same product run, that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.
 - 1. Paint: 5 percent, but not less than 1 gallon of each material and color applied.

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1.4 QUALITY ASSURANCE

- A. Mockups: Apply mockups 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. The Architect will select one surface to represent surfaces and conditions for application of each paint system.
 - a. Vertical and Horizontal Surfaces: Provide samples of at least 4 sq. ft.
 - b. Other Items: Architect will designate items or areas required.
 - 2. Final approval of color selections will be based on mockups.
 - a. If preliminary color selections are not approved, apply additional mockups of additional colors selected by Architect at no added cost to Owner.
 - 3. Approval of mockups does not constitute approval of deviations from the Contract Documents contained in mockups unless Architect specifically approves such deviations in writing.
 - 4. 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.
 - 1. Maintain containers in clean condition, free of foreign materials and residue.
 - 2. Remove rags and waste from storage areas daily.

1.6 FIELD CONDITIONS

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

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Manufacturers: Basis-of-Design Product, Sherwin-Williams Company, or comparable product by one of the following:
 - 1. Benjamin Moore & Co.

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2. PPG Architectural Finishes, Inc. (Pittsburgh Paints, Glidden Professional, Flood Stains)

B. Products: Subject to compliance with requirements listed in the Interior Painting Schedule for the paint category indicated.

2.2 PAINT, GENERAL

A. Material Compatibility:

1. Materials for use within each paint system shall be 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, products shall be recommended in writing by topcoat manufacturers for use in paint system and on substrate indicated.

B. Colors: As selected by Architect from manufacturer's full range.

1. Allow for up to 3 different color selections.

2.3 PRIMERS/SEALERS

A. Sherwin-Williams: ProMar 200 Zero VOC Interior Latex Primer B28W02600 Series. (0 g/L)

1. Benjamin Moore: Ultra Spec 500 Interior Latex Primer, No. N534. (0 g/L)
2. PPG: Pure Performance Interior Latex Primer, 9-900 Series. (0 g/L)

2.4 LATEX PAINTS

A. Sherwin-Williams: ProMar 200 Zero VOC Interior Latex (Eggshell) B20-2600 Series (0 g/L).

1. Benjamin Moore: Ultra Spec 500 Interior Eggshell Finish, No. N538. (0 g/L)
2. PPG: 1500-0100 Series, Ultra-Hide Zero Interior Latex Paint, Eggshell. (0 g/L)

B. Interior General Use Conditions: Coatings limited to interior service where protection of the coating during application and curing, the construction and the occupancy of the building are as recommended by the product manufacturer for the specific application.

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 Substrates: When measured with an electronic moisture meter as follows:

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1. Gypsum Board: 12 percent.
- C. Gypsum Board Substrates: Verify that the finishing compound is sanded smooth.
- D. Verify suitability of substrates, including surface conditions and compatibility, with existing finishes and primers.
- E. Proceed with coating application only after unsatisfactory conditions have been corrected.
 1. Application of coating indicates acceptance of surfaces and conditions.

3.2 PREPARATION

- A. Comply with manufacturer's written instructions and recommendations in "MPI Architectural Painting Specification Manual" applicable to substrates and paint systems indicated.
- B. Remove hardware, covers, plates, and similar items already in place that are removable and are not to be painted. If removal is impractical or impossible because of size or weight of item, provide surface-applied protection before surface preparation and painting.
 1. After completing painting operations, use workers skilled in the trades involved to reinstall items that were removed. Remove surface-applied protection if any.
- C. Clean substrates of substances that could impair the bond of paints, including dust, dirt, oil, grease, and incompatible paints and encapsulants.
 1. Remove incompatible primers and reprime substrate with compatible primers or apply tie coat as required to produce paint systems indicated.

3.3 APPLICATION

- A. Apply paints according to manufacturer's written instructions and to recommendations in "MPI Manual."
 1. Use applicators and techniques suited for paint and substrate indicated.
 2. Paint surfaces behind movable equipment same as similar exposed surfaces. Before final installation, paint surfaces behind permanently fixed equipment with prime coat only.
 3. Paint the front and backsides of access panels, removable or hinged covers, and similar hinged items to match exposed surfaces.
 4. Do not paint over labels of independent testing agencies or equipment name, identification, performance rating, or nomenclature plates.
 5. Primers specified in painting schedules may be omitted on items that are factory primed or factory finished if acceptable to topcoat manufacturers.
- B. If undercoats or other conditions show through topcoat, apply additional coats until cured film has a uniform paint finish, color, and appearance. Give special attention to ensure edges, corners, crevices, and exposed fasteners receive a dry film thickness equivalent to that of flat surfaces. Notify Architect when additional coats do not fix the problem.

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- C. 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.
- D. Painting Plumbing, HVAC, Electrical, Communication, and Electronic Safety and Security Work: Not applicable.

3.4 CLEANING AND PROTECTION

- A. At the end of each workday, remove rubbish, empty cans, rags, and other discarded materials from the 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 INTERIOR PAINTING SCHEDULE

- A. Gypsum Board Substrates:
 - 1. Low-Odor/VOC Latex System:
 - a. Prime Coat: Primer sealer, interior, low odor/VOC.
 - b. Intermediate Coat: Latex, interior, institutional low odor/VOC, matching topcoat.
 - c. Topcoat: Latex, interior, institutional low odor/VOC eggshell (MPI Gloss Level 3).

END OF SECTION 099123

SECTION 099300 - STAINING AND TRANSPARENT FINISHING

PART 1 - GENERAL

1.1 SUMMARY

- A. Section includes surface preparation and application of wood stains and transparent finishes on the following substrates:
 - 1. Exterior Substrates:
 - a. Exposed glue-laminated wood beams.
 - b. Wood siding and trim.
 - 2. Interior Substrates:
 - a. Exposed glued-laminated beams.
 - b. Dressed lumber roof decking.
 - c. Exposed 2x wood framing and wall caps.
 - d. Birch plywood sheathing.

1.2 ACTION SUBMITTALS

- A. Product Data: For each type of product. Include preparation requirements and application instructions.
 - 1. Include printout of current "MPI Approved Products List" for each product category specified, with the proposed product highlighted.
 - 2. Indicate VOC content.
- B. Samples for Verification: For each type of finish system and in each color and gloss of finish required.
 - 1. Submit Samples on representative samples of actual wood substrates, 8 inches square or 8 inches 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.
- C. 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. Coating Maintenance Manual: Upon conclusion of the project, the Contractor or paint manufacturer/supplier shall furnish a coating maintenance manual, such as Sherwin-Williams "Custodian Project Color and Product Information" report or equal. Manual shall include an

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Area Summary with finish schedule, product data pages, Material Safety Data Sheets, care and cleaning instructions, touch-up procedures, and color samples of each color and finish used.

- B. 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 gallon of each material and color applied.

1.4 QUALITY ASSURANCE

- A. Mockups: Apply mockups of each finish system indicated and each color selected to verify preliminary selections made under Sample submittals, 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 8 sq. ft.
 - b. Other Items: 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 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.

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.
- B. Do not apply finishes when relative humidity exceeds 85 percent, at temperatures less than 5 deg F above the dew point, or to damp or wet surfaces.
- C. Do not apply exterior finishes in snow, rain, fog, or mist.

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PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Manufacturers: Basis-of-Design Product, Sherwin-Williams Company, or comparable product by one of the following:
 - 1. Benjamin Moore & Co.
 - 2. PPG Architectural Finishes, Inc. (Pittsburgh Paints, Glidden Professional, Flood Stains, Sikkens)
 - 3. Samuel Cabot Incorporated.
- B. Products: Subject to compliance with requirements, provide products listed in wood finish systems schedules for the product category indicated.

2.2 MATERIALS, GENERAL

- A. Material Compatibility:
 - 1. Materials for use within each paint system shall be 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, products shall be recommended in writing by manufacturers of topcoat for use in paint system and on substrate indicated.
- B. Stain Colors: As selected by Architect from manufacturer's full range.

2.3 WOOD FILLERS

- A. Wood Filler Paste: MPI #91.VOC Content: E Range of E1.

2.4 WOOD PENETRATING STAIN

- A. Exposed exterior and interior Glulam beams. Finish: Sherwin Williams Woodscapes Weathered Gray SW3568
- B. Exterior vertical wood siding and trim. Finish: Sherwin Williams Woodscapes Weathered Gray SW3568
- C. Exposed interior 2x wood framing, wall caps, and birch plywood sheathing. Finish: Sherwin Williams Woodscapes Weathered Gray SW3568.
 - 1. Basis-of-design manufacturer Sherwin-Williams: Woodscapes Water-Based Semi-Transparent Stain or comparable product from the following:
 - a. Ben Moore: Arborcoat Exterior Waterborne Semi-transparent Deck & Siding Stain; 638/K638.
 - b. PPG: Olympic Maximum Deck & Siding Semi-Transparent Stain, 79550 Series.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates and conditions, with Applicator present, for compliance with requirements for max moisture content, light levels 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. Verify suitability of substrates, including surface conditions and compatibility with existing finishes and primers.
- D. Proceed with finish application only after unsatisfactory conditions have been corrected.
 - 1. Finish 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 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.
- C. Clean and prepare surfaces to be finished according to manufacturer's written instructions for each substrate condition and as specified.
 - 1. Remove dust, dirt, oil, and grease by washing with a detergent solution; rinse thoroughly with clean water and allow to dry. Remove grade stamps and pencil marks by sanding lightly. Remove loose wood fibers by brushing.
 - 2. Remove mildew by scrubbing with a commercial wash formulated for mildew removal and as recommended by stain manufacturer.
- D. Exterior Wood Substrates:
 - 1. Countersink steel nails, if used, and fill with putty or plastic wood filler tinted to final color. Sand smooth when dried.
- E. Interior Wood Substrates:
 - 1. Apply wood filler paste to open-grain woods, as defined in "MPI Architectural Painting Specification Manual," to produce smooth, glasslike finish.
 - 2. Sand surfaces exposed to view and dust off.

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3.3 APPLICATION

- A. Apply finishes according to manufacturer's written instructions and recommendations in "MPI Architectural Painting Specification Manual."
 - 1. Use applicators and techniques suited for finish and substrate indicated.
 - 2. Finish surfaces behind movable equipment 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 the end of each workday, remove rubbish, empty cans, rags, and other discarded materials from the 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 Architect.
- D. At completion of construction activities of other trades, touch up and restore damaged or defaced finished wood surfaces.

3.5 EXTERIOR WOOD-FINISH-SYSTEM SCHEDULE

- A. Exposed Glulam Beams, Vertical Wood Siding and Wood Trim:
 - 1. Water-Based Semitransparent Stain System:
 - a. Under Coat: Stain, exterior, water based, semitransparent, matching topcoat.
 - b. Topcoat: Stain, exterior, water based, semitransparent.

3.6 INTERIOR WOOD -FINISH-SYSTEM SCHEDULE

- A. Exposed Glulam Beams, Dress Lumber Rood Decking, Exposed 2x Wood Framing and Wall Cap, and Birch Plywood Sheathing:
 - 1. Water-Based Semitransparent Stain System:
 - a. Under Coat: Stain, water-based semitransparent, matching topcoat.
 - b. Topcoat: Stain, water-based semitransparent, for interior wood.

END OF SECTION 099300

SECTION 101400 - SIGNS

PART 1 - GENERAL

1.1 SUMMARY

- A. This Section includes the following types of signs:
 - 1. Panel signs.

1.2 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."

1.3 ACTION SUBMITTALS

- A. Product Data: For each type of sign specified, including details of construction relative to materials, dimensions of individual components, profiles, and finishes.
- B. Shop Drawings: Show fabrication and erection of signs. Include plans, elevations, and large-scale sections of typical members and other components based upon Architects drawings.
 - 1. Provide a message list for each sign required, including large-scale details of wording and lettering layout.
 - 2. For signs supported by or anchored to permanent construction, provide setting drawings, templates, and directions for installation of anchor bolts and other anchors to be installed as a unit of Work in other Sections.
- C. Samples for Selection: Manufacturer's color charts consisting of actual units or sections of units showing the full range of colors available.

1.4 INFORMATION SUBMITTALS

- A. Warranty: Special warranty specified in this Section.

1.5 QUALITY ASSURANCE

- A. Single-Source Responsibility: For each separate sign type required, obtain signs from one source of a single manufacturer.
- B. Regulatory Requirements: Comply with the Americans with Disabilities Act (ADA) and with code provisions as adopted by authorities having jurisdiction.

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- C. Design Concept: The Drawings indicate sizes, profiles, and dimensional requirements of signs and are based on the specific types and models indicated. Sign units by other manufacturers may be considered provided deviations in dimensions and profiles do not change the design concept as judged by the Architect. The burden of proof of equality is on the proposer.

1.6 PROJECT CONDITIONS

- A. Field Measurements: Take field measurements prior to preparation of shop drawings and fabrication to ensure proper fitting. Show recorded measurements on final shop drawings. Coordinate fabrication schedule with construction progress to avoid delay.

1.7 COORDINATION

- A. Coordinate placement of anchorage devices with templates for installing signs.

1.8 WARRANTY

- A. Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace components of signs that fail in materials or workmanship within specified warranty period.
 - 1. Failures include, but are not limited to, the following:
 - a. Deterioration of polymer finishes beyond normal weathering.
 - b. Deterioration of embedded graphic image colors and sign lamination.
 - 2. Warranty Period: Five years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 MATERIALS

- A. Acrylic Sheet: ASTM D 4802, Category A-1 (cell-cast sheet), Type UVA (UV absorbing).
- B. Polycarbonate Sheet: Of thickness indicated, manufactured by extrusion process, coated on both surfaces with abrasion-resistant coating:
 - 1. Impact Resistance: 16 ft-lbf/in. per ASTM D 256, Method A.
 - 2. Tensile Strength: 9000 lbf/sq. in. per ASTM D 638.
 - 3. Flexural Modulus of Elasticity: 340,000 lbf/sq. in. per ASTM D 790.
 - 4. Heat Deflection: 265 deg F at 264 lbf/sq. in. per ASTM D 648.
 - 5. Abrasion Resistance: 1.5 percent maximum haze increase for 100 revolutions of a Taber abraser with a load of 500 g per ASTM D 1044.
- C. Fasteners: Use concealed fasteners fabricated from metals that are not corrosive to the sign material and mounting surface.

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- D. Anchors and Inserts: Use nonferrous metal or hot-dipped galvanized anchors and inserts for exterior installations and elsewhere as required for corrosion resistance. Use toothed steel or lead expansion bolt devices for drilled-in-place anchors. Furnish inserts, as required, to be set into concrete or masonry work.

2.2 PANEL SIGNS

- A. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated in the Work include, but are not limited to, the following:
 - 1. Caron Sign, Hermon, Maine
 - 2. Welch Sign, Scarborough, Maine
- B. Substrate: Fabricate signs from 1/8 inch or thicker acrylic with edges mechanically and smoothly finished to eliminate cut marks. Background color to be subsurface.
 - 1. Edge Condition: Straight.
 - 2. Size: 8x8 inches and 8x12 inches, unless noted otherwise.
- C. Copy: Complying with ADA Accessibility Guidelines.
- D. 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, if used.
- E. Braille: Use engrave process for all Braille areas. Engrave Braille dots into surface of clear material.
- F. Symbols of Accessibility:
 - 1. Accessible elements: Provide an international symbol of accessibility.
 - a. Provide symbols of actual fixtures in room including a toilet, shower and adult changing table.
- G. Provide characters complying with ADA Accessibility Guidelines and ICC/ANSI A117.1. Text shall be accompanied by Grade 2 braille.

2.3 FINISHES

- A. Colors and Surface Textures: For exposed sign material that requires selection of materials with integral or applied colors, surface textures or other characteristics related to appearance, provide color matches indicated, or if not indicated, as selected by the Architect from the manufacturer's standards.

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2.4 ACRYLIC SHEET FINISHES

- A. Colored Coatings for Acrylic Sheet: For copy and background colors, provide colored coatings, including inks and paints, that are recommended by acrylic manufacturers for optimum adherence to acrylic surface and that are UV and water resistant for five years.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of work.
- B. Verify that items are sized and located to accommodate signs.
- C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

- A. Locate sign units and accessories where indicated, using mounting methods of the type described and in compliance with the manufacturer's instructions.
 - 1. Install signs level, plumb, and at the height indicated, with sign surfaces free from distortion or other defects in appearance.
- B. Wall-Mounted Signs: Comply with sign manufacturer's written instructions except where more stringent requirements apply.

3.3 CLEANING AND PROTECTION

- A. After installation, clean soiled sign surfaces according to the manufacturer's instructions. Protect units from damage until acceptance by the Owner.

3.4 PANEL SIGN SCHEDULE

<u>Types</u>	<u>Sizes</u>	<u>Quantity</u>
Universal Restrooms	8" x 8"	02
Universal Restroom with Shower	8" x 8"	08
Universal Restroom with Shower & Adult Changing Table	8" x 14"	01
Electrical Room	8" x 8"	01
Mechanical Room	8" x 8"	01

- B. Final room names and numbers will be verified during the submittal.

END OF SECTION 101400

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SECTION 102800 – TOILET AND BATH ACCESSORIES

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Public-use washroom accessories.
2. Public-use shower room accessories.

B. Related Requirements:

1. Section 088300 "Mirrors" for frameless mirrors.

1.2 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.

1.3 ACTION SUBMITTALS

A. Product Data: For each type of product.

1. Include construction details, material descriptions, dimensions of individual components and profiles, and finishes.
2. Include anchoring and mounting requirements, including requirements for cutouts in other work and substrate preparation.

B. Product Schedule: Indicating types, quantities, sizes, and installation locations by room of each accessory required.

1. Identify locations using room designations indicated.
2. Identify accessories using designations indicated.

1.4 INFORMATIONAL SUBMITTALS

- ##### A. Sample Warranty: For manufacturer's special warranty.

1.5 CLOSEOUT SUBMITTALS

- ##### A. Maintenance Data: For accessories to include in maintenance manuals.

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1.6 WARRANTY

- A. Manufacturer's Special Warranty for Mirrors: Manufacturer agrees to repair or replace mirrors that fail in materials or workmanship within specified warranty period.
 - 1. Failures include, but are not limited to, visible silver spoilage defects.
 - 2. Warranty Period: 15 years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 OWNER-FURNISHED MATERIALS

- A. Owner-Furnished Materials: To be determined.

2.2 PERFORMANCE REQUIREMENTS

- A. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.

2.3 PUBLIC-USE WASHROOM ACCESSORIES

- 1. Basis-of-Design Product: GAMCO Specialty Accessories; a division of Bobrick Washroom Equipment, Inc. Subject to compliance with requirements indicated in this section or substitute products by one of the following:
 - a. A & J Washroom Accessories, Inc.
 - b. American Specialties, Inc.
 - c. Bradley Corporation.
- B. Toilet Tissue (Roll) Dispenser:
 - 1. Basis-of-Design Product: Bobrick No. B-2840.
 - 2. Description: Dual roll dispenser with utility shelf.
 - 3. Mounting: Surface mounted.
 - 4. Operation: Non-control delivery with standard spindle.
 - 5. Capacity: Designed for up to 5-1/4 inch-diameter tissue rolls.
 - 6. Material and Finish: Stainless steel, No. 4 finish (satin).
- C. Liquid Soap Dispenser:
 - 1. Basis-of-Design Product: Bobrick No. B-2111.
 - 2. Description: Vertical style, manual valve operation, bottom dispensing.
 - 3. Mounting: Surface mounted.
 - 4. Minimum Capacity: 40 fl. oz..
 - 5. Material and Finish: Stainless steel, No. 4 finish (satin).
 - 6. Lockset: Lockable access, Key type.

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D. Sanitary Napkin Disposal

1. Basis-of-Design Product: Bobrick No. B-270 Contura Series.
2. Description: Vertical style, manual top lid operation.
3. Mounting: Surface mounted.
4. Minimum Capacity: 1 gal.
5. Material and Finish: Stainless steel, No. 4 finish (satin).
6. Lockset: None.

E. Grab Bar:

1. Basis-of-Design Product: Bobrick No. B-5806 Series
2. Mounting: Flanges with concealed fasteners.
3. Material: Stainless steel, 0.05 inch thick.
 - a. Finish: Smooth, No. 4 finish (satin) on ends and slip-resistant texture in grip area.
4. Outside Diameter: 1-1/4 inches.
5. Configuration and Length: As indicated on Drawings.

F. Grab Bar - Swing Up-Type:

1. Basis-of-Design Product: Gamco Swing Up Grab Bar 125
2. Mounting: Flanges with (4) min. ¼” diameter bolt fasteners.
3. Material: Stainless steel, Type 304, 18 gauge.
 - a. Finish: Smooth, No. 4 finish (satin) on ends and knurled grip.
4. Outside Diameter: 1-1/4 inches.
5. Configuration and Length: Wall mounted, Swing up. 29-15/16-inch length.

G. Mirror Unit:

1. Basis-of-Design Product: Bobrick B-166-2436.
2. Mirror: 1/4” Float glass.
3. Frame: Stainless-steel channel.
 - a. Corners: Mitered.
4. Shelf: 18-ga stainless steel, satin finish. Flanged front and side, welded to frame.
5. Hangers: Produce rigid, tamper- and theft-resistant installation, using the method indicated below.
 - a. One-piece, galvanized-steel, wall-hanger device with spring-action locking mechanism to hold mirror unit in position with no exposed screws or bolts.
 - b. Wall bracket of galvanized steel, equipped with concealed locking devices requiring a special tool to remove.
6. Size: 24 by 36 inches. Mirror Unit:

H. Pipe Guard: Restroom Lavatories and Kitchen Sink Piping.

1. Basis-of-Design Product: Oatey Co., Dearborn Safety Series Tubular Cover.
2. Material: EVA Insulating.

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3. Durometer: Shore C.
4. Fastening: Hook and loop
5. Color: White

2.4 SHOWER ROOM ACCESSORIES

1. Basis-of-Design Product: GAMCO Specialty Accessories; a division of Bobrick Washroom Equipment, Inc. Subject to compliance with requirements indicated in this section or substitute products by one of the following:
 2. A & J Washroom Accessories, Inc.
 3. American Specialties, Inc.
 4. Bradley Corporation.

B. Robe Hook:

1. Basis-of-Design Product: Bradley Elvari 9B1-1102S.
2. Description: Double hook unit.
3. Material and Finish: Stainless steel, No. 4 finish (satin).

C. Shower Seat:

1. Basis-of-Design Product: Bobrick B-5191.
2. Description: Folding phenolic shower seat, stainless stl. frame, wall mounted.
3. Material and Finish: Stainless steel, No. 4 finish (satin).

D. Adult Changing Table:

1. Basis-of-Design Product: Foundations Worldwide Inc.
2. Description: Surface wall mounted, Full body with ABS replaceable tray liner.
3. Material and Finish: 16-gauge, Stainless steel, No. 4 finish (satin).
4. 400 pounds (181 kg) static load.

2.5 CHILDCARE ACCESSORIES

A. Basis-of-Design Product: Subject to compliance with requirements, provide product indicated on Drawings or comparable product by one of the following:

1. Koala Kare Products; a division of Bobrick Washroom Equipment, Inc.

B. Diaper-Changing Station:

1. Basis-of-Design Product: Baby Changing Station, KB301-01SS. Grey
2. Description: Vertical unit that opens by folding down from stored position and with child-protection strap.
3. Mounting: Surface-mounted,
4. Operation: By pneumatic shock-absorbing mechanism.

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5. Material and Finish: Injection molded polypropylene with Microban with brushed stainless steel veneer.

2.6 MATERIALS

- A. Stainless Steel: ASTM A240/A240M or ASTM A666, Type 304, 0.031-inch minimum nominal thickness unless otherwise indicated.
- B. Steel Sheet: ASTM A1008/A1008M, Designation CS (cold rolled, commercial steel), 0.036-inch minimum nominal thickness.
- C. Fasteners: Stainless steel screws, bolts, anchor shields, and other devices of same material as accessory unit and tamper-and-theft resistant where exposed, and of galvanized steel where concealed.

2.7 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. Provide minimum of six keys to Owner's representative.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Install accessories according to manufacturers' written instructions, using fasteners appropriate to substrate indicated and recommended by unit manufacturer. Install units' level, plumb, and firmly anchored in locations and at heights indicated.
- B. Grab Bars: Install to withstand a downward load of at least 250 lbf, when tested according to ASTM F446.

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 instructions.

END OF SECTION 102800

SECTION 104416 - FIRE EXTINGUISHERS

PART 1 - GENERAL

1.1 SUMMARY

- A. Section includes portable, hand-carried fire extinguishers and mounting brackets for fire extinguishers.

1.2 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 installation as indicated on Drawings.

1.3 INFORMATIONAL SUBMITTALS

- A. Warranty: Sample of special warranty.

1.4 CLOSEOUT SUBMITTALS

- A. Operation and Maintenance Data: For fire extinguishers to include in maintenance manuals.

1.5 COORDINATION

- A. Coordinate type and capacity of fire extinguishers with fire-protection cabinets to ensure fit and function.

1.6 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.

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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 extinguisher and mounting bracket indicated.
 - 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. Amerex Corporation.
 - b. Ansul Incorporated; Tyco International.
 - c. Badger Fire Protection.
 - d. Buckeye Fire Equipment Company.
 - e. JL Industries, Inc.; a division of the Activar Construction Products Group.
 - f. Kidde Residential and Commercial Division.
 - g. Larsens Manufacturing Company.
 - h. Potter Roemer LLC.
 - 2. Valves: Manufacturer's standard.
 - 3. Handles and Levers: Manufacturer's standard.
 - 4. Instruction Labels: Include pictorial marking system complying with NFPA 10, Appendix B, and bar coding for documenting fire-extinguisher location, inspections, maintenance, and recharging.
- B. Wet-Chemical Type: UL-rated 2-A:1-B:C:K, 2.5-gal. nominal capacity, with potassium carbonate-based chemical in stainless-steel container; with pressure-indicating gage.
- C. Multipurpose Dry-Chemical Type in Steel Container: UL-rated 4-A:60-B:C, 10-lb nominal capacity, with monoammonium phosphate-based dry chemical in enameled-steel container.

2.3 MOUNTING BRACKETS

- A. Mounting Brackets: Manufacturer's standard steel, designed to secure fire extinguisher to wall or structure, of sizes required for types and capacities of fire extinguishers indicated, with plated or red or black baked-enamel finish.

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 with requirements of authorities having jurisdiction.
 - 1. Mounting Brackets: Top of fire extinguisher to be at 54 inches above finished floor.
- B. Mounting Brackets: Fasten mounting brackets to surfaces, square and plumb, at locations indicated.

END OF SECTION 104416

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SECTION 108000 - OTHER SPECIALTIES

PART 1 - GENERAL

1.1 SUMMARY

- A. This Section includes the following:
1. Bicycle rack.
 2. Playground Equipment

1.2 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 BICYCLE RACK

- A. Provide Flo™ Bike Rack by Landscape Forms or approved substitute. Constructed of 1-1/2 inch outside diameter steel piping with powder coat finish. Surface mount to concrete apron per manufacturer's instructions.
1. Capacity: 3 bikes.
 2. Mounting: Embedded.
 3. Color: Bronze Metallic

2.2 PLAYGROUND EQUIPMENT SYSTEM

- A. Provide "ADA Universal Elements" by Kompan or approved substitute.

Swing, 8 ft. high, 1 Rope Seat Item: KSW92008-0910

1. Dimensions LxWxH: 10'6" x 6'0" x 8'4"
2. Age group: 2 - 12
3. Play capacity (users): 6
4. Color: Teal

Tipi Carousel w/ Top Brace Item: ELE400065-3717DT

5. Dimensions LxWxH: 3'11"
6. Age group: 5 - 12
7. Play capacity (users): 8

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8. Color: Beige

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Install accessories according to manufacturers' written instructions, using fasteners appropriate to substrate indicated and recommended by unit manufacturer. Install units level, plumb, and firmly anchored in locations and at heights indicated.

3.2 ADJUSTING AND CLEANING

- A. Adjust specialties for unencumbered, smooth operation and verify that mechanisms function properly. Replace damaged or defective items.

3.3 CLEANING

- A. Clean surfaces prior to inspection. Replace damaged or defective items.

END OF SECTION 108000

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SECTION 220000 - PLUMBING

PART 1 GENERAL

1.1 RELATED DOCUMENTS

- A. The drawings and the specifications including Section 230500 “Supplemental General Mechanical Conditions” are hereby made a part of the work of this section.

1.2 DESCRIPTION

- A. The work covered by this Section of the specifications includes the furnishing of labor, materials, equipment, transportation, permits, inspections, and incidentals and the performing of operations required to provide a complete and functional plumbing system.
- B. Work shall be in accordance with the current edition of the Maine State Plumbing Code and applicable local ordinances.

1.3 SUBMITTALS

- A. Substitutions: Your attention is directed to Section 230500-"Substitutions", relative to competition and the (ONLY) notation. Familiarity with this section shall be achieved before reading the PRODUCTS section of this specification.
- B. The items for which the submittals paragraph in Section 230500, Supplemental General Mechanical Requirements, apply are as follows:
 - 1. Piping materials.
 - 2. Valves.
 - 3. Pipe hangers.
 - 4. Fixtures and trim.
 - 5. Miscellaneous equipment.
 - 6. Water heating equipment.
 - 7. Piping, valves and equipment identification.
 - 8. Gas piping system.

PART 2 PRODUCTS

2.1 PIPING MATERIALS

- A. Soil and Waste (Sanitary) and Vent Piping:
 - 1. Below Grade: Sched. 40 PVC with solvent welded joints. Contractor shall use Purple Primer on all solvent welded joints.
 - 2. Above Grade: Sanitary and vent piping shall be Sched. 40 PVC with solvent welded joints. Contractor shall use Purple Primer on all solvent welded joints. Vent piping shall be cast iron (ONLY) thru roof. Contractor shall use Purple Primer on all solvent welded joints.

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- B. Domestic Water Piping:
 - 1. Pipe sizes larger than 1": Type L hard copper tubing and cast bronze or wrought copper solder fittings.
 - 2. Branch piping to individual fixtures shall be one of the following:
 - a. Uponor AquaPEX, NSF rated, 180°F at 100psi, red (HW), blue (CW) and white (RHW).
 - b. Type L hard copper tubing and cast bronze or wrought copper solder fittings.
- C. Exposed Water and Waste Piping at Fixtures: I.P.S. copper with cast brass fittings chrome plated finish, with deep one piece escutcheon plates at traverse points.
- D. Solder: Lead-free (ONLY), Englehard Silvacrite 100, 440°F melting point, ASTM B32.
- E. Condensate Drain Piping: Schedule 40 PVC with solvent welded joints.

2.2 PIPE HANGERS

- A. Adjustable Swivel Hangers:
 - 1. Pipe sizes 2" and less: Carpenter and Paterson Fig. 800, oversize for insulated piping systems.
 - 2. Pipe sizes larger than 2": Carpenter and Paterson Fig. 100, oversize for insulated piping systems.
- B. Riser Clamp: Carpenter and Paterson Fig. 126 CT copper plated for copper piping, Fig. 126 for iron and PVC piping.
- C. Insulation Shields: 18 ga. galvanized steel, 180o wrap, Carpenter and Paterson Fig. 265P, Type H.
- D. All piping 20' upstream and downstream of pumps shall also have Mason Industries PC30N precompressed double deflection spring isolators installed.

2.3 FIXTURES AND TRIM

- A. (P-1) ADA Water Closet: Floor mounted, flush valve, American Standard Priolo flushometer toilet, elongated bowl, top spud, rear discharge, vitreous china with everclean, 1.6 GPF. Provide with American Standard open-front seat.
 - 1. Seat: American Standard extra heavy duty open front less cover with Everclean surface, model 5905.110.
 - 2. Sensor: Sloan Royal 111, 1.6 GPF Flushometer, chrome finish, top spud connection.

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3. Total installed height of front edge of seat shall be 17” to 19” above finished floor. Final installation shall meet ADA guidelines and ANSI A117.1.
- B. (P-2) ADA Wall-hung Lavatory: American Standard Decorum model 9134001EC (center hole only), vitreous china with Everclean and rear overflow. Overall dimensions of 21” x 20.25” with 5” deep bowl. Included wall support shall be suitable for CMU installation.
1. Faucet: American Standard Colony Pro single control lavatory faucet, 1 GPM. Metal body and lever handle, washerless ceramic disc valve cartridge with integrated hot limit safety stop.
 2. Drain: Pop-up drain assembly with bright metal finish.
 3. Trap: 1 ¼” PVC P-trap with cleanout plug. Adjustable with connected elbow and nipple to wall.
 4. Fixture and installation shall be in accordance with ADA and ANSI A117.1. Insulate exposed traps and supplies with Truebro Lavguard.
- C. (P-3) ADA Shower controls: Symmons Verity Versaflex model S4991TRM shower head with integral diverter shower trim, single lever control valve, 2 GPM flow rate, provide with Temptrol valve. Assembly shall be installed in CMU wall, refer to Architectural drawings for details.
1. Provide with 36” slide/grab bar and ADA handshower with non-positive shut-off.
 2. Installation shall be in accordance with ADA and ANSI A117.1
- D. (P-4) Outdoor Drop-In Sink: Elkay model LRAD372260 Lustertone 18 guage stainless steel. Bowl dimensions of 16” x 16” x 5.875”, double bowl drop-in ADA sink with overall dimensions of 37” x 22” x 6”, single center hole.
1. Faucet: Elkay model LK6000, single hole deck mount faucet with pull-down spray.
 2. Drain: Elkay perfect drain, chrome plated brass body vandal-resistant strainer.
 3. Final installation shall be in accordance with ADA and ANSI117.1.
 4. Provide weatherproofing as necessary for outdoor installation.
- G. (P-5) Mop Basin: Mustee model 63M, single-piece molded Durastone fiberglass, 24"x24"x10" 3" cast iron drain with combination dome strainer and lint basket. Provided with wall guards and bumper guards.
1. Faucet: Mustee Service Faucet Model 63.600A,chrome plated brass handle sink faucet with top reinforcing bar and [pail hook on spout.
 2. Hose and Hose Bracket: Mustee model 63.700, heavy duty 5/8” diameter reinforced 31” rubber hose with brass couplings on one end. Spring loaded, molded rubber hose holder mounts on stainless steel wall plate.

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3. Mop Bracket: Mustee 65.600, stainless steel.
4. Caulk around mop basin at floor and walls with white silicone caulk.

2.4 MISCELLANEOUS EQUIPMENT

- A. Floor Drain (FD-#): Zurn Z-415, cast iron body with 3" bottom outlet, combination invertible membrane clamp and adjustable collar. Strainer shall be 6" diameter Zurn "Type B", polished nickel-bronze. Floor drains shall have "deep seal" traps and trap primer connection, connect to nearest plumbing fixture.
- B. Floor/Yard Cleanout (FCO/YCO): Zurn Z-1400 adjustable floor cleanout, cast iron body, with gas and watertight ABS tapered thread plug. Provide size equal to piping served with maximum size of 4".
 1. Concrete floor finishes: Scoriated round polished bronze top.
 2. Sheet tile finishes: Scoriated square polished bronze top recessed to receive tile.
 3. Carpeted finishes: Scoriated round polished bronze top and carpet marker.
- C. Vacuum Breaker: Watts Model N36, 3/4" size, 20 CFM capacity.
- D. Strainer: Watts Series 777, MIL-S-16293, bronze body wye-type, 200 WOG rating, screwed end connections, 20 mesh stainless steel, monel, or bronze screen.
- E. Thermometers: Terrice Series V80445 or Ashcroft Series 600A-04, vapor actuated, adjustable angle, 4-1/2" diameter face, cast aluminum case, stainless steel ring, glass window, white background dial with black figures, black finished stainless steel pointer, brass movement with bronze bearings, phosphor bronze bourdon tube. Accuracy shall be to within one scale division.
 1. Thermowell: Provide with brass thermometer wells projecting a minimum of 2" into the pipe with extension to face of insulation. Provide with heat transfer fluid to fill interstitial space between bulb and well.
 2. Range: 30°F to 240°F for domestic hot water systems.
- F. Pressure Gauges: Terrice Series 800 or Ashcroft Type 1005, Grade B, 3-1/2" dial, ANSI B40.1, drawn steel case, white background dial with black figures, clear glass window, brass movement, beryllium copper bourdon tube, 0 to 100 PSI range, accuracy shall be within 2% over middle half of scale and 3% over the remainder. Provide with shut off petcock and restrictor.
- G. Circulator (inline)(CP): Taco or Wilo model indicated, pumps shall be inline cartridge-type or close coupled pump of capacity and performance indicated with all bronze or stainless steel construction 125 psig rated working pressure, 200°F maximum water temperature, carbon Ni-resist mechanical seal, flexible coupling, resilient-mount drip-proof sleeve bearing motor. The pumps shall be factory tested, cleaned and painted with machinery enamel. A set of installation instructions shall be included with pump. Provide high efficiency motors if available as an option of the manufacturer. If high

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efficiency motors are not available as an option of the manufacturer, submit a certification stating same.

- H. Water Hammer Arrestor (Shock Absorber): Plumbing and Drainage Institute listed.

Schedule:

"A" - Size #100 PDI - 0-11 Fixture Units
"B" - Size #200 PDI - 12-32 Fixture Units
"C" - Size #300 PDI - 33-60 Fixture Units
"D" – Size #400 PDI – 61-113 Fixture Units
"E" – Size #500 PDI – 114-154 Fixture Units

- I. Thermostatic Mixing Valve: Thermostatic controller shall be of capacity and size indicated. Provide regulator valve, swivel action check stops, removable cartridge, strainer, stainless steel piston and liquid fill thermal motor with bellows element mounted out of water, in rough chrome finish.
- J. Trap Primer (TP): Zurn Z-1022 Automatic Trap Primer, all bronze body with integral vacuum breaker, non-liming internal operating assembly with gasketed bronze cover, flow-thru design operates on a 2-5psi pressure drop.
- K. Wall Hydrant (HB): Woodford 65, ¾" size, brass body, automatic draining, loose key for operation, with anti-siphon vacuum breaker.
- L. Wall Hydrant Fill (HF): Woodford Model 26, ¾" size, polished chrome finish, automatic draining and backflow protected.
- M. Pressure Tanks (PT-#): Amtrol model WELL-X-TROL or approved equal. Full acceptance bladder well tank with steel construction, heavy duty butyl bladder with EPDM valve seats. Shall be designed and constructed per ASME code section VIII, division 1.
- N. Grease Interceptor (G-1): Zurn GT2700-25 grease interceptor, 25 GPM rated flow (50 lb grease capacity).

2.5 WATER HEATING EQUIPMENT

- A. Electric Water Heater (HPWH-#): model indicated, UL 732 and ASHRAE 90A (2013 requirements) compliant, Glass lined tank with replaceable anode rods and plastic jacket, factory installed ASME rated temperature and pressure relief valve, and adjustable range thermostat. Set to provide 140°F water temperature.
1. Sequence of Operation: Electric water heaters shall be the primary mode of DHW production and shall feed in to GFWH fill line (refer to drawings and detail). If DHW production lags demand then secondary mode of DHW production (GFWH) shall initiate.
- B. Gas Water Heaters (GFWH-#): Model indicated or approved equal. UL certified and complies with US Department of Energy efficiency/stand-by loss requirements. Shall contain a seamless glass lined tank with replaceable anode rods and plastic jacket, have a down-fired power burner designed for precise mixing of air and gas for optimum

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efficiency, factory installed ASME rated temperature and pressure relief valve, and adjustable range thermostat. Set to provide 140°F water temperature.

1. Controls shall be an integrated solid-state temperature and ignition control device with integral diagnostics, user interface, fault history display, and shall have a digital temperature readout.
2. Water heater shall be suitable for power venting using a 4" diameter CPVC pipe.
3. Sequence of Operation: Gas-fired water heater shall be the secondary mode of DHW production and shall operate to maintain a storage temperature of 140 deg F via the integrated control device.

2.6 PIPING, VALVE, AND EQUIPMENT IDENTIFICATION

- A. Piping identification: Provide plastic "wrap-around" identification markers indicating flow and fluid flowing for the following:
 1. Domestic Hot Water
 2. Domestic Cold Water
 3. Domestic Hot Water Recirc
 4. Vent Piping
 5. Exposed Above-ground Sanitary Drain Piping
 6. Gas Piping
- B. Markers shall be placed 30-50 ft. apart for piping in accessible areas.
- C. Markers shall be placed outside the pipe insulation and in the most obvious location for viewing.
- D. Equipment Identification: Provide laminated plastic nameplates for equipment, pumps, mixing valves, backflow preventers, and balancing valves. Nameplates shall be laminated 0.125-inch thick melamine plastic conforming to Fed. Spec. L-P-387, black with white center core. Surface shall be a matte finish, corners shall be square. Accurately align lettering and engrave into the white core. Minimum size of nameplates shall be 1.0 inch by 2.5 inches. Lettering shall be minimum of 0.25-inch high normal block lettering.
- E. Valve Tags:
 1. Attach to each valve a 1-1/2" round or octagonal brass tag with 1/2" indented numerals filled with a durable black compound. In addition to the valve numbers, each tag shall identify the system it controls. Service stop valves exposed in finished areas need not be tagged.
 2. Tags shall be securely attached to stems of valves with copper or brass "S" hooks, or chains.
 3. Valve charts shall be provided for each piping system and shall consist of schematic drawings of piping layouts, showing and identifying each valve and describing its function. Upon completion of the work, one (1) copy of each chart, sealed to rigid backboard with clear lacquer placed under glass and framed,

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shall be hung where directed. Two (2) additional unmounted copies shall be delivered to the Architect.

4. Tags and charts shall be coordinated with Section 230000 Heating System and when completed this work shall have been done sequentially.

2.7 GAS PIPING SYSTEM

- A. Rigid Gas Piping: Schedule 40 carbon steel pipe conforming to ASTM 120 or A53, with threaded joints and malleable iron fittings (Above grade).
- B. Ball Valves for Gas Service: Copper alloy with chromium plated floating ball per Federal Specification WW-V-35B, Type II, Class 3. Blowout-proof stem, reinforced teflon seats, threaded ends, quarter turn on-off, 600 WOG rating, 250 psi rating for natural gas, UL-listed as a natural gas/propane shutoff valve, Apollo Model 80-100 series.
- C. Flexible Gas Piping: OmegaFlex TracPipe (concealed above grade no joints). Provide appropriate grounding if used.
- D. Gas Pressure Regulators: Maxitrol 325 Series, lever acting, vent limiting device where allowed by manufacturer.

PART 3 EXECUTION

3.1 SURFACE CONDITIONS

- A. Inspection:
 1. Prior to work of this Section, carefully inspect the installed work of other trades and verify that such work is complete to the point where this installation may properly commence.
 2. Verify that plumbing may be installed in strict accordance with pertinent codes and regulations and the reviewed Shop Drawings.

3.2 INSTALLATION OF PIPING

- A. Provide and erect in accordance with the best practice of the trade piping shown on the drawings and as required to complete the intended installation. Make offsets as shown or required to place piping in proper position to avoid other work and to allow the application of insulation and finish painting to the satisfaction of the Architect.
- B. The size and general arrangements, as well as the methods of connecting piping, valves, and equipment, shall be as indicated, or so as to meet the requirements of the Architect.
- C. Piping shall be erected so as to provide for the easy and noiseless passage of fluids under working conditions.
- D. Install unions to facilitate removal of equipment.
- E. Copper pipe shall be reamed to remove burrs.

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- F. Connections between copper and steel piping shall be made with brass fittings.
- G. Solder joints shall be made with lead free solder. Clean surfaces to be soldered and use a paste flux. Wash joints with sodium bicarbonate and water to remove corrosive effects of heated solder paste. Caution: Lead-bearing solder is not permitted.
- H. Pipe penetrations through walls, floors and ceilings shall be in accordance with Section 230500 "Supplemental General Mechanical Requirements". Traverse points of piping shall be escutcheoned with split chrome floor and ceiling plates and spring anchors, where visible to occupancy.
- I. Provide a cleanout in the vertical position at the base of each sanitary and roof drain drop.
- J. Sanitary and vent piping shall be sized and installed at 1/4" per foot slope.

3.3 PIPE HANGERS

- A. Impact driven studs are prohibited.
- B. Copper Tubing: supported at intervals with rod sizes as follows, double nuts on hangers and on beam clips.

Copper Size	Hanger Intervals	Rod Sizes
1/2"	5'	3/8"
3/4"	6'	3/8"
1"	6'	3/8"
1-1/4"	8'	3/8"
1-1/2"	8'	3/8"
2"	10'	3/8"

- C. Cast Iron Pipe: Supported at intervals with rod sizes as follows, double nuts on hangers and on beam clips.

Cast Iron Size	Hanger Intervals	Rod Sizes
1-1/2"	5'	3/8"
2"	5'	3/8"
2-1/2"	5'	1/2"
3"	6'	1/2"
4"	7'	5/8"

- D. PVC & CPVC Pipe: Supported at 4 foot intervals.
- E. Verticals: Supported by use of clamp hangers at every story height, and at not more than 6 feet intervals for copper piping 1-1/4" and smaller size.
- F. Spring Isolators: All pipe 20' upstream and downstream of pumps.

3.4 CLOSING IN UNINSPECTED WORK

- A. General: Cover up or enclose work after it has been properly and completely reviewed.

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- B. If any of the work is covered or enclosed prior to required inspections and review, uncover the work as required for the test and review. After review, tests and acceptance, repairs and replacements shall be made by the appropriate trades with such materials as necessary for the acceptance by the Architect and at no additional cost to the Owner.

3.5 CLEANUP AND CORROSION PREVENTION

- A. Upon completion of the work thoroughly clean and flush piping systems to the sewer with water.
- B. Fixtures, piping and equipment shall be thoroughly cleaned. Dirt, dust, and debris shall be removed and the premises left in a clean and neat condition.
- C. Caulk around fixtures at floor and wall.
- D. Before covering is applied to piping systems, clips, rods, clevises and other hanger attachments, and before uncovered piping is permitted to be concealed, corrosion and rust shall be wire brushed and cleaned and in the case of iron products, a coat of approved protective paint applied to these surfaces. When corrosion is from the effects of hot solder paste, the areas shall be cleaned and polished and a wash of bicarbonate of soda and water used to neutralize the acid condition.

3.6 DISINFECTING

- A. After the entire potable water system is completed, cleaned and tested, and just before the building is ready to be occupied, disinfect the system as follows: After flushing the mains, introduce a water and chlorine solution for a period of not less than three hours before final flushing of the system.

3.7 TESTS

- A. Sanitary soil, waste and vent piping: Fill with water to top of vents, and test as required by Code.
- B. Water piping shall be tested to a pressure of 100 lbs. per square inch for at least 30 minutes. Pressure drop in this period shall not exceed two pounds per square inch. Leaks shall be repaired and system retested. Notify Architect 24 hours before test is to be performed.

3.8 INSTRUCTIONS

- A. On completion of the project, provide a competent technician to thoroughly instruct the Owner's representative in the care and operation of the system. The total period of instruction shall not exceed four (4) hours. The time of instruction shall be arranged with the Owner.

3.9 FIRESTOPPING

- A. Firestopping shall be performed in accordance with Specification Section 07840 "Firestopping". All penetrations of fire-rated assemblies including walls and floors by mechanical system components (piping, ductwork, conduits, etc.) shall be firestopped as specified.

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* END OF SECTION *

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SECTION 230000 – HVAC SYSTEM

PART 1 GENERAL

1.1 DESCRIPTION

- A. The work covered by this Section of the specifications includes the furnishing of labor, materials, equipment, transportation, permits, inspections and incidentals and the performing of operations required to install the heating and ventilating systems indicated.

1.2 RELATED DOCUMENTS

- A. The drawings and the specifications including Section 23 05 00 "Supplemental Mechanical General Requirements" are hereby made a part of the work of this section.
- B. Coordinate with Section 01 91 00 Commissioning.
- C. Drawings and general provisions of Contract including General and Supplementary Conditions and all Division 1 specification sections.
- D. Provision of waste management: Section 01 74 19, Construction Waste Management and Disposal.

1.3 SUBMITTALS

- A. Substitutions: Your attention is directed to Section 23 05 00-"Substitutions", relative to competition and the (ONLY) notation. Familiarity with this section should be achieved before reading the PRODUCTS section of this specification.
- B. The items for which the submittals paragraph in Section 23 05 00, Supplemental Mechanical General Requirements, apply are as follows:
 - 1. Fans.
- C. Section 01 33 00 - Submittal Procedures: Submittal procedures.
- D. Product Data: Submit data on product characteristics, performance criteria and limitations.
- E. Manufacturer's Installation Instructions: Submit procedure for preparation and installation.
- F. Manufacturer's Certificate: Certify products meet or exceed specified requirements.

PART 2 PRODUCTS

2.1 EQUIPMENT IDENTIFICATION

- A. Equipment Identification:
 - 1. Provide laminated plastic nameplates for boilers, pumps, and air handling units. Laminated plastic shall be 0.125-inch thick melamine plastic conforming to Fed. Spec. L-P-387, black with white center core. Surface shall be a matte finish,

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corners shall be square. Accurately align lettering and engrave into the white core. Minimum size of nameplates shall be 1.0 inch by 2.5 inches. Lettering shall be minimum of 0.25-inch high normal block lettering.

2.2 FANS

- A. Shall be model indicated on the drawing. The fan shall include housing, fan wheel, shaft, bearings, inlet shroud, motor, mounting support and mounting frame as a factory-assembled unit. An OSHA-approved belt guard shall be included. The fan drive shall have a 1.5 service factor for the maximum rated horsepower.

2.3 REFRIGERANT PIPING (Refer to Gate House ARCH Drawings)

- A. Refrigerant Piping: Dimensions and material requirements for pipe, pipe fittings and components shall conform to ASHRAE 15 and ANSI B31.5 and shall be compatible with fluids used and capable of withstanding the pressures and temperatures of the service.
- B. All piping exterior to building, shall be a minimum of type “L”, “ACR” rated straight pipe for R- 410A or as specified. All piping on the building interior shall be “L”, “ACR” rated rolled soft copper or line set for R-410A or as specified, piping (after annealing) shall have sufficient wall thickness for a continuous operating pressure of 600 PSI per ASME B 31.5-2010.
- C. Tubing used for refrigerant service shall be cleaned, sealed, capped, or plugged prior to shipment from the manufacturer's plant.
- D. All joints shall be brazed except at the indoor units which shall be flared. Brazing Materials: Provide AWS A5.8 brazing filler metal Type BAg-5 with AWS Type 3 flux, except Type BCuP-5 or BCuP-6 may be used for brazing copper-to-copper joints
 - 1. Dry Nitrogen: Dry nitrogen must be used during all brazing (pressure regulated to 3 PSI) to prevent copper plate or oxidation formation
- E. All piping shall be installed in accordance with the mechanical design. Any deviation shall be submitted for prior approval to the mechanical engineer prior to installation. Selected copper tube must be of suitable wall thickness for higher operation pressures.
- F. Flaring: Flared tube ends should have a smooth, even round flare of sufficient length to fully engage the mating surface of the flare nut, without protruding into the threads. Use only “PVE” or “POE” refrigeration oil when making flares. Dedicated flare block and tool is recommended. Only use synthetic oil on the flare tool.
- G. Pressure testing: Tighten down stop valves before any pressure testing to prevent nitrogen from leaking back through condenser and contaminating refrigerant.

Pressure testing shall be done in three

(3) steps.

Step 1 – Leak check 3 minutes at 150

PSI

Step 2 – Leak check after 5 minutes at 325 PSI

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Step 3 – Leak check after 24 hours at 550 PSI (450 psi for systems with vertical Air Handlers) Always check flare nuts for leaks using bubble solution. Be sure to use a recommended product. Do not use a watered down fairy liquid solution.

- H. Leak testing and evacuation shall be done in accordance with the US EPA “Green Chill Best Practices Guideline Ensuring Leak-Tight Installation of Commercial Refrigerant Equipment.”
- I. Evacuation procedures: Evacuation procedures shall be performed as follows:
 1. Evacuate the system to 4000 microns. Break the vacuum with dry nitrogen to a pressure of 2-3 PSI and hold for 15 minutes.
 2. Evacuate system to 1500 microns and maintain for 20 minutes. Break the vacuum with dry nitrogen to a pressure of 2-3 PSI and hold for 15 minutes.
 3. Evacuate system to below 500 microns and hold for 60 minutes.
 4. Evacuate system to below 300 microns and hold for 24 hours.

Vacuum pump check valve should be used to prevent mineral oil from being drawn into the system. These procedures must be adhered to, documented and included in the HVAC subcontractors price.

- J. Refrigerant charging: Weigh in additional refrigerant with digital scales. Calculate charge based on total line length plus lb/ft of diameter. Check with each unit model for correct multiplier. After the amount of refrigerant to be added is determined write it down on the label on the back side of the front cover. After the vacuum/drying is complete, charge the additional refrigerant in its liquid state through the liquid stop valve service port.

Make sure to use installation tools exclusively used on R410A installations to withstand the pressure and to prevent foreign material from mixing into the system.

- K. Ball valves: Ball valves for refrigerant service shall be Streamline Cyclemaster ball valves, with full port construction, rupture-proof encapsulated stem, UL Listed with a maximum working pressure of 700 psig and a working temperature range of -40°F to 300°F. Materials shall be compatible with all CFC, HCFC and HFC refrigerants and oils.

2.4 MULTI-ZONE HEAT PUMP SYSTEM (Refer to Gate House ARCH Drawings)

- A. The Split System Heat Pump Air Conditioning Systems shall be Mitsubishi Series indicated consisting of indoor units (single or multiple) served by a single outdoor condensing units. The outdoor unit shall have rated performance of heating operation at -13°F ambient temperatures (note: Submittal must include unit performance from the manufacturer at -13°F). The system shall utilize R-410A refrigerant. Piping joints and headers in the refrigeration piping shall be manufactured by the system manufacturer, piping shall be type ACR Copper. The split system shall include packaged controls including hard wired remote space sensors and condensate overflow safety switches for each indoor unit.
- B. The indoor air handling unit shall be Mitsubishi as scheduled/indicated. Cooling/Heating capacities shall be as scheduled. The system shall operate on 208V-1 phase power fed from the outdoor unit to the indoor unit. Furnish with refrigerant piping, wiring and condensate piping as recommended by the manufacturer. Units must be suitable for use

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with the refrigerant line lengths required by the unit placement as shown on the plans with no reduction in capacity. All indoor units shall include condensate overflow switches, condensate pumps, piped to nearest IW funnel or fixture P-6.

- C. The split system heat pump units shall be the model and capacity scheduled. Compressors shall be inverter-driven scroll type. Capacity shall match system load. Heat exchanger shall be a copper pipe-in-pipe structure, unit shall include a high pressure sensor and switch, inverter overcurrent/overheat protection, compressor overheat protection, auto-defrost mode.
- D. Outdoor units shall be set on the ground on 12” tall stands mounted on concrete pads as recommended by the manufacturer. Provide base pan heaters. The indoor units shall be piped in an aesthetically pleasing manner with no exposed piping. Exposed outdoor piping shall have a finished molded PVC cover. Installation shall be per the manufacturers recommendations.
- E. Controls: (1) wired remote mounted thermostat shall be provided per indoor unit. The system shall operate in either heating or cooling mode in order to satisfy the (adj.) t-stat setpoint.

PART 3 EXECUTION

3.1 SURFACE CONDITIONS

- A. Inspection:
 - 1. Prior to work of this Section, carefully inspect the installed work of other trades and verify that such work is complete to the point where this installation may properly commence.
 - 2. Verify that the heating system may be installed in accordance with pertinent codes and regulations and the reviewed Submittals.

3.2 INSTALLATION OF PIPING

- A. In general, piping shall be run concealed above ceilings in occupied areas. Piping in other areas may be run exposed. Piping shall not be exposed in occupied spaces unless written authorization is given by the Architect.
- B. Provide and erect in accordance with the best practice of the trade piping shown on the Drawings and as required to complete the intended installation. Make offsets as shown or required to place piping in proper position to avoid other work and to allow the application of insulation and finish painting to the satisfaction of the Architect.
- C. The size and general arrangements, as well as the methods of connecting piping, valves, and equipment, shall be as indicated, or so as to meet the requirements of the Architect.
- D. Piping shall be erected so as to provide for the easy and noiseless passage of heating fluid under working conditions. Inverted eccentric reducing fittings shall be used whenever water pipes reduce in size.

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- E. Install stop valves and unions to facilitate isolation and removal of equipment. Provide final connections for hydronic specialties furnished under other sections of the Specifications.
- F. Solder joints shall be made with non-lead solder. Clean surfaces to be soldered and use a paste flux. Wash joints with sodium bicarbonate and water to remove corrosive effects of heated solder paste. Hot wipe solder at each fitting.
- G. Pipe penetrations through walls, floors and ceilings shall be in accordance with Section 23 05 00 "Supplemental Mechanical General Requirements". Traverse points of piping shall be escutcheoned with split chrome floor and ceiling plates and spring anchors, where visible to occupancy.
- H. All vertical and horizontal penetrations through walls, floors and ceilings shall be sealed against air movement between spaces.

3.3 PIPE HANGERS

- A. Impact driven studs are not acceptable.
- B. Pipes (copper or steel) shall be supported at intervals and rod sizes as follows, double nuts on hangers and on beam clips.

Pipe Size	Hanger Intervals	Rod Sizes
1/2"	5'	3/8"
3/4"	6'	3/8"

- C. Verticals: Supported at the base and at intervals as follows by use of clamp hangers:

Copper Pipe and Tubing:

1-1/2" and larger - Not more than 12 ft.

1-1/4" and smaller - Not more than 6 ft.

- D. Provide welded steel saddles at each hanger on steel piping systems 4" and larger.

3.4 CLOSING IN WORK

- A. Cover up or enclose work after it has been properly and completely tested and reviewed.
- B. No additional cost to the Owner will be allowed for uncovering or recovering any work that is covered or enclosed prior to required test and review.

3.5 TEST AND ADJUST

- A. Piping Systems: Test with water to a pressure of 75 psi and hold for a period of two hours. Repair any leaks and retest the piping system; repeat process until systems are leak-free. Test piping before it is insulated.
- B. Before operating any system, flush the piping to remove oil and foreign materials.
- C. After the installation is complete and ready for operation, test the system under normal

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operating conditions in the presence of the Architect and demonstrate that the system functions as designed.

- D. Demonstrate that the HVAC systems have free and noiseless circulation of water, that all air has been purged and that systems are watertight.
- E. Correct defects which develop in operational testing, conduct additional testing until defect free operation is achieved.
- F. Provide balancing and adjusting of terminal devices in accordance with Specification Section 23 05 93.

3.6 CLEANUP AND CORROSION PREVENTION

- A. Piping and equipment shall be thoroughly cleaned. Dirt, dust, and debris shall be removed and the premises left in a clean and neat condition.
- B. Before covering is applied to piping systems, clips, rods, clevises and other hanger attachments, and before uncovered piping is permitted to be concealed, corrosion and rust shall be wire brushed and cleaned and in the case of iron products, a coat of approved protective paint applied to these surfaces. When corrosion is from the effects of hot solder paste, the areas shall be cleaned and polished and a wash of bicarbonate of soda and water used to neutralize the acid condition.

3.7 INSTRUCTIONS

- A. On completion of the project, instruct the Owner's representative in the care and operation of the system. The period of instruction shall be for not less than one 8 hour period. The time of instruction shall be arranged with the Owner. In addition to the prime Mechanical Contractor, the control system Contractor, Balancing Contractor, and Owner's representative shall be present and participate in the Owner's instruction.

3.8 FIRESTOPPING

- A. Firestopping shall be performed in accordance with Specification Section 07 84 00 "Firestopping". All penetrations of fire-rated assemblies including walls and floors by mechanical system components (piping, ductwork, conduits, etc.) shall be firestopped as specified.

* END OF SECTION *

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SECTION 230500 – SUPPLEMENTAL MECHANICAL GENERAL REQUIREMENTS

PART 1 GENERAL

1.1 RELATED DOCUMENTS

- A. The General Conditions, Supplemental General Conditions and Instructions to Bidders shall apply to this work. Read these to be familiar with conditions related to the installation of the work.
- B. Coordinate with Section 01 91 00 Commissioning.
- C. Drawings and general provisions of Contract including General and Supplementary Conditions and all Division 1 specification sections.
- D. Provision of waste management: Section 01 74 19, Construction Waste Management and Disposal.

1.2 WORK SHOWN ON DRAWINGS

- A. The drawings accompanying this specification, as a part thereof, are working drawings indicating the location and arrangement of the increments of the systems of this section of work. Material deviation from this arrangement, process or means of application, shall bear the Engineer's review stamp before the change is made on the job or materials are ordered. Changes made without such review shall be ordered removed and items installed as specified shall be provided at no additional expense to the Owner.
- B. The drawings are not intended to show in minute detail minor items of installation or materials such as specific fittings or findings.

1.3 MATERIALS AND LABOR

- A. Furnish materials and labor necessary to deliver to the Owner a complete and operable system installed in accordance with the contract documents.
- B. Materials shall be of the best quality. Workmanship shall be of highest grade and construction shall be done according to best practices of the trade.
- C. Provide, when required, labeled samples of material or equipment specified herein or proposed to be used in this work.
- D. Where words "furnish", "provide", or "install" are mentioned, either singly or in combination, these words are hereby interpreted to mean "furnish and install" or "provide and install", including materials complete with connections, supplemental devices, accessories and appurtenances, unless specifically otherwise noted. These words are likewise hereby interpreted as being prefixed to materials, equipment, and apparatus hereinafter mentioned, either in abbreviated or scheduled information or in the technical sections of the specifications.

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1.4 EQUIPMENT INSTALLATION IN HEATING SEASON

- A. The system shall be installed such that the construction area will have sufficient heat to maintain temperature above 40°F throughout the construction period.
- B. Coordinate with section 01 50 00 Temporary Facilities.

1.5 COOPERATION BETWEEN TRADES

- A. Provide information sufficiently in advance of this work, so that work by the other trades may be coordinated and installed without delays. Furnish and locate sleeves, supports, anchors and necessary access panels.
- B. Where work is concealed, assure it does not project beyond finished lines of floors, ceilings, or walls.
- C. Equipment or piping requiring access found to be located above sheetrock ceilings shall be brought immediately to the attention of the Architect for resolution.

1.6 ORDINANCES, AUTHORITIES, PERMITS, AND FEES

- A. Obtain necessary permits and licenses, give notices and comply with laws, ordinances, rules, regulations or orders affecting the work, and pay fees and charges in connection therewith.
- B. The "authority having jurisdiction" is the organization, office, or individual responsible for "approving" equipment, an installation, or a procedure.

1.7 PROTECTION OF WORK AND MATERIALS

- A. Protect and care for materials delivered and work performed until the completion of the work. Defective equipment or equipment damaged in the course of storage, installation or test shall be replaced or repaired to the satisfaction of the Engineer at no additional cost to the Owner.

1.8 INSURANCE

- A. Purchase and maintain Public Liability and Property Insurance during the progress of the work and until completion and acceptance of the entire project by the Owner in the amounts as specified in the General Conditions.

1.9 APPLICABLE CODES

- A. Work and materials shall conform to the latest rules and regulations listed below and these rules and regulations hereby are made part of this specification. They include, but are not necessarily limited to the following:

American Society for Testing and Materials (ASTM)
Underwriters' Laboratories, Inc. (UL)
Air Moving and Conditioning Assoc. (AMCA)
American Society of Heating, Refrigerating, and Air
Conditioning Engineers (ASHRAE)
American Society of Mechanical Engineers (ASME)

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National Electrical Manufacturers Association (NEMA)
Institute of Electrical and Electronics Engineers (IEEE)
American National Standards Institute (ANSI)
National Fire Protection Association (NFPA)
American Water Works Association (AWWA)
Local Fire Code
Local Plumbing Codes
American Welding Society
Maine Uniform Building and Energy Codes (MUBEC)

1.10 SHOP DRAWINGS

- A. Submit shop drawings, manufacturers' data and certificates for equipment, materials and finish, and pertinent details for each system where specified in each individual section, to be submitted to the Architect. Shop drawings will be returned "No Exceptions Taken", "Make Corrections Noted", "Amend and Resubmit", "Submit Specified Item", or "Rejected". Work shall progress in accordance with "Reviewed" shop drawings (ONLY).
- B. Shop drawings that are facsimiled, (FAX) produced, or photocopies of FAX documents will not be considered or reviewed. Only originals and or photocopied originals, or PDF files complying with this section will be considered. Submittals that include illegible pages will be rejected.
- C. Groups of similar shop drawings shall be submitted as individual bound documents with covers and indexes. Submittals shall be grouped by specification section and major paragraph number (ie 2.1, 2.2, 2.3, etc) in a separate submittal (file) and shall include all items under that paragraph. Submittals shall not include items from multiple major paragraphs and shall be rejected without review if they do (the exception to this is that Automatic Temperature Controls may be submitted as a single submittal, Automatic Fire Protection (sprinkler) may also be submitted as a single submittal.) Rejection of individual items shall not be cause for rejection of the entire document.
- D. Clearly indicate item(s) to be reviewed on each submission by **highlighting**, underlining or indicating with arrows, the intended item(s). All proposed options and accessories shall be clearly marked to identify what is to be provided. Submissions not clearly marked shall be returned "Amend and Resubmit".
- E. Shop drawings must bear the Engineer's review stamp. In the event that the Engineer returns shop drawings "Amend and Resubmit" or "Rejected", the shop drawing must be revised and resubmitted for review.
- F. Furnishing of the specified item must still produce the results and performance, dependability and quality reasonably to be expected within the spirit of the specifications, drawings, and the standard of good mechanical performance normal to the trade.
- G. Section 01 33 00 - Submittal Procedures: Submittal procedures.
- H. Product Data: Submit data on product characteristics, performance criteria and limitations.
- I. Manufacturer's Installation Instructions: Submit procedure for preparation and installation.
- J. Manufacturer's Certificate: Certify products meet or exceed specified requirements.

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1.11 SUBSTITUTIONS

- A. Where the specifications allow the substitution of a product, still this product is subject to review by the Engineer in accordance with the paragraph entitled "Shop Drawings". Review of a substitute item is an indication only that the substitute item is compatible with the specified item as a claim of the manufacturer. Insure dimensional propriety, performance, and quality of the substitute item.
- B. Reference in the specifications or on the drawings to any product, material, fixture, form or type of construction, by proprietary name, manufacturer, make or catalog number, establishes a standard of quality or design and is not meant to limit competition. Use any equivalent substitute provided favorable written review by the Engineer is first obtained. The (ONLY) notation in the specification is an exception to this and leaves no option.
- C. For materials or equipment which are supplied with integral or factory applied finish, the colors will be considered in evaluating substitutions.
- D. For the purpose of avoiding conflicts with other trades, contracts, and adjoining work where more than one (1) article, device, material, fixture, form or proprietary name, manufacturer, make or catalog number, the first named shall be used as the basis of design and details. The cost of any changes because of substituted item shall be borne by the Contractor requesting such change.

PART 2 PRODUCTS

NOT USED

PART 3 EXECUTION

3.1 EQUIPMENT SUPPORTS

- A. Furnish and install equipment supports for mechanical equipment as required. Supports shall be subject to review by the Engineer.

3.2 SLEEVES AND PREPARED OPENINGS

- A. Coordinate cutting, patching and setting of sleeves, frames, framing and lintels for openings with other trades. Sleeves shall be furnished by the Contractor. All penetrations through concrete shall be sleeved as required by IBC.
- B. Failure to give timely notice of and to locate openings and furnish sleeves shall cause no additional expense to the Owner.

3.3 CONNECTION TO EQUIPMENT

- A. Provide piping connections, supports, brackets, compensators or flexible connections to prevent application of excessive stresses to equipment.
- B. Equipment shall be installed with flanges or unions in such a manner as to permit disconnecting for removal of tubes, coils, elements and other equipment for inspection, service and repairs.

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3.4 ACCESS TO EQUIPMENT

- A. The installation of work performed shall provide reasonable accessibility for operation, inspection, and maintenance of equipment and accessories. The Engineer shall determine the adequacy of such accessibility.

3.5 ACCESS PANELS

- A. Access panels shall be provided where indicated on the drawings and as required for access to fire dampers, smoke dampers, valves and other serviceable components.
- B. Access panels installed in fire-rated assemblies shall have the same fire rating as the assembly.

3.6 PAINTING OF EQUIPMENT

- A. Exposed ironwork, including steel supports and hangers in unfinished spaces, mechanical rooms, pits, and trenches shall be properly cleaned, prepared and painted with two (2) coats of black asphaltum varnish.

3.7 GUARDS

- A. Exposed moving and rotating elements of mechanical equipment items shall be protected with suitable guards for personnel protection. Guards shall be of rigid construction, firmly positioned. Holes shall be provided in guards at shaft centers to facilitate tachometer readings.

3.8 LUBRICATION

- A. Furnish and install grease fittings for points requiring lubrication. Furnish extension type fittings as required to provide easy access for maintenance lubrication.
- B. Furnish initial charges of lubricants for equipment. Lubricants shall be in conformance with the manufacturer's requirements and recommendations.

3.9 ELECTRIC MOTORS AND MOTOR CONTROLS

- A. Unless otherwise noted, motors, motor starters and other electrical accessories which are specified under Mechanical specifications shall be selected with characteristics as follows:
 - 1/2 Horsepower and less - 120 volt, 1 phase, 60 Hz.
 - 3/4 Horsepower and greater - 208 volt, 3 phase, 60 Hz.
- B. Motors shall be built in accordance with the latest applicable NEMA, IEEE and ANSI Standards. Motors shall be of the latest type and quality specified under individual items of equipment.
- C. Magnetic motor starters for mechanical items of equipment shall be furnished under Division 26 unless the starter is an integral part of a factory packaged item of equipment. Each starter furnished as an integral item of equipment shall be provided with overload heater elements. Starters shall have single phase protection or shall have relays installed to

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provide this feature. Starters shall be equipped with suitable step-down transformers to provide required control voltage.

- D. Motors shall have a minimum continuous duty service factor of 1.15. Minimum motor efficiency shall be:

MOTOR HORSEPOWER	PERCENTAGE EFFICIENCY		
	(1200RPM)	(1800 RPM)	(3600 RPM)
1,1-1/2,2,3	---	78.0	76.0
5	87.4	87.4	86.3
7.5	89.4	89.8	87.7
10	89.7	90.3	89.0

3.10 CLEANING OF SYSTEMS

- A. Piping systems shall be thoroughly cleaned and flushed prior to initial operation.
- B. Thoroughly clean exposed portions of the mechanical installation, removing labels and foreign substance.
- C. Furnish detergents, solvents, cleaning compounds, and tools required for cleaning operations.
- D. Keep the premises free from accumulation of waste material or rubbish and at the completion of the work, remove from the job site tools, scaffolding, surplus materials, and rubbish, leaving the work areas "broom" clean.

3.11 STARTING OF EQUIPMENT

- A. Testing or starting of equipment shall be done in collaboration with trades concerned to insure safe and proper operation of the equipment.
- B. Prior to starting equipment, provide lubrication at required points. Before starting any electrical or electric motor driven equipment, a check must be made to insure that proper heater coils are installed in the starters and that the equipment is rotating in the proper direction.

3.12 OPERATIONAL TESTING

- A. Operate systems until successful operation is demonstrated to the Engineer. This initial operation shall be in addition to the testing of the system and shall be done after the system is cleaned and finished.

3.13 RECORD DRAWINGS

- A. During construction, keep an accurate record of deviations to the installation of the work as indicated on the drawings. Upon completion of the work, furnish a copy of this record to the Engineer. **Submit record drawings before requesting final payment.**

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3.14 MANUFACTURER'S REPRESENTATIVE

- A. As indicated in the Technical Sections of this specification or as directed by the Engineer, provide the services of a factory trained Engineer or Technician to inspect, adjust, and place in proper operating condition the equipment or item involved. No additional compensation will be allowed for such service.

3.15 MANUFACTURER'S INSTRUCTIONS, OPERATION AND MAINTENANCE DATA

- A. Provide for each item of equipment or apparatus furnished, a complete set of printed instructions obtained from the manufacturer covering proper operation, maintenance, lubrication, cleaning, servicing, adjustment, and safety instructions.
- B. Manufacturer's data shall include performance data (curves are preferred where applicable) complete parts lists, recommended spare parts lists, piping, and wiring diagrams.
- C. Arrange data in complete sets, properly indexed and marked.
- D. Data shall include a complete set of shop drawings.
- E. Material shall first be submitted in preliminary form for review by the Engineer. After review, submit two (2) copies in bound volumes to the Engineer for distribution.

3.16 GUARANTEES

- A. An item becomes "defective" when it ceases to conform to the Contract Documents. Guarantees begin on the date of issuance of a certificate authorizing final payment or certificate of substantial completion with the Owner taking occupancy or beneficial use thereafter.
- B. Upon completion of the work and before applying for final payment, furnish a written guarantee, stating that the work complies with the provisions of codes listed herein and the local enforcing authorities, and that it will be free from defects of material and workmanship for not less than one (1) year. Guarantee shall further state that the Contractor will, at his own expense, repair or replace any of his material and work which may become defective during the time of guarantee, together with other work damaged as a consequence of such defects.
- C. Repeated malfunctioning or failure in service of any item or work of the system is sufficient cause for the Engineer to order the removal of the item, and its replacement with new item at the expense of the Contractor.

3.17 FIRESTOPPING

- A. Firestopping shall be performed in accordance with Specification Section 07 84 00 Firestopping. All penetrations of fire-rated assemblies including walls and floors by mechanical system components (piping, ductwork, conduits, etc.) shall be firestopped as specified.

* END OF SECTION *

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SECTION 230700 - INSULATION

PART 1 GENERAL

1.1 RELATED DOCUMENTS

- A. The drawings and the specifications including Section 23 05 00 “Supplemental General Mechanical Conditions” are hereby made a part of the work of this section.
- B. Coordinate with Section 01 91 00 Commissioning.
- C. Drawings and general provisions of Contract including General and Supplementary Conditions and all Division 1 specification sections.
- D. Provision of waste management: Section 01 74 19, Construction Waste Management and Disposal.

1.2 DESCRIPTION

- A. The work covered by this Section of the specifications includes the furnishing of labor, materials, equipment, transportation, permits, inspections and incidentals and the performing of operations required to insulate the heating, ventilating, air conditioning, and plumbing systems.

1.3 SUBMITTALS

- A. Substitutions: Your attention is directed to Section 23 05 00-"Substitutions", relative to competition and the (ONLY) notation. Familiarity with this section shall be achieved before reading the PRODUCTS section of this specification.
- B. The items for which the submittals paragraph in Section 23 05 00, Supplemental General Mechanical Requirements, apply are as follows:
 - 1. Piping insulation.
 - 2. Duct insulation.
 - 3. Equipment insulation.
 - 4. Insulation application schedule.
 - 5. Vapor barrier coating.
- C. Section 01 33 00 - Submittal Procedures: Submittal procedures.
- D. Product Data: Submit data on product characteristics, performance criteria and limitations.
- E. Manufacturer's Installation Instructions: Submit procedure for preparation and installation.
- F. Manufacturer's Certificate: Certify products meet or exceed specified requirements.

1.4 DEFINITIONS

- A. Finished Spaces: Spaces other than furred spaces, pipe and duct shafts, unheated spaces immediately below roof, spaces above ceilings, unexcavated spaces, crawl spaces, and tunnels, unless specifically listed below as an unfinished space.
- B. Unfinished Spaces: Mech/Elect Rooms and attic.

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- C. Unconditioned Spaces: Spaces exposed to near outside ambient temperatures (attic) and spaces not air conditioned.
- D. Outside: Areas beyond the exterior side of walls or above the roof, unexcavated spaces, and crawl spaces.
- E. Concealed: Not visible in finished or unfinished spaces. For example, above ceilings, below floors, between double walls, furred-in areas, pipe and duct shafts, and similar spaces.
- F. Exposed: Visible from a finished or unfinished space.

1.5 MANUFACTURER'S STAMP OR LABEL

- A. Packages or standard containers of insulation, jackets, cements, adhesives, and coatings delivered to the project site for use must have the manufacturer's stamp or label attached giving name of manufacturer, brand, and description of material. Insulation shall be asbestos-free.

1.6 FLAME SPREAD AND SMOKE DEVELOPED RATINGS

- A. Materials shall have a flame-spread rating of not more than 25 and a smoke developed rating of not more than 50 when tested in accordance with NFPA 255, ASTM E84, or UL 723.
- B. Provide materials with flame resistant treatments not subject to deterioration due to aging, moisture, high humidity, oxygen, ozone, or heat.
- C. Materials Exempt from Fire-Resistant Rating: Nylon anchors for securing insulation to ducts or equipment.

PART 2 PRODUCTS

2.1 PIPING INSULATION

- A. Fiberglass: Heavy density preformed fiberglass with thermal conductivity of 0.29 Btu-in/hr-ft²-°F at 150°F mean temperature. Insulation shall conform to ASTM C547 Class I and shall be suitable for 450°F service. Fitting insulation shall be of same material used for pipe.
 - 1. Insulation Jacket: All service (ASJ) type conforming to Fed. Spec. HH-B-100B Type I. Jacket permeability shall not exceed 0.02 perms (ASTM E96). Pipe fitting jacket shall be factory premolded, one-piece, PVC covers with pressure sensitive taped joints. Jackets in exposed locations shall have a white surface suitable for field painting. Provide vapor barrier as required by service.
- B. Flexible Unicellular: Flexible unicellular with thermal conductivity of 0.27 Btu-in/hr-ft²-°F at 75°F mean temperature. Insulation shall conform to ASTM C534, Type I, Tubular and shall be suitable for 200°F service. Fitting insulation shall be of same material used for pipe. Permeability shall not exceed 0.10 perms (ASTM E96). Insulation adhesive shall conform to Mil. Spec. MIL-A-24179A, Type II, Class 1.
- C. Fittings, Flanges, and Valves: Provide insulation for fittings, flanges, and valves premolded, precut, or job fabricated of the same thickness and conductivity as used on adjacent piping.

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- D. Insulation Kit: Insulate exposed supply and waste piping at handicapped accessible sinks with fully molded insulation kit. McGuire Products ProWrap, 3/16" thick closed vinyl with anti-microbial additive, 1.02 Btu-in/hr-F²-°F thermal conductivity, white color.
- E. Exposed exterior pipe insulation shall have a glossy white PVC jacket with solvent welded seams and joints for a weathertight installation. Insulated and Heat-traced exposed above grade piping located in the unheated Garage Areas shall be jacketed. Exposed insulated piping located in public areas within 7'-0" of the finished floor shall be jacketed.

2.2 EQUIPMENT INSULATION

- A. Fiberglass (Hot Equipment): Semi-rigid fiberglass board conforming to Fed. Spec. HH-I-558B, Form B, Type I. Thermal conductivity shall be 0.32 Btu-in/hr-ft²-°F at 150°F mean temperature (ASTM C177), insulation shall be suitable for 650°F service. Insulation jacket shall be "all service" type conforming to Fed. Spec. HH-I-100B Type I or II. Jacket permeability shall not exceed 0.02 perms (ASTM E96).
- B. Flexible Unicellular (Cold Equipment): Flexible unicellular with thermal conductivity of 0.27 Btu-in/hr-ft²-°F at 75°F mean temperature. Insulation shall conform to ASTM C534, Type II, sheet and shall be suitable for 200°F service. Permeability shall not exceed 0.10 perms (ASTM E96). Insulation adhesive shall conform to Mil. Spec. MIL-A-24179A, Type II, Class 1.

2.4 VAPOR BARRIER COATING

- A. Raw (cut) ends of fiberglass pipe insulation shall be finished (protected) with the application of a suitable vapor barrier coating or finishing cement (mastic) to maintain the continuous visual and functional integrity of the insulation jacket. Mastic shall be Childers "Chil-Perm" CP-30, elastomeric resin, or approved equal, applied in accordance with the manufacturer's recommendations.

PART 3 EXECUTION

3.1 SURFACE CONDITIONS

- A. Inspection:
 - 1. Prior to work of this Section, carefully inspect the installed work of other trades and verify that such work is complete to the point where this installation may properly commence.
 - 2. Verify that the insulation systems may be installed in accordance with pertinent codes and regulations and the reviewed Submittals.

3.2 GENERAL

- A. Insulate after system tests have been completed and surfaces to be insulated have been cleaned of dirt, rust, and scale and are dry.
- B. Install insulation with jackets drawn tight and cement down longitudinal and end laps. Do not use scrap pieces where a full length section will fit. Insulation shall be continuous through sleeves, wall and ceiling openings, except at fire dampers in duct systems and pipe penetrations through fire rated assemblies. Extend surface finishes to protect ends, and raw edges of insulation. Apply coatings and adhesives at the manufacturer's recommended coverage per

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gallon. Individually insulate piping and ductwork. Keep insulation dry during the application of the finish. Bevel and seal the edges of exposed insulation.

- C. Unless otherwise indicated, do not insulate the following:
1. Factory pre-insulated flexible ductwork.
 2. Factory pre-insulated ductwork, plenums, casings, mixing boxes, and filter boxes.
 3. Chrome plated pipes and fire protection pipes.
 4. Vibration isolating connections
 5. Adjacent insulation
 6. ASME stamps, nameplates, access plates
 7. Ductwork exposed to view in a normally occupied space.
 8. Hydronic specialties: Low water cutoff, relief valves, relief valve discharge piping, pressure reducing valves, and expansion tanks.
 9. Unions and flanges at equipment required for frequent service.

3.3 PIPING INSULATION

- A. Pipe Insulation (Fiberglass): Place sections of insulation around the pipe and joints, tightly butt into place. Draw jacket laps tight and smooth. Secure jacket with fire resistant adhesive, or factory applied self sealing lap. Cover circumferential joints with butt strips, not less than 3-inches wide, of material identical to the jacket material. Overlap longitudinal laps of jacket material not less than 1-1/2 inches. Adhesive used to secure the butt strip shall be the same as used to secure the jacket laps. Exposed fiberglass shall be coated with vapor barrier coating.
- B. Flanges, Unions, Valves and Fittings Insulation (Fiberglass): Factory fabricated removable and reusable insulation covers. Place factory pre-molded, precut or field-fabricated segmented insulation of the same thickness and conductivity as the adjoining pipe insulation around the flange, union, valve, and fitting abutting the adjoining pipe insulation. Install factory premolded one-piece PVC fitting covers over the insulation and secure by stapling or with metal or plastic tacks made for securing PVC fitting covers and secure with PVC vapor barrier tape.
- C. Pipe Insulation (Flexible Unicellular): Bond cuts, butt joints, ends, and longitudinal joints with adhesive. Miter 90-degree turns and elbows, tees, and valve insulation. Insulate flanges, unions, valves, and fittings.
- D. Where penetrating roofs and exterior walls, insulate piping to a point flush with the underside of the deck or wall and seal with a vapor barrier coating.
- E. Hangers and Anchors: Pipe insulation shall be continuous through pipe hangers. Where pipe is supported by the insulation, provide MSS SP-58, Type 40 galvanized steel shields (16 gage maximum). For fiberglass insulation systems on pipe sizes 2 inches through 3", provide insulation inserts at points of hangers and supports. Insulation inserts shall be of molded glass fiber (minimum 12 pcf). Insulation inserts shall cover the bottom half of the pipe circumference, 180 degrees, and be not less than 4" long. Vapor-barrier facing of the insert shall be of the same material as the facing on the adjacent insulation. Seal inserts into the insulation. Insulation inserts for pipe sizes 4" and larger shall be welded pipe saddles. Install insulation in void area of saddle of same material used on adjacent insulation. For pipe sizes 2" and smaller, insulation inserts for flexible unicellular insulation systems shall be wooden doweling set on end of length equal to insulation thickness. Seal dowel to insulation with adhesive.

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- F. PVC or Metal Jackets: Provide over insulation where subject to abuse. Machine cut jacket to smooth edge of circumferential joints. Overlap metal jacket not less than 2 inches at longitudinal and circumferential joints and secure with metal bands at not more than 9 inch centers. Overlap longitudinal joints down to shed water. Seal circumferential joints with a coating recommended by insulation manufacturer for weatherproofing. Solvent weld PVC jacket system to provide continuous watertight seal.

3.4 EQUIPMENT INSULATION

- A. General Procedures: Apply equipment insulation suitable for temperature and service to fit as closely as possible to equipment. Join sections of insulation with adhesive. Bevel insulation around name plates, ASME Stamp, and access plates. For insulation on equipment that must be opened periodically for inspection, cleaning, or repair, construct insulation to be removable and replaceable without damage. Provide vapor barrier seal at joints and seams for "cold" equipment.
- B. Heating Equipment: Provide semi-rigid mineral fiber board insulation. Seal longitudinal and lateral seams with FSK tape. Bond cuts, ends, and mitered sections with adhesive. Provide a vinyl-acrylic mastic coating on exposed fiberglass ends.
- C. Cold Equipment: Provide flexible unicellular sheet insulation, bond cuts, butt joints, longitudinal joints and ends with vapor barrier adhesive. Vapor seal exposed edges to equipment.

3.5 INSULATION APPLICATION SCHEDULE

SERVICE	THICKNESS	MATERIAL/JACKET
PIPING (including PEX tubing):		
Domestic Cold Water Piping		
1" and smaller	1"	Fiberglass w/ASJ or Flexible Unicellular
1 1/4" and larger	1 1/4"	Fiberglass w/ASJ or Flexible Unicellular
Domestic Hot Water Piping and Domestic Hot Water Recirculation Piping		
1" and smaller	1"	Fiberglass w/ASJ or Flexible Unicellular
1-1/2 and 1-1/4	1-1/2	Fiberglass w/ASJ or Flexible Unicellular
2" and larger	2"	Fiberglass w/ASJ or Flexible Unicellular
Water and Drain Piping Under Handicap Accessible Fixtures		Insulation Kit

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Refrigeration piping

1" and smaller

3/4"

Flexible Unicellular
(w/PVC jacket outdoors)

<u>SERVICE</u>	<u>THICKNESS</u>	<u>MATERIAL/JACKET</u>
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EQUIPMENT:

Water Meter

1/2"

Flexible Unicellular

Flexible Connectors, Valves, etc.

1/2"

Flexible Unicellular

3.6 FIELD INSPECTION

- A. Visually inspect to ensure that materials used conform to specifications. Inspect installations progressively for compliance with requirements.

3.7 FIRESTOPPING

- A. Firestopping shall be performed in accordance with Specification Section 07 84 00 "Firestopping & Smoke Seals". All penetrations of fire-rated assemblies including walls and floors by mechanical system components (piping, ductwork, conduits, etc.) shall be firestopped as specified.

* END OF SECTION *

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SECTION 260000 - GENERAL ELECTRICAL REQUIREMENTS

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Basic Electrical Requirements specifically applicable to Divisions 26, 27 and 28 Sections.

1.02 REFERENCES

- A. ANSI/NFPA 70 - National Electrical Code.
- B. ANSI C2 - National Electrical Safety Code.
- C. ANSI/NFPA 101 - Life Safety Code.

1.03 RELATED REQUIREMENTS

- A. Conditions of the Contract and Division 1 - General Requirements, apply to all work, including work of this Division. Examine all contract documents for requirements affecting this work.

1.04 SUBMITTALS

- A. Submit under provisions of Division 01.
- B. Submit shop drawings and product data grouped to include complete submittals of related systems, products, and accessories in a single submittal.
- C. Mark dimensions and values in units to match those specified.
- D. Provide fixture schedule, lighting drawings, panelboard schedules and single line or risers diagram(s) to supplier for assistance in pricing as applicable. Contractor shall receive one set of black line drawings for reproduction from the engineer for this purpose.

1.05 REGULATORY REQUIREMENTS

- A. Conform to applicable local, State and Federal Building Code for the State of Maine.
- B. Electrical: Conform to NFPA 70, NFPA72, NFPA 99, NFPA 101, ANSI C2, 2 FM, UL, and applicable ASTM and ANSI Standards.
- C. Contractor shall visit the site to become familiar with all existing conditions affecting this work. No claim shall be recognized for extra compensation due to failure of contractor to familiarize himself/herself with the conditions and extent of proposed work.
- D. Obtain permits and request inspections by local authority having jurisdiction.

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1.06 PROJECT/SITE CONDITIONS

- A. Install Work in locations shown on Drawings, unless prevented by Project conditions.
- B. Prepare drawings showing proposed rearrangement of Work to meet Project conditions, including changes to Work specified in other Sections. Obtain permission of Engineer before proceeding.

1.08 TEMPORARY LIGHT AND POWER

- A. Temporary light and power shall be installed and maintained by the Electrical Contractor for use by all trades for the duration of construction complete with all wiring, switches, protective devices and similar equipment as may be required. Arrangement for the temporary service with the Power Company is the responsibility of the Electrical Contractor. Power bills will be paid by the General Contractor. Provide 120/208 volt or 120/240 volt 100 ampere, drop box similar to standard CMP detail 980-31.1.4. Provide 15-20 watt self ballasted compact fluorescent, lamps with plastic “cages” as needed. or 4 foot twin lamp (T8) fluorescent tamper-proof, gasketed and water-tight as required.

1.09 CONTRACT DRAWINGS AND SPECIFICATIONS

- A. It is to be understood that drawings accompanying these specifications are intended to show general arrangement and extent of work to be done, but exact location and arrangement of all components shall be determined as work progresses. Anything shown on the drawings and not specifically mentioned in specifications or vice versa shall be considered as required in both.
- B. Locations of equipment, and materials, etc., as given on drawings are approximate unless dimensioned. It shall be understood they are subject to such modifications as may be found necessary or desirable at time of installation in order to meet any structural conditions. Such changes shall be made by the contractor without extra charges.
- C. Because of small scale drawings, all required offsets, etc., as may be required to clear work of other Contractors, may not be shown. Contractor, however, shall provide all necessary offsets, etc., as required to complete the installation of their work and not conflict with that of others.
- D. It is the intention that wiring systems shall be complete and fully operational. The contractor shall identify system components during the bid process that clearly constitute conditions that would cause the system to be incomplete. Clarification: The remedy to these discrepancies shall be communicated by the engineer to all bidders or included as an addenda.

1.10 MATERIALS AND LABOR

- A. Bidders for this work shall carefully examine the Plans and Specifications, as the Contractor shall be required to furnish all materials and labor necessary to deliver to the Owner a complete system installed in full accordance with Local State and Federal laws. The system shall be furnished as specified, tested, and turned over to the Owner in perfect operating condition.

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- B. All materials shall be new and of best quality of their respective kinds. Workmanship in all respects shall be of highest grade and all construction shall be done according to best practices of the trade. Materials shall be warrantied directly by the manufacturer.
- C. Contractor shall provide, when required for review of Engineer, labeled samples of any material or equipment specified herein or proposed to be used on this project.
- D. Where words "furnish", "provide" or "install" are mentioned, either singly or in combination, these words are hereby interpreted to mean "furnish and install" or "provide and install," including all materials complete with all connections, supplemental devices, accessories and appurtenances, unless specifically otherwise noted. These words are likewise hereby interpreted as being prefixed to all materials, equipment, and apparatus hereinafter mentioned, either in abbreviated or schedule information.

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1.11 PROTECTION OF WORK AND MATERIALS

- A. Contractors shall be responsible for the care and protection of all materials delivered and labor performed until the completion of the work.
- B. Cap all uncompleted lines, raceways, and ducts until ready for final connections, or future work as indicated.
- C. All portions of the work liable to damage by weather or by those engaged on the project, must be securely protected by temporary, but substantial covering which must be maintained in position until Engineer authorizes removal.

1.12 REPLACEMENTS

- A. In the event of damage to any equipment or materials, immediately make all repairs and replacements necessary to the approval of the Engineer at no additional cost to the Owner.

1.13 SAFETY REGULATIONS

- A. All work to be performed and/or installed shall conform to all requirements of the Occupational Safety and Health Act (OSHA) of 1970 and all Amendments thereto.

1.14 INSURANCE

- A. The Contractor shall purchase and maintain all Workmen's 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.

1.15 QUALITY ASSURANCE/CONTROL OF INSTALLATION

- A. Monitor quality control over suppliers, manufacturers, Products, services, site conditions, and workmanship, to produce Work of specified quality.
- B. Comply fully with manufacturers' instructions, including each step in sequence.
- C. Should manufacturers' instructions conflict with Contract Documents, request clarification from Engineer before proceeding.
- D. Comply with specified standards as a minimum quality for the Work except when more stringent tolerances, codes, or specified requirements indicate higher standards or more precise workmanship.
- E. Perform work using persons qualified to produce workmanship of specified quality.
- F. Secure Products in place with positive anchorage devices designed and sized to withstand stresses, vibration, and physical distortion or disfigurement.

1.16 SCHEDULE OF MATERIALS AND EQUIPMENT

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- A. As soon as practicable, and before commencement of installation of any material or equipment, a complete schedule of materials and equipment proposed for installation shall be submitted for review. Schedule shall also include a list of all proposed subcontractors. Partial or incomplete lists will not be considered. Any materials, fixtures, and equipment not conforming to specifications may be rejected. Also see Section 01300, Submittals.
- B. Orders for purchase of any devices, material, conduit, etc., or other equipment shall not be placed until this schedule is reviewed.

1.17 UNDERWRITER'S APPROVALS

- A. All electrical materials and equipment shall bear label of Underwriter's Laboratories, shall be listed by them in their list of electrical fittings and shall be approved by them for purpose for which they are to be used, unless materials and equipment are of a type for which Underwriter's Laboratories does not list or provide label service.

1.18 SUBSTITUTIONS

- A. Where the specifications allow the substitution of a product for that which has been specified, said substitution must be reviewed by the Engineer and shall be equivalent in all respects to that which is specified. The Engineer's decision shall be obtained on all questions as follows, and his/her judgment shall be final and binding on all parties.
- B. Reference in the specifications or on the drawings to any product, material, fixture, form or type of construction, etc., by proprietary name, manufacturer, make or catalog number, shall be interpreted as establishing a standard of quality or design and shall not be construed as limiting competition. The Contractor may, at his/her option, use any fully equivalent substitute provided written review by the Engineer is first obtained indicating acceptance of the equality of the substitute preferred.
- C. For materials or equipment which are supplied with integral or factory applied finish, the colors of same shall be considered in evaluating substitutions.
- D. For the purpose of avoiding conflicts with other trades, contracts, and adjoining work where more than one (1) article, device, material, fixture, form or type of construction, etc., is referred to by proprietary name, manufacturer, make or catalog number, the first named shall be used as the basis of design and details. The cost of any changes of approved equivalent item shall be borne by the Contractor requesting such change.

1.19 RECORD DRAWINGS

- A. During construction, the Contractor shall keep an accurate record of all deviations to the installation of the work as indicated on the drawings. Upon completion of the work, the Contractor shall furnish a copy of this record to the Engineer, on a black line of the original which will be available from the Engineer. Submit record drawings before requesting final payment.

1.20 MANUFACTURER'S REPRESENTATIVE

- A. At appropriate times, or as directed by the Engineer, provide the services of a competent

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factory trained Engineer or Technician of the particular manufacturer of equipment or item involved, to inspect, adjust, and place in proper operating condition any and all such items of manufacture. No additional compensation shall be allowed Contractors for such service.

1.21 MANUFACTURERS' INSTRUCTIONS, AND OPERATION AND MAINTENANCE DATA

- A. Provide for each item of equipment or apparatus furnished, a complete set of printed instructions obtained from the manufacturer covering proper operation, care, lubrication, cleaning, servicing, adjustment, etc., together with any special safety instructions.
- B. Manufacturers' data shall further include performance data (time current curves, where applicable), complete parts lists, recommended spare parts lists, and wiring diagrams.
- C. Data shall be arranged in complete sets, properly indexed and marked.
- D. Data shall include complete set of shop drawings.
- E. Material shall first be submitted in preliminary fashion for review by Engineer. After approval, Contractor shall submit two (2) copies in bound volumes to the Engineer for distribution.
- F. Provide contacts for service agencies for all major system components.

1.22 GUARANTEES

- A. An item becomes "defective" when it ceases to conform to this Contract Document. Guarantees beginning on the date of issuance of the Owner's final payment, or certificate of substantial completion, with Owner taking occupancy or beneficial use thereafter.
- B. Upon completion of the work and before applying for final payment, furnish a written guarantee, stating that the work complies with the provisions of codes listed herein and the local enforcing authorities, and that it will be free from defects of material and workmanship for the required guarantee period. Guarantee shall further state that the Contractor will, at his own expense, repair and/or replace any of his material and work which may become defective during the time of guarantee, together with other work damaged as a consequence of such defects. All manufacturers written warranties shall apply to materials. Warranties other than that of the manufacturer are not acceptable.
- C. The guarantee period shall be one (1) year except when longer periods are indicated for specific equipment.
- D. All materials in Division 26 where a written warranty is published shall require the warranty to be offered by the product manufacturer.

PART 2 PRODUCTS

Not used.

PART 3 EXECUTION

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3.01 CONNECTION TO EQUIPMENT

- A The Contractor shall be responsible for proper wiring and raceway connections to equipment, make sure of alignment, both initially and under operating conditions, and provide proper supports, brackets, means of expansion, etc., to make sure that no excessive stresses are applied to equipment. Raceways shall be run to the equipment and alignment checked before final bolting and fastening.
- B At the request of the Engineer, dismantle equipment connections to demonstrate proper installation and make such corrections necessary without additional compensation for disassembly, re-connection, or the required corrective work.
- C Equipment shall be installed in such a manner as to permit disconnecting for service and repairs without the necessity of rigging.

3.02 CLOSING IN UNINSPECTED WORK

- A General: Do not cover up or enclose work until it has been properly and completely inspected and approved. Engineer may waive this requirement by written permission.
- B Noncompliance: Should any of the work be covered up or enclosed prior to all required inspections and approvals, uncover the work as required, and after it has been completely inspected and approved, make all repairs and replacements with such materials as are necessary to the approval of the Engineer and at no additional cost to the Owner.

3.03 CLEANING OF SYSTEMS

- A All wiring systems shall be thoroughly cleaned prior to initial operation and in accordance with manufacturer's instructions for equipment to be furnished and/or installed.
- B Furnish all detergents, solvents, cleaning compounds, tools, etc., required in connection with cleaning operations.
- C Thoroughly clean all exposed portions of all equipment, remove all labels, and wipe clean with a damp rag.

3.04 TESTING, BALANCING, AND ADJUSTING

- A Electrical loads shall be balanced on all phase legs to a tolerance of plus or minus 10 percent. Include testing circuits for shorts to ground. Measure grounding system resistance. Correct all deficiencies. Provide all test equipment.

3.05 INSTRUCTIONS

- A On completion of the job, Contractor shall provide competent technicians to thoroughly instruct the Owner's representative in the care and operation of the system. The total period of instruction shall not exceed 2 hours and be performed in a minimum of one interval. The time of instruction shall be arranged with the Owner. The Electrical subcontractor shall be present and participate in the Owner's instruction.

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3.06 FIRESTOPPING

- A Firestopping shall be performed in accordance with Specification Section “Firestopping”. All penetrations of fire-rated assemblies including walls and floors by electrical system components (conduits, cables, trays, etc.) shall be firestopped as specified. Coordinate size, location and type of sleeves as required by firestopping systems.

*** END OF SECTION ***

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SECTION 260519 - LOW-VOLTAGE ELECTRICAL POWER CONDUCTORS AND CABLES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section Includes:
 - 1. Building wires and cables rated 600 V and less.
 - 2. Connectors, splices, and terminations rated 600 V and less.

1.3 ACTION SUBMITTALS

- A. Product Data: For each type of product.

PART 2 - PRODUCTS

2.1 CONDUCTORS AND CABLES

- A. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
 - 1. General Cable Technologies Corporation.
 - 2. Southwire Incorporated.
 - 3. The Okonite Company.
- B. Copper Conductors: Comply with NEMA WC 70/ICEA S-95-658.
- C. Conductor Insulation: Comply with NEMA WC 70/ICEA S-95-658 for Type THHN-2-THWN-2.
- D. Multiconductor Cable: Comply with NEMA WC 70/ICEA S-95-658 for Metal Clad cable, Type MC or SO cable.

2.2 CONNECTORS AND SPLICES

- A. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

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1. AFC Cable Systems, Inc.
2. Gardner Bender.
3. Hubbell Power Systems, Inc.
4. Ideal Industries, Inc.
5. IlSCO; a branch of Bardes Corporation.
6. NSi Industries LLC.
7. O-Z/Gedney; a brand of the EGS Electrical Group.
8. 3M; Electrical Markets Division.
9. Tyco Electronics.

- B. Description: Factory-fabricated connectors and splices of size, ampacity rating, material, type, and class for application and service indicated.

2.3 SYSTEM DESCRIPTION

- A. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.
- B. Comply with NFPA 70.

PART 3 - EXECUTION

3.1 CONDUCTOR MATERIAL APPLICATIONS

- A. Feeders: Copper for feeders smaller than No. 4 AWG; copper or aluminum for feeders No. 4 AWG and larger. Solid for No. 10 AWG and smaller; stranded for No. 8 AWG and larger.
- B. Branch Circuits: Copper. Solid for No. 12 AWG and smaller; stranded for No. 10 AWG and larger.
- C. All conductor sizes shown on drawings are for copper unless noted otherwise.

3.2 CONDUCTOR INSULATION AND MULTICONDUCTOR CABLE APPLICATIONS AND WIRING METHODS

- A. Service Entrance: Type THHN-2-THWN-2, single conductors in raceway.
- B. Feeders: Type THHN-2-THWN-2, single conductors in raceway.
- C. Exposed Branch Circuits, Including in Crawlspace: Type THHN-2-THWN-2, single conductors in raceway.
- D. Branch Circuits Concealed in Ceilings, Walls, and Partitions: Metal Clad Cable, Type MC.
- E. Branch Circuits Concealed in Concrete, below Slabs-on-Grade, and Underground: Type THHN-2-THWN-2, single conductors in raceway.

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- F. Cord Drops and Portable Appliance Connections: Type SO, hard service cord with stainless-steel, wire-mesh, strain relief device at terminations to suit application.

3.3 INSTALLATION OF CONDUCTORS AND CABLES

- A. Conceal cables in finished walls, ceilings, and floors unless otherwise indicated.
- B. Complete raceway installation between conductor and cable termination points according to Section "Raceways and Boxes for Electrical Systems" prior to pulling conductors and cables.
- C. Use manufacturer-approved pulling compound or lubricant where necessary; compound used must not deteriorate conductor or insulation. Do not exceed manufacturer's recommended maximum pulling tensions and sidewall pressure values.
- D. Use pulling means, including fish tape, cable, rope, and basket-weave wire/cable grips that will not damage cables or raceway.
- E. Install exposed cables parallel and perpendicular to surfaces of exposed structural members, and follow surface contours where possible.

3.4 CONNECTIONS

- A. Tighten electrical connectors and terminals according to manufacturer's published torque-tightening values. If manufacturer's torque values are not indicated, use those specified in UL 486A-486B.
- B. Make splices, terminations, and taps that are compatible with conductor material.
- C. Wiring at Outlets: Install conductor at each outlet, with at least 6 inches of slack.

3.5 IDENTIFICATION

- A. Identify and color-code conductors and cables according to Section "Identification for Electrical Systems."
- B. Identify each spare conductor at each end with identity number and location of other end of conductor, and identify as spare conductor.

3.6 FIELD QUALITY CONTROL

- A. Perform the following tests and inspections:
 - 1. After installing conductors and cables and before electrical circuitry has been energized, test service entrance and feeder conductors for compliance with requirements.
 - 2. Perform each visual and mechanical inspection and electrical test stated in NETA Acceptance Testing Specification. Certify compliance with test parameters.

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- B. Test and Inspection Reports: Prepare a written report to record the following:
 - 1. Procedures used.
 - 2. Results that comply with requirements.
 - 3. Results that do not comply with requirements and corrective action taken to achieve compliance with requirements.

- C. Cables will be considered defective if they do not pass tests and inspections.

END OF SECTION 260519

SECTION 260526 - GROUNDING AND BONDING FOR ELECTRICAL SYSTEMS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section Includes: Grounding systems and equipment.
- B. Section includes grounding systems and equipment, plus the following special applications:
 - 1. Underground distribution grounding.

1.3 ACTION SUBMITTALS

- A. Product Data: For each type of product indicated.

1.4 QUALITY ASSURANCE

- A. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.
- B. Comply with UL 467 for grounding and bonding materials and equipment.

PART 2 - PRODUCTS

2.1 CONDUCTORS

- A. Insulated Conductors: Copper or tinned-copper wire or cable insulated for 600 V unless otherwise required by applicable Code or authorities having jurisdiction.
- B. Bare Copper Conductors:
 - 1. Solid Conductors: ASTM B 3.
 - 2. Stranded Conductors: ASTM B 8.
 - 3. Tinned Conductors: ASTM B 33.
 - 4. Bonding Cable: 28 kcmil, 14 strands of No. 17 AWG conductor, 1/4 inch (6 mm) in diameter.
 - 5. Bonding Conductor: No. 4 or No. 6 AWG, stranded conductor.

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6. Bonding Jumper: Copper tape, braided conductors terminated with copper ferrules; 1-5/8 inches (41 mm) wide and 1/16 inch (1.6 mm) thick.
 7. Tinned Bonding Jumper: Tinned-copper tape, braided conductors terminated with copper ferrules; 1-5/8 inches (41 mm) wide and 1/16 inch (1.6 mm) thick.
- C. Grounding Bus: Predrilled rectangular bars of annealed copper, 1/4 by 4 inches (6.3 by 100 mm) in cross section, with 9/32-inch (7.14-mm) holes spaced 1-1/8 inches (28 mm) apart. Stand-off insulators for mounting shall comply with UL 891 for use in switchboards, 600 V. Lexan or PVC, impulse tested at 5000 V.

2.2 CONNECTORS

- A. Listed and labeled by an NRTL acceptable to authorities having jurisdiction for applications in which used and for specific types, sizes, and combinations of conductors and other items connected.
- B. Bolted Connectors for Conductors and Pipes: Copper or copper alloy, pressure type with at least two bolts.
1. Pipe Connectors: Clamp type, sized for pipe.
- C. Welded Connectors: Exothermic-welding kits of types recommended by kit manufacturer for materials being joined and installation conditions.
- D. Bus-bar Connectors: Mechanical type, cast silicon bronze, solderless compression-type wire terminals, and long-barrel, two-bolt connection to ground bus bar.

2.3 GROUNDING ELECTRODES

- A. Ground Rods: Copper-clad steel; 3/4 inch by 10 feet.
1. Termination: Factory-attached No. 4/0 AWG bare conductor at least 48 inches (1200 mm) long.
 2. Backfill Material: Electrode manufacturers recommended material.

PART 3 - EXECUTION

3.1 APPLICATIONS

- A. Conductors: Install solid conductor for No. 8 AWG and smaller, and stranded conductors for No. 6 AWG and larger unless otherwise indicated.
- B. Underground Grounding Conductors: Install bare tinned-copper conductor, No. 2/0 AWG minimum.
1. Bury at least 24 inches (600 mm) below grade.
 2. Duct-Bank Grounding Conductor: Bury 12 inches (300 mm) above duct bank when indicated as part of duct-bank installation.

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- C. Grounding Bus: Install in electrical and telephone equipment rooms, in rooms housing service equipment, and elsewhere as indicated.
 - 1. Install bus on insulated spacers 2 inches (50 mm) minimum from wall, 6 inches (150 mm) above finished floor unless otherwise indicated.
 - 2. Where indicated on both sides of doorways, route bus up to top of door frame, across top of doorway, and down to specified height above floor; connect to horizontal bus.
- D. Conductor Terminations and Connections:
 - 1. Pipe and Equipment Grounding Conductor Terminations: Bolted connectors.
 - 2. Underground Connections: Welded connectors except at test wells and as otherwise indicated.
 - 3. Connections to Ground Rods at Test Wells: Bolted connectors.
 - 4. Connections to Structural Steel: Welded connectors.

3.2 GROUNDING UNDERGROUND DISTRIBUTION SYSTEM COMPONENTS

- A. Comply with IEEE C2 grounding requirements.
- A. Install insulated equipment grounding conductors with all feeders and branch circuits.
- B. Air-Duct Equipment Circuits: Install insulated equipment grounding conductor to duct-mounted electrical devices operating at 120 V and more, including air cleaners, heaters, dampers, humidifiers, and other duct electrical equipment. Bond conductor to each unit and to air duct and connected metallic piping.
- C. Water Heater, Heat-Tracing, and Antifrost Heating Cables: Install a separate insulated equipment grounding conductor to each electric water heater and heat-tracing cable. Bond conductor to heater units, piping, connected equipment, and components.
- D. Metal Poles Supporting Outdoor Lighting Fixtures: Install grounding electrode and a separate insulated equipment grounding conductor in addition to grounding conductor installed with branch-circuit conductors.

3.4 INSTALLATION

- A. Grounding Conductors: Route along shortest and straightest paths possible unless otherwise indicated or required by Code. Avoid obstructing access or placing conductors where they may be subjected to strain, impact, or damage.
- B. Ground Rods: Drive rods until tops are 2 inches (50 mm) below finished floor or final grade unless otherwise indicated.
 - 1. Interconnect ground rods with grounding electrode conductor below grade and as otherwise indicated. Make connections without exposing steel or damaging coating if any.

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2. For grounding electrode system, install at least three rods spaced at least one-rod length from each other and located at least the same distance from other grounding electrodes, and connect to the service grounding electrode conductor.
- C. Bonding Straps and Jumpers: Install in locations accessible for inspection and maintenance except where routed through short lengths of conduit.
1. Bonding to Structure: Bond straps directly to basic structure, taking care not to penetrate any adjacent parts.
 2. Bonding to Equipment Mounted on Vibration Isolation Hangers and Supports: Install bonding so vibration is not transmitted to rigidly mounted equipment.
 3. Use exothermic-welded connectors for outdoor locations; if a disconnect-type connection is required, use a bolted clamp.
- D. Grounding and Bonding for Piping:
1. Metal Water Service Pipe: Install insulated copper grounding conductors, in conduit, from building's main service equipment, or grounding bus, to main metal water service entrances to building. Connect grounding conductors to main metal water service pipes; use a bolted clamp connector or bolt a lug-type connector to a pipe flange by using one of the lug bolts of the flange. Where a dielectric main water fitting is installed, connect grounding conductor on street side of fitting. Bond metal grounding conductor conduit or sleeve to conductor at each end.
 2. Water Meter Piping: Use braided-type bonding jumpers to electrically bypass water meters. Connect to pipe with a bolted connector.
- E. Bonding Interior Metal Ducts: Bond metal air ducts to equipment grounding conductors of associated fans, blowers, electric heaters, and air cleaners. Install bonding jumper to bond across flexible duct connections to achieve continuity.

3.5 LABELING

- A. Comply with requirements in Section 260553 "Identification for Electrical Systems" for instruction signs. The label or its text shall be green.

3.6 FIELD QUALITY CONTROL

- A. Perform tests and inspections.
1. Manufacturer's Field Service: Engage a factory-authorized service representative to inspect components, assemblies, and equipment installations, including connections, and to assist in testing.
- B. Tests and Inspections:
1. After installing grounding system but before permanent electrical circuits have been energized, test for compliance with requirements.

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2. Inspect physical and mechanical condition. Verify tightness of accessible, bolted, electrical connections with a calibrated torque wrench according to manufacturer's written instructions.
- C. Grounding system will be considered defective if it does not pass tests and inspections.
- D. Prepare test and inspection reports.
- E. Report measured ground resistances that exceed the following values:
 1. Power and Lighting Equipment or System with Capacity of 500 kVA and less: 10 ohms.
- F. Excessive Ground Resistance: If resistance to ground exceeds specified values, notify Architect promptly and include recommendations to reduce ground resistance.

END OF SECTION 260526

SECTION 260533 - RACEWAYS AND BOXES FOR ELECTRICAL SYSTEMS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section Includes:
 - 1. Metal conduits, tubing, and fittings.
 - 2. Nonmetal conduits, tubing, and fittings.
 - 3. Boxes, enclosures, and cabinets.

1.3 DEFINITIONS

- A. GRC: Galvanized rigid steel conduit.

1.4 ACTION SUBMITTALS

- A. Product Data: For surface raceways, wireways and fittings, floor boxes, hinged-cover enclosures, and cabinets.

PART 2 - PRODUCTS

2.1 METAL CONDUITS, TUBING, AND FITTINGS

- A. Listing and Labeling: Metal conduits, tubing, and fittings shall be listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.
- B. GRC: Comply with ANSI C80.1 and UL 6.
- C. EMT: Comply with ANSI C80.3 and UL 797.
- D. FMC: Comply with UL 1; zinc-coated steel or aluminum.
- E. LFMC: Flexible steel conduit with PVC jacket and complying with UL 360.
- F. Fittings for Metal Conduit: Comply with NEMA FB 1 and UL 514B.
 - 1. Fittings for EMT:

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- a. Material: Steel or die cast.
 - b. Type: Setscrew.
2. Expansion Fittings: PVC or steel to match conduit type, complying with UL 651, rated for environmental conditions where installed, and including flexible external bonding jumper.
- G. Joint Compound for GRC: Approved, as defined in NFPA 70, by authorities having jurisdiction for use in conduit assemblies, and compounded for use to lubricate and protect threaded conduit joints from corrosion and to enhance their conductivity.

2.2 NONMETALLIC CONDUITS, TUBING, AND FITTINGS

- A. Listing and Labeling: Nonmetallic conduits, tubing, and fittings shall be listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.
- B. RNC: Type EPC-40-PVC, complying with NEMA TC 2 and UL 651 unless otherwise indicated.
- C. Fittings for RNC: Comply with NEMA TC 3; match to conduit or tubing type and material.
- D. Solvent cements and adhesive primers shall have a VOC content of 510 and 550 g/L or less, respectively, when calculated according to 40 CFR 59, Subpart D (EPA Method 24).
- E. Solvent cements and adhesive primers shall comply with the testing and product requirements of the California Department of Health Services' "Standard Practice for the Testing of Volatile Organic Emissions from Various Sources Using Small-Scale Environmental Chambers."

2.3 BOXES, ENCLOSURES, AND CABINETS

- A. General Requirements for Boxes, Enclosures, and Cabinets: Boxes, enclosures, and cabinets installed in wet locations shall be listed for use in wet locations.
- B. Sheet Metal Outlet and Device Boxes: Comply with NEMA OS 1 and UL 514A.
- C. Cast-Metal Outlet and Device Boxes: Comply with NEMA FB 1, aluminum, Type FD, with gasketed cover.
- D. Luminaire Outlet Boxes: Nonadjustable, designed for attachment of luminaire weighing 50 lb (23 kg). Outlet boxes designed for attachment of luminaires weighing more than 50 lb (23 kg) shall be listed and marked for the maximum allowable weight.
- E. Small Sheet Metal Pull and Junction Boxes: NEMA OS 1.
- F. Cast-Metal Access, Pull, and Junction Boxes: Comply with NEMA FB 1 and UL 1773, cast aluminum with gasketed cover.
- G. Box extensions used to accommodate new building finishes shall be of same material as recessed box.

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- H. Device Box Dimensions: 4 inches square by 2-1/8 inches deep (100 mm square by 60 mm deep).
- I. Hinged-Cover Enclosures: Comply with UL 50 and NEMA 250, Type 3R with continuous-hinge cover with flush latch unless otherwise indicated.
 - 1. Metal Enclosures: Steel, finished inside and out with manufacturer's standard enamel.
 - 2. Interior Panels: Steel; all sides finished with manufacturer's standard enamel.
- J. Recessed device box.
 - 1. Non-metallic, recessed electrical box with trim plate.
 - 2. Two-gang style to allow installation of two duplex receptacles, or two low voltage devices in the box.

PART 3 - EXECUTION

3.1 RACEWAY APPLICATION

- A. Outdoors: Apply raceway products as specified below unless otherwise indicated:
 - 1. Exposed Conduit: GRC.
 - 2. Concealed Conduit, Aboveground: GRC.
 - 3. Concealed Conduit, Underground: RNC, PVC Schedule 40 (Schedule 80 under roadways).
 - 4. Connection to Vibrating Equipment (Including Transformers and Hydraulic, Pneumatic, Electric Solenoid, or Motor-Driven Equipment): FMC.
 - 5. Boxes and Enclosures, Aboveground: NEMA 250, Type 3R.
- B. Indoors: Apply raceway products as specified below unless otherwise indicated:
 - 1. Exposed: EMT.
 - 2. Feeders concealed in Ceilings and Interior Walls and Partitions: EMT.
 - 3. Connection to Vibrating Equipment (Including Transformers and Hydraulic, Pneumatic, Electric Solenoid, or Motor-Driven Equipment): FMC, except use LFMC in damp or wet locations.
 - 4. Damp or Wet Locations: GRC.
 - 5. Boxes and Enclosures: NEMA 250, Type 1, except use NEMA 250, Type 4 stainless steel in damp or wet locations including kitchens.
- C. Minimum Raceway Size: 3/4-inch (21-mm) trade size.
- D. Raceway Fittings: Compatible with raceways and suitable for use and location.
 - 1. Rigid Steel Conduit: Use threaded rigid steel conduit fittings unless otherwise indicated. Comply with NEMA FB 2.10.
 - 2. EMT: Use setscrew, steel fittings. Comply with NEMA FB 2.10.
 - 3. Flexible Conduit: Use only fittings listed for use with flexible conduit. Comply with NEMA FB 2.20.

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3.2 INSTALLATION

- A. Comply with NECA 1 and NECA 101 for installation requirements except where requirements on Drawings or in this article are stricter. Comply with NECA 102 for aluminum conduits. Comply with NFPA 70 limitations for types of raceways allowed in specific occupancies and number of floors.
- B. Keep raceways at least 6 inches (150 mm) away from parallel runs of flues and steam or hot-water pipes. Install horizontal raceway runs above water and steam piping.
- C. Complete raceway installation before starting conductor installation.
- D. Arrange stub-ups so curved portions of bends are not visible above finished slab.
- E. Install no more than the equivalent of three 90-degree bends in any conduit run except for control wiring conduits, for which fewer bends are allowed. Support within 12 inches (300 mm) of changes in direction.
- F. Conceal conduit and EMT within finished walls, ceilings, and floors unless otherwise indicated. Install conduits parallel or perpendicular to building lines.
- G. Support conduit within 12 inches (300 mm) of enclosures to which attached.
- H. Threaded Conduit Joints, Exposed to Wet, Damp, Corrosive, or Outdoor Conditions: Apply listed compound to threads of raceway and fittings before making up joints. Follow compound manufacturer's written instructions.
- I. Raceway Terminations at Locations Subject to Moisture or Vibration: Use insulating bushings to protect conductors including conductors smaller than No. 4 AWG.
- J. Terminate threaded conduits into threaded hubs or with locknuts on inside and outside of boxes or cabinets. Install bushings on conduits up to 1-1/4-inch (35mm) trade size and insulated throat metal bushings on 1-1/2-inch (41-mm) trade size and larger conduits terminated with locknuts. Install insulated throat metal grounding bushings on service conduits.
- K. Install raceways square to the enclosure and terminate at enclosures with locknuts. Install locknuts hand tight plus 1/4 turn more.
- L. Do not rely on locknuts to penetrate nonconductive coatings on enclosures. Remove coatings in the locknut area prior to assembling conduit to enclosure to assure a continuous ground path.
- M. Cut conduit perpendicular to the length. For conduits 2-inch (53-mm) trade size and larger, use roll cutter or a guide to make cut straight and perpendicular to the length.
- N. Install pull wires in empty raceways. Use polypropylene or monofilament plastic line with not less than 200-lb (90-kg) tensile strength. Leave at least 12 inches (300 mm) of slack at each end of pull wire. Cap underground raceways designated as spare above grade alongside raceways in use.

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- O. Flexible Conduit Connections: Comply with NEMA RV 3. Use a maximum of 72 inches (1830 mm) of flexible conduit for equipment subject to vibration, noise transmission, or movement; and for transformers and motors.
 - 1. Use LFMC in damp or wet locations subject to severe physical damage.
- P. Mount boxes at heights indicated on Drawings. If mounting heights of boxes are not individually indicated, give priority to ADA requirements. Install boxes with height measured to center of box unless otherwise indicated.
- Q. Horizontally separate boxes mounted on opposite sides of walls so they are not in the same vertical channel.
- R. Locate boxes so that cover or plate will not span different building finishes.
- S. Support boxes of three gangs or more from more than one side by spanning two framing members or mounting on brackets specifically designed for the purpose.
- T. Fasten junction and pull boxes to or support from building structure. Do not support boxes by conduits.
- U. Set metal floor boxes level and flush with finished floor surface.
- V. Set nonmetallic floor boxes level. Trim after installation to fit flush with finished floor surface.

3.3 INSTALLATION OF ELECTRICAL BOXES IN FIRE RATED WALLS

- A. Outlet boxes on opposite sides of the wall shall be separated as follows:
 - 1. By a horizontal distance of not less than 24 inches (610 mm);
 - 2. By a horizontal distance of not less than the depth of the wall cavity where the wall cavity is filled with cellulose loose fill, rockwool or slag mineral wool insulation.
 - 3. By protecting both outlet boxes by listed putty pads, 3M Catalog # MPP+ or equal.
- B. Boxes exceeding 16 sq. in. (103 sq. cm) must be protected by listed putty pads, 3M Catalog # MPP+ or equal.

3.4 FIRESTOPPING

- A. Install firestopping at penetrations of fire-rated floor and wall assemblies. Comply with requirements in Section 078413 "Penetration Firestopping."

END OF SECTION

SECTION 260553 - IDENTIFICATION FOR ELECTRICAL SYSTEMS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section Includes:
 - 1. Identification for raceways.
 - 2. Identification of power and control cables.
 - 3. Identification for conductors.
 - 4. Underground-line warning tape.
 - 5. Warning labels and signs.
 - 6. Instruction signs.
 - 7. Equipment identification labels.
 - 8. Miscellaneous identification products.

1.3 ACTION SUBMITTALS

- A. Product Data: For each electrical identification product indicated.

1.4 QUALITY ASSURANCE

- A. Comply with ANSI A13.1.
- B. Comply with NFPA 70.
- C. Comply with 29 CFR 1910.144 and 29 CFR 1910.145.
- D. Comply with ANSI Z535.4 for safety signs and labels.
- E. Adhesive-attached labeling materials, including label stocks, laminating adhesives, and inks used by label printers, shall comply with UL 969.

1.5 COORDINATION

- A. Coordinate identification names, abbreviations, colors, and other features with requirements in other Sections requiring identification applications, Drawings, Shop Drawings, manufacturer's wiring diagrams, and the Operation and Maintenance Manual; and with those required by codes, standards, and 29 CFR 1910.145. Use consistent designations throughout Project.

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- B. Coordinate installation of identifying devices with completion of covering and painting of surfaces where devices are to be applied.
- C. Coordinate installation of identifying devices with location of access panels and doors.
- D. Install identifying devices before installing acoustical ceilings and similar concealment.

PART 2 - PRODUCTS

2.1 POWER AND CONTROL RACEWAY IDENTIFICATION MATERIALS

- A. Comply with ANSI A13.1 for minimum size of letters for legend and for minimum length of color field for each raceway size.
- B. Colors for Raceways Carrying Circuits at 600 V or Less:
 - 1. Black letters on a white field.
 - 2. Legend: Indicate voltage.
- C. Vinyl Labels for Raceways Carrying Circuits at 600 V or Less: Preprinted, flexible label laminated with a clear, weather- and chemical-resistant coating and matching wraparound clear adhesive tape for securing ends of legend label.
- D. Snap-Around Labels for Raceways Carrying Circuits at 600 V or Less: Slit, pretensioned, flexible, preprinted, color-coded acrylic sleeve, with diameter sized to suit diameter of raceway or cable it identifies and to stay in place by gripping action.
- E. Snap-Around, Color-Coding Bands for Raceways Carrying Circuits at 600 V or Less: Slit, pretensioned, flexible, solid-colored acrylic sleeve, 2 inches (50 mm) long, with diameter sized to suit diameter of raceway or cable it identifies and to stay in place by gripping action.
- F. Tape and Stencil for Raceways Carrying Circuits More Than 600 V: 4-inch- (100-mm-) wide black stripes on 10-inch (250-mm) centers diagonally over orange background that extends full length of raceway or duct and is 12 inches (300 mm) wide. Stop stripes at legends.

2.2 ARMORED AND METAL-CLAD CABLE IDENTIFICATION MATERIALS

- A. Comply with ANSI A13.1 for minimum size of letters for legend and for minimum length of color field for each cable size.
- B. Colors for Cables Carrying Circuits at 600 V and Less:
 - 1. Black letters on an white field.
 - 2. Legend: Indicate voltage.
- C. Vinyl Labels: Preprinted, flexible label laminated with a clear, weather- and chemical-resistant coating and matching wraparound clear adhesive tape for securing ends of legend label.

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- D. Self-Adhesive Vinyl Tape: Colored, heavy duty, waterproof, fade resistant; 2 inches (50 mm) wide; compounded for outdoor use.
- E. Heat-Shrink Preprinted Tubes: Flame-retardant polyolefin tube with machine-printed identification label. Sized to suit diameter of and shrinks to fit firmly around cable it identifies. Full shrink recovery at a maximum of 200 deg F (93 deg C). Comply with UL 224.

2.3 POWER AND CONTROL CABLE IDENTIFICATION MATERIALS

- A. Comply with ANSI A13.1 for minimum size of letters for legend and for minimum length of color field for each cable size.
- B. Vinyl Labels: Preprinted, flexible label laminated with a clear, weather- and chemical-resistant coating and matching wraparound clear adhesive tape for securing ends of legend label.
- C. Self-Adhesive, Self-Laminating Polyester Labels: Preprinted, 3-mil- (0.08-mm-) thick flexible label with acrylic pressure-sensitive adhesive that provides a clear, weather- and chemical-resistant, self-laminating, protective shield over the legend. Labels sized to fit the cable diameter such that the clear shield overlaps the entire printed legend.
- D. Heat-Shrink Preprinted Tubes: Flame-retardant polyolefin tube with machine-printed identification label. Sized to suit diameter of and shrinks to fit firmly around cable it identifies. Full shrink recovery at a maximum of 200 deg F (93 deg C). Comply with UL 224.

2.4 UNDERGROUND-LINE WARNING TAPE

- A. Tape:
 - 1. Recommended by manufacturer for the method of installation and suitable to identify and locate underground electrical and communications utility lines.
 - 2. Printing on tape shall be permanent and shall not be damaged by burial operations.
 - 3. Tape material and ink shall be chemically inert, and not subject to degrading when exposed to acids, alkalis, and other destructive substances commonly found in soils.
- B. Color and Printing:
 - 1. Comply with ANSI Z535.1 through ANSI Z535.5.
 - 2. Inscriptions for Red-Colored Tapes: ELECTRIC LINE.
 - 3. Inscriptions for Orange-Colored Tapes: TELEPHONE CABLE, CATV CABLE, COMMUNICATIONS CABLE.

2.5 WARNING LABELS AND SIGNS

- A. Comply with NFPA 70 and 29 CFR 1910.145.
- B. Self-Adhesive Warning Labels: Factory-printed, multicolor, pressure-sensitive adhesive labels, configured for display on front cover, door, or other access to equipment unless otherwise indicated.

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C. Baked-Enamel Warning Signs:

1. Preprinted aluminum signs, punched or drilled for fasteners, with colors, legend, and size required for application.
2. 1/4-inch (6.4-mm) grommets in corners for mounting.
3. Nominal size, 7 by 10 inches (180 by 250 mm).

D. Warning label and sign shall include, but are not limited to, the following legends:

1. Multiple Power Source Warning: "DANGER - ELECTRICAL SHOCK HAZARD - EQUIPMENT HAS MULTIPLE POWER SOURCES."
2. Workspace Clearance Warning: "WARNING - OSHA REGULATION - AREA IN FRONT OF ELECTRICAL EQUIPMENT MUST BE KEPT CLEAR FOR 36 INCHES (915 MM)."

2.6 INSTRUCTION SIGNS

A. Engraved, laminated acrylic or melamine plastic, minimum 1/16 inch (1.6 mm) thick for signs up to 20 sq. inches (129 sq. cm) and 1/8 inch (3.2 mm) thick for larger sizes.

1. Engraved legend with black letters on white face.
2. Punched or drilled for mechanical fasteners.
3. Framed with mitered acrylic molding and arranged for attachment at applicable equipment.

B. Adhesive Film Label: Machine printed, in black, by thermal transfer or equivalent process. Minimum letter height shall be 3/8 inch (10 mm).

2.7 EQUIPMENT IDENTIFICATION LABELS

A. Adhesive Film Label: Machine printed, in black, by thermal transfer or equivalent process. Minimum letter height shall be 3/8 inch (10 mm).

B. Self-Adhesive, Engraved, Laminated Acrylic or Melamine Label: Adhesive backed, with white letters on a dark-gray background. Minimum letter height shall be 3/8 inch (10 mm).

C. Engraved, Laminated Acrylic or Melamine Label: Punched or drilled for screw mounting. White letters on a dark-gray background. Minimum letter height shall be 3/8 inch (10 mm).

2.8 MISCELLANEOUS IDENTIFICATION PRODUCTS

A. Paint: Comply with requirements in painting Sections for paint materials and application requirements. Select paint system applicable for surface material and location (exterior or interior).

B. Fasteners for Labels and Signs: Self-tapping, stainless-steel screws or stainless-steel machine screws with nuts and flat and lock washers.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Verify identity of each item before installing identification products.
- B. Location: Install identification materials and devices at locations for most convenient viewing without interference with operation and maintenance of equipment.
- C. Apply identification devices to surfaces that require finish after completing finish work.
- D. Self-Adhesive Identification Products: Clean surfaces before application, using materials and methods recommended by manufacturer of identification device.
- E. Underground-Line Warning Tape: During backfilling of trenches install continuous underground-line warning tape directly above line at 6 to 8 inches (150 to 200 mm) below finished grade. Use multiple tapes where width of multiple lines installed in a common trench exceeds 16 inches (400 mm) overall.

3.2 IDENTIFICATION SCHEDULE

- A. Accessible Raceways and Metal-Clad Cables, 600 V or Less, for Service, Feeder, and Branch Circuits More Than 30 A, and 120 V to ground: Identify with self-adhesive vinyl label. Install labels at 30-foot (10-m) maximum intervals.
- B. Power-Circuit Conductor Identification, 600 V or Less: For conductors in vaults, pull and junction boxes, manholes, and handholes, use color-coding conductor tape to identify the phase.
 - 1. Color-Coding for Phase Identification, 600 V or Less: Use colors listed below for ungrounded feeder and service conductors.
 - a. Color shall be factory applied or field applied for sizes larger than No. 8 AWG, if authorities having jurisdiction permit.
 - b. Colors for 208/120-V Circuits:
 - 1) Phase A: Black.
 - 2) Phase B: Red.
 - 3) Phase C: Blue.
- C. Install instructional sign including the color-code for grounded and ungrounded conductors using adhesive-film-type labels.
- D. Control-Circuit Conductor Identification: For conductors and cables in pull and junction boxes, and handholes, use self-adhesive vinyl labels with the conductor or cable designation, origin, and destination.
- E. Control-Circuit Conductor Termination Identification: For identification at terminations provide self-adhesive vinyl labels with the conductor designation.

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- F. Auxiliary Electrical Systems Conductor Identification: Identify field-installed alarm, control, and signal connections.
1. Identify conductors, cables, and terminals in enclosures and at junctions, terminals, and pull points. Identify by system and circuit designation.
 2. Use system of marker tape designations that is uniform and consistent with system used by manufacturer for factory-installed connections.
 3. Coordinate identification with Project Drawings, manufacturer's wiring diagrams, and the Operation and Maintenance Manual.
- G. Locations of Underground Lines: Identify with underground-line warning tape for power, lighting, communication, and control wiring.
1. Install underground-line warning tape for both direct-buried cables and cables in raceway.
- H. Warning Labels for Indoor Cabinets, Boxes, and Enclosures for Power and Lighting: Self-adhesive warning labels.
1. Comply with 29 CFR 1910.145.
 2. Identify system voltage with black letters on an orange background.
 3. Apply to exterior of door, cover, or other access.
 4. For equipment with multiple power or control sources, apply to door or cover of equipment including, but not limited to, the following:
 - a. Power transfer switches.
 - b. Controls with external control power connections.
- I. Operating Instruction Signs: Install instruction signs to facilitate proper operation and maintenance of electrical systems and items to which they connect. Install instruction signs with approved legend where instructions are needed for system or equipment operation.
- J. Equipment Identification Labels: On each unit of equipment, install unique designation label that is consistent with wiring diagrams, schedules, and the Operation and Maintenance Manual. Apply labels to disconnect switches and protection equipment, central or master units, control panels, control stations, terminal cabinets, and racks of each system. Systems include power, lighting, control, communication, signal, monitoring, and alarm systems unless equipment is provided with its own identification.
1. Labeling Instructions:
 - a. Indoor Equipment: Self-adhesive, engraved, laminated acrylic or melamine label. Unless otherwise indicated, provide a single line of text with 1/2-inch- (13-mm-) high letters on 1-1/2-inch- (38-mm-) high label; where two lines of text are required, use labels 2 inches (50 mm) high.
 - b. Outdoor Equipment: Engraved, laminated acrylic or melamine label.
 - c. Elevated Components: Increase sizes of labels and letters to those appropriate for viewing from the floor.
 - d. Unless provided with self-adhesive means of attachment, fasten labels with appropriate mechanical fasteners that do not change the NEMA or NRTL rating of the enclosure.

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2. Equipment to Be Labeled:

- a. Panelboards: Typewritten directory of circuits in the location provided by panelboard manufacturer. Panelboard identification shall be self-adhesive, engraved, laminated acrylic or melamine label.
- b. Enclosures and electrical cabinets.
- c. Access doors and panels for concealed electrical items.
- d. Enclosed switches.
- e. Enclosed circuit breakers.
- f. Enclosed controllers.
- g. Variable-speed controllers.
- h. Push-button stations.
- i. Contactors.
- j. Remote-controlled switches, dimmer modules, and control devices.

END OF SECTION 260553

SECTION 260924 - LIGHTING CONTROL DEVICES

PART 1 – GENERAL

1.1 SUMMARY

A. Section Includes:

1. Wall box mounted, wall/corner mounted, and ceiling mounted occupancy sensors including dual technology, ultrasonic, and passive infrared technologies. This includes self contained PIR sensors as well as low voltage sensors that work with Switchpacks.

B. Related Sections:

1. Section 265100 – Interior Lighting.

1.2 REFERENCES

A. American National Standards Institute/Institute of Electrical and Electronic Engineers (ANSI/IEEE)

1. C62.41-1991 – Recommended Practice for Surge Voltages in Low Voltage AC Power Circuits.

B. ASTM International (ASTM)

1. D4674 -02a Standard Test Method for Accelerated Testing for Color Stability of Plastics Exposed to Indoor Fluorescent Lighting and Window-Filtered Daylight.

C. National Electrical Manufacturers Association (NEMA)

1. WD1 (R2005) - General Color Requirements for Wiring Devices.

D. Underwriters Laboratories, Inc. (UL):

1. 94 – Flammability Rating
2. 916 – Energy Management Equipment.
3. 508 (2005) - Standard for Industrial Control Equipment.
4. 244A – Appliance Controls

1.3 SYSTEM DESCRIPTION

A. Permanently installed

1. Wall switch occupancy sensors
2. Ceiling mounted occupancy sensors

1.4 SUBMITTALS

A. Submit under provisions of Section 013300.

B. Specification Conformance Document: Indicate whether the submitted equipment:

1. Meets specification exactly as stated.
2. Meets specification via an alternate means and indicate the specific methodology used.

C. Shop Drawings; include:

1. Load schedule indicating actual connected load, load type, and voltage per circuit, circuits and their respective control zones, circuits that are on emergency, and capacity, phase, and corresponding circuit numbers.
2. Schematic of system.

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3. Lighting plan clearly marking product type, location and orientation of each sensor.
- D. Product Data: Catalog specification sheets with performance specifications demonstrating compliance with specified requirements.

1.5 QUALITY ASSURANCE

- A. Manufacturer: Minimum 20 years' experience in manufacture of occupancy sensor lighting controls.
- B. Manufacturer's Quality System: Registered to ISO 9001:2000 Quality Standards, including in-house engineering for product design activities.
- C. Occupancy Sensing Lighting Controls:
 1. Listed by UL specifically for the required loads. Provide evidence of compliance upon request.
- D. Installer Qualifications: Installer shall be one who is experienced in performing the work of this section, and who has specialized in installation of work similar to that required for this project.
- E. Source Limitations: To assure compatibility, obtain occupancy sensors from a single source with complete responsibility over all lighting controls, including accessory products. The use of subcontracted component assemblers is not acceptable.

1.6 PROJECT CONDITIONS

- A. Do not install equipment until following conditions can be maintained in spaces to receive equipment:
 1. Ambient temperature: 0° to 40° C (32° to 104° F).
 2. Relative humidity: Maximum 90 percent, non-condensing.
 3. Occupancy Sensors must be protected from dust during installation.

1.7 WARRANTY

- A. Provide manufacturer's 5-year parts warranty.

1.8 MAINTENANCE

- A. Make ordering of new equipment for expansions, replacements, and spare parts available to end user.
- B. Make new replacement parts available for minimum of ten years from date of manufacture.
- C. Provide factory direct technical support.

PART 2- PRODUCTS

2.1 MANUFACTURERS

- A. Acceptable Manufacturer: Eaton Lighting Systems (formerly Cooper Controls)
- B. Substitutions: Allowed under provisions of Division 1.

2.2 SENSOR PERFORMANCE REQUIREMENTS

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- A. Sensing mechanism:
 - 1. Infrared: Utilize multiple segmented lens, with internal grooves to eliminate dust and residue build-up.
 - 2. Dual technology:
 - a. Utilize multiple segmented lens, with internal grooves to eliminate dust and residue build-up.
 - b. Utilize an operating frequency of 32 kHz or 40 kHz that shall be crystal controlled to operate within plus or minus 0.005% tolerance.
 - c. Incorporate Doppler shift ultrasonic and passive infrared motion detection technologies. Products that react to noise or ambient sound shall not be considered.
- B. Power failure memory:
 - 1. Controls incorporate non-volatile memory. Should power be interrupted and subsequently restored, settings and parameters saved in protected memory shall not be lost.
- C. Designed and tested to withstand discharges without impairment of performance when subjected to discharges of 15,000 volts per IEC 801-2.
- D. Products tested in identical manner, complaint to NEMA WD 7 -2011 Occupancy Motion Sensors Standards.
- E. Sensor shall have time delays from 10 to 30 min.
- F. When specified, sensors shall automatically adjust time delay and sensitivity settings.
- G. All sensors shall provide an LED as a visual means of indication at all times to verify that motion is being detected during both testing and normal operation.
- H. All sensors shall have readily accessible, user adjustable settings for time delay and sensitivity. Settings shall be located on the sensor (not the control unit) and shall be recessed to limit tampering.
- I. Where specified, sensor shall have an internal additional isolated relay with Normally Open, Normally Closed, and Common outputs for use with HVAC control, Data Logging and other control options. Sensors utilizing separate components or specially modified units to achieve this function are not acceptable.

2.3 LINE VOLTAGE CEILING MOUNTED OCCUPANCY SENSORS

- A. Product: OAC-DT-2000-MV, OAC-DT-2000-DMV
- B. Provide all necessary mounting hardware and instructions.
- C. Capable of detection of occupancy at desktop level up to 300 square feet, and gross motion up to 1000 square feet
- D. Shall accommodate loads from 0-800 watts at 120 volts; 0 to 1200 watts at 277 volts and shall have 180 degree coverage capability.
- E. Shall be able to have their visible plastic parts replaced, for color changes in the field, without removing the body of the control from the wall and without requiring special tools.
- F. Shall utilize Zero Crossing Circuitry which increases relay life, protects from the effects of inrush current, and increases sensor's longevity.
- G. Shall have no leakage current to load, in manual or in Auto/Off Mode for safety purposes and shall have voltage drop protection.
- H. Where specified, dual relay sensors shall offer daylighting foot-candle adjustment control

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for either or both relays.

2.4 OCCUPANCY WALL SWITCHES

- A. Product: OSW-P-0451-MV-*, ONW-P-1001-MV-*, ONW-P-1001-347-*, ONW-P-1001-DMV-*, ONW-P-1001-D347-*, ONW-P-1001-SP-*, ONW-P-1001-RR7-*
- B. Capable of detection of occupancy at desktop level up to 300 square feet, and gross motion up to 1000 square feet
- C. Shall accommodate loads from 0-800 watts at 120 volts; 0 to 1200 watts at 277 volts and shall have 180 degree coverage capability.
- D. Shall be able to have their visible plastic parts replaced, for color changes in the field, without removing the body of the control from the wall and without requiring special tools.
- E. Shall utilize Zero Crossing Circuitry which increases relay life, protects from the effects of inrush current, and increases sensor's longevity.
- F. Shall have no leakage current to load, in manual or in Auto/Off Mode for safety purposes and shall have voltage drop protection.
- G. Where specified, wall switch sensors shall provide a field selectable option to convert sensor operation from Automatic On to Manual On.
- H. Where specified, dual relay sensors shall offer daylighting footcandle adjustment control for either or both relays.

2.5 SOURCE QUALITY CONTROL

- A. Perform full-function testing on 100% of all system components and panel assemblies at the factory.

PART 3- EXECUTION

3.1 INSTALLATION

- A. Install equipment in accordance with manufacturer's installation instructions.
- B. Provide complete installation of system in accordance with Contract Documents.
- C. Provide equipment at locations and in quantities indicated on Drawings. Provide any additional equipment required to provide control intent.

3.2 TESTING

- A. Upon completion of all wiring and after all fixtures are installed and lamped, a representative shall check the installation prior to energizing the system. Each installed occupancy sensor shall be tested in the Test Mode to see that lights turn OFF and on based on occupancy.
- B. At the time testing, the owner's representative shall be thoroughly instructed in the proper operation of the system.

END OF SECTION

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SECTION 261900 - SUPPORTING DEVICES

PART 1 GENERAL

1.01 WORK INCLUDED

- A. Conduit and equipment supports.
- B. Fastening hardware.

1.02 RELATED WORK

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

PART 2 PRODUCTS

2.01 MATERIAL

- A. Support Channel: Galvanized or painted steel.
- B. Hardware: Corrosion resistant.

PART 3 EXECUTION

3.01 INSTALLATION

- A. Install products in accordance with manufacturer's instructions.
- B. Fasten hanger rods, conduit clamps, and outlet and junction boxes to building structure using pre-cast insert system, expansion anchors, beam clamps.
- C. Anchors and Fasteners
 - 1) Concrete Structural Elements: Use pre-cast insert system, expansion anchors, powder actuated anchors and preset inserts.
 - 2) Steel Structural Elements: Use beam clamps, steel ramset fasteners, and welded fasteners.
 - 3) Concrete Surfaces: Use self-drilling anchors and expansion anchors.
 - 4) Hollow Masonry, Plaster, and Gypsum Board Partitions: Use toggle bolts and hollow wall fasteners.
 - 5) Solid Masonry Walls: Use expansion anchors and preset inserts.
 - 6) Sheet Metal: Use sheet metal screws.
 - 7) Wood Elements: Use wood screws.
- D. Do not fasten supports to piping, ductwork, mechanical equipment, or conduit.
- E. Do not use power-actuated anchors.

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- F. Do not drill structural steel members.
- G. Fabricate supports or trapeze hangers from structural steel or steel channel, rigidly welded or bolted to present a neat appearance. Use hexagon head bolts with spring lock washers under all nuts.
- H. In wet locations install free-standing electrical equipment on concrete pads.
- I. Install surface-mounted cabinets and panelboards with minimum of four anchors. Provide steel channel supports to stand cabinet one inch off wall.

*** END OF SECTION ***

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SECTION 262713 - ELECTRICITY METERING

PART 1 GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section includes equipment for electricity metering by utility company.

1.3 ACTION SUBMITTALS

- A. Product Data: For each type of product indicated.

1.4 QUALITY ASSURANCE

- A. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.

1.5 DELIVERY, STORAGE, AND HANDLING

- A. Receive, store, and handle modular meter center according to NECA 400.

1.6 COORDINATION

- A. Electrical Service Connections: Coordinate with utility companies and components they furnish as follows:
 1. Comply with requirements of utilities providing electrical power services.
 2. Coordinate installation and connection of utilities and services, including provision for electricity-metering components.

PART 2 PRODUCTS

2.1 EQUIPMENT FOR ELECTRICITY METERING BY UTILITY COMPANY

- A. Meters will be furnished by utility company.

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- B. Meter enclosure: Factory-coordinated assembly of a main service disconnect device, wireways, socket module.
 - 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. Eaton Electrical Inc.; Cutler-Hammer Business Unit.
 - b. General Electric Company; GE Consumer & Industrial - Electrical Distribution.
 - c. Siemens Energy & Automation, Inc.
 - d. Square D; a brand of Schneider Electric.
 - 2. Comply with requirements of utility company for meter center.
 - 3. Housing: NEMA 250, Type 3R enclosure.

PART 3 EXECUTION

3.1 INSTALLATION

- A. Comply with equipment installation requirements in NECA 1.
- B. Install meters furnished by utility company. Install raceways and equipment according to utility company's written requirements. Provide empty conduits for metering leads and extend grounding connections as required by utility company.

3.2 IDENTIFICATION

- A. Comply with requirements for identification specified in Section 260553 "Identification for Electrical Systems."
 - 1. Series Combination Warning Label: Self-adhesive type, with text as required by NFPA 70.
 - 2. Equipment Identification Labels: Adhesive film labels with clear protective overlay.

END OF SECTION 262713

SECTION 262726 - WIRING DEVICES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section Includes:
 - 1. Receptacles, receptacles with integral GFCI, and associated device plates.
 - 2. Weather-resistant receptacles.
 - 3. Snap switches.
 - 4. Cord and plug sets.

1.3 DEFINITIONS

- A. EMI: Electromagnetic interference.
- B. GFCI: Ground-fault circuit interrupter.
- C. Pigtail: Short lead used to connect a device to a branch-circuit conductor.
- D. RFI: Radio-frequency interference.
- E. TVSS: Transient voltage surge suppressor.
- F. UTP: Unshielded twisted pair.

1.4 ADMINISTRATIVE REQUIREMENTS

- A. Coordination:
 - 1. Receptacles for Owner-Furnished Equipment: Match plug configurations.
 - 2. Cord and Plug Sets: Match equipment requirements.

1.5 ACTION SUBMITTALS

- A. Product Data: For each type of product.

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1.6 INFORMATIONAL SUBMITTALS

- A. Field quality-control reports.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Manufacturers' Names: Shortened versions (shown in parentheses) of the following manufacturers' names are used in other Part 2 articles:
 - 1. Cooper Wiring Devices; Division of Cooper Industries, Inc. (Cooper).
 - 2. Hubbell Incorporated; Wiring Device-Kellems (Hubbell).
 - 3. Leviton Mfg. Company Inc. (Leviton).
 - 4. Pass & Seymour/Legrand (Pass & Seymour).
- B. Source Limitations: Obtain each type of wiring device and associated wall plate from single source from single manufacturer.

2.2 GENERAL WIRING-DEVICE REQUIREMENTS

- A. Wiring Devices, Components, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.
- B. Comply with NFPA 70.
- C. Devices that are manufactured for use with modular plug-in connectors may be substituted under the following conditions:
 - 1. Connectors shall comply with UL 2459 and shall be made with stranding building wire.
 - 2. Devices shall comply with the requirements in this Section.

2.3 STRAIGHT-BLADE RECEPTACLES

- A. Convenience Receptacles, 125 V, 20 A: Comply with NEMA WD 1, NEMA WD 6 Configuration 5-20R, UL 498, and FS W-C-596.
 - 1. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:

2.4 GFCI RECEPTACLES

- A. General Description:
 - 1. Straight blade, non-feed-through type.
 - 2. Comply with NEMA WD 1, NEMA WD 6, UL 498, UL 943 Class A, and FS W-C-596.

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3. Include indicator light that shows when the GFCI has malfunctioned and no longer provides proper GFCI protection.

B. Duplex GFCI Convenience Receptacles, 125 V, 20 A:

1. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:

2.5 CORD AND PLUG SETS

A. Description:

1. Match voltage and current ratings and number of conductors to requirements of equipment being connected.
2. Cord: Rubber-insulated, stranded-copper conductors, with Type SOW-A jacket; with green-insulated grounding conductor and ampacity of at least 130 percent of the equipment rating.
3. Plug: Nylon body and integral cable-clamping jaws. Match cord and receptacle type for connection.

2.6 TOGGLE SWITCHES

A. Comply with NEMA WD 1, UL 20, and FS W-S-896.

B. Switches, 120/277 V, 20 A:

1. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:

2.7 WALL PLATES

A. Single and combination types shall match corresponding wiring devices.

1. Plate-Securing Screws: Metal with head color to match plate finish.
2. Material for Finished Spaces: Stainless steel.
3. Material for Unfinished Spaces: Stainless steel.
4. Material for Damp Locations: Cast aluminum with spring-loaded lift cover and listed and labeled for use in wet and damp locations.

B. Wet-Location, Weatherproof Cover Plates: NEMA 250, complying with Type 3R, weather-resistant, die-cast aluminum with lockable cover.

2.8 FLOOR SERVICE FITTINGS

A. Type: Modular, flush-type, dual-service units suitable for wiring method used.

B. Compartments: Barrier separates power from voice and data communication cabling.

C. Service Plate: Round, die-cast aluminum with satin finish.

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- D. Power Receptacle: NEMA WD 6 Configuration 5-20R, gray finish, unless otherwise indicated.
- E. Voice and Data Communication Outlet: Two modular, keyed, color-coded, RJ-45 jacks for UTP cable complying with requirements in Section 271500 "Communications Horizontal Cabling."

2.9 FINISHES

- A. Device Color:
 - 1. Wiring Devices Connected to Normal Power System: As selected by Architect unless otherwise indicated or required by NFPA 70 or device listing.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Comply with NECA 1, including mounting heights listed in that standard, unless otherwise indicated.
- B. Coordination with Other Trades:
 - 1. Protect installed devices and their boxes. Do not place wall finish materials over device boxes and do not cut holes for boxes with routers that are guided by riding against outside of boxes.
 - 2. Keep outlet boxes free of plaster, drywall joint compound, mortar, cement, concrete, dust, paint, and other material that may contaminate the raceway system, conductors, and cables.
 - 3. Install device boxes in brick or block walls so that the cover plate does not cross a joint unless the joint is troweled flush with the face of the wall.
 - 4. Install wiring devices after all wall preparation, including painting, is complete.
- C. Conductors:
 - 1. Do not strip insulation from conductors until right before they are spliced or terminated on devices.
 - 2. Strip insulation evenly around the conductor using tools designed for the purpose. Avoid scoring or nicking of solid wire or cutting strands from stranded wire.
 - 3. The length of free conductors at outlets for devices shall meet provisions of NFPA 70, Article 300, without pigtails.
- D. Device Installation:
 - 1. Replace devices that have been in temporary use during construction and that were installed before building finishing operations were complete.
 - 2. Keep each wiring device in its package or otherwise protected until it is time to connect conductors.
 - 3. Do not remove surface protection, such as plastic film and smudge covers, until the last possible moment.

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4. Connect devices to branch circuits using pigtails that are not less than 6 inches (152 mm) in length.
5. When there is a choice, use side wiring with binding-head screw terminals. Wrap solid conductor tightly clockwise, two-thirds to three-fourths of the way around terminal screw.
6. Use a torque screwdriver when a torque is recommended or required by manufacturer.
7. When conductors larger than No. 12 AWG are installed on 15- or 20-A circuits, splice No. 12 AWG pigtails for device connections.
8. Tighten unused terminal screws on the device.
9. When mounting into metal boxes, remove the fiber or plastic washers used to hold device-mounting screws in yokes, allowing metal-to-metal contact.

E. Receptacle Orientation:

1. Install ground pin of vertically mounted receptacles down, and on horizontally mounted receptacles to the right.

F. Device Plates: Do not use oversized or extra-deep plates. Repair wall finishes and remount outlet boxes when standard device plates do not fit flush or do not cover rough wall opening.

G. Dimmers:

1. Install dimmers within terms of their listing.
2. Install unshared neutral conductors on line and load side of dimmers according to manufacturers' device listing conditions in the written instructions.

H. Arrangement of Devices: Unless otherwise indicated, mount flush, with long dimension vertical and with grounding terminal of receptacles on top. Group adjacent switches under single, multigang wall plates.

I. Adjust locations of floor service outlets and service poles to suit arrangement of partitions and furnishings.

3.2 GFCI RECEPTACLES

- A. Install non-feed-through-type GFCI receptacles where protection of downstream receptacles is not required.

3.3 IDENTIFICATION

- A. Identify each receptacle with panelboard identification and circuit number. Use hot, stamped, or engraved machine printing with black-filled lettering on face of plate, and durable wire markers or tags inside outlet boxes.

3.4 FIELD QUALITY CONTROL

- A. Test straight-blade for the retention force of the grounding blade according to NFPA 99. Retention force shall be not less than 4 oz. (115 g).

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- B. Wiring device will be considered defective if it does not pass tests and inspections.
- C. Prepare test and inspection reports.

END OF SECTION 262726

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SECTION 264700 - PANELBOARDS

PART 1 GENERAL

1.01 WORK INCLUDED

- A. Branch circuit panelboards

1.02 RELATED WORK

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

1.03 REFERENCES

- A. NECA (National Electrical Contractors Assoc.) “Standard of Installation”.
- B. FS W-C-375 - Circuit Breakers, Molded Case, Branch Circuit and Service.
- C. NEMA AB 1 - Molded Case Circuit Breakers.
- D. NEMA KS 1 - Enclosed Switches.
- E. NEMA PB 1 - Panelboards.
- F. NEMA PB 1.1 - Instructions for Safe Installation, Operation and Maintenance of Panelboards Rated 600 Volts or Less.
- G. NEMA PB 1.2 - Application Guide for Ground-Fault Protective Devices for Equipment.
- H. NFPA 70 - National Electrical Code.

1.04 SUBMITTALS

- A. Submit shop drawings for equipment and component devices.
- B. Include outline and support point dimensions, voltage, main bus ampacity, integrated short circuit ampere rating, circuit breaker and fusible switch arrangement and sizes.

1.05 SPARE PARTS

- A. Keys: Furnish 4 each to Owner.

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PART 2 PRODUCTS

2.01 PANELBOARDS

Branch Circuit Panelboards

1. Lighting and Appliance Branch Circuit Panelboards: NEMA PB 1; circuit breaker type. FS W-P-115; Type I, Class 1.
2. Enclosure: NEMA PB 1; Type 1.
3. Cabinet Size: 6 inches deep; 20 inches wide for 240 volt and less panelboards.
4. Provide surface cabinet front with concealed trip clamps, concealed hinge and flush lock all keyed alike. Finish in manufacturer's standard gray enamel.
5. Provide panelboards with aluminum bus, ratings as scheduled on Drawings. Provide copper ground bus in all panelboards.
6. Molded Case Circuit Breakers: NEMA AB 1 FS W-C- 375; bolt-on type thermal magnetic trip circuit breakers, with common trip handle for all poles. Provide circuit breakers UL listed as Type SWD for lighting circuits. Provide UL Class A ground fault interrupter circuit breakers where scheduled on Drawings.
7. Current Limiting Molded Case Circuit Breakers: NEMA AB 1 FS W-C-375; provide circuit breakers with integral thermal and instantaneous magnetic trip in each pole, coordinated with automatically resetting current limiting elements in each pole. Interrupting rating 100,000 symmetrical amperes, let-through current and energy level less than permitted for same size Class RK-5 fuse.
8. Provide circuit breaker accessory trip units and auxiliary contacts as indicated.

PART 3 EXECUTION

3.01 INSTALLATION

- A. Install panelboards plumb and flush with wall finishes, in conformance with NEMA PB 1.1.
- B. Height: 6 feet to top of panelboard maximum.
- C. Provide filler plates for unused spaces in panelboards.
- D. Provide typed or neatly handwritten circuit directory for each branch circuit panelboard. Revise directory to reflect circuiting changes required to balance phase loads. Label Panels per Section 261950.
- E. Provide 6 – 1” EMT conduits from recessed panelboards to accessible point above the ceiling wherever possible.

3.02 FIELD QUALITY CONTROL

- A. Measure steady state load currents at each panelboard feeder. Should the difference at any panelboard between phases exceed 20 percent, rearrange circuits in the panelboard to balance the phase loads within 20 percent. Take care to maintain proper phasing for multi-wire branch circuits.

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- B. Visual and Mechanical Inspection: Inspect for physical damage, proper alignment, anchorage, and grounding. Check proper installation and tightness of connections for circuit breakers, fusible switches, and fuses.

*** END OF SECTION ***

SECTION 265100 - INTERIOR LIGHTING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section Includes:
 - 1. Interior lighting fixtures, LEDs and drivers.
 - 2. Emergency lighting units.
 - 3. Exit signs.
 - 4. Lighting fixture supports.

1.3 DEFINITIONS

- A. CCT: Correlated color temperature.
- B. CRI: Color-rendering index.
- C. LER: Luminaire efficacy rating.
- D. Lumen: Measured output of lamp and luminaire, or both.
- E. Luminaire: Complete lighting fixture, including ballast housing if provided.

1.4 ACTION SUBMITTALS

- A. Product Data: For each type of lighting fixture, arranged in order of fixture designation. Include data on features, accessories, finishes, and the following:
 - 1. Physical description of lighting fixture including dimensions.
 - 2. Emergency lighting units including battery and charger.
 - 3. Energy-efficiency data.
 - 4. Life, output (lumens, CCT, and CRI), and energy-efficiency data for lamps.
 - 5. Lamp data including dimensions, color temperature and power consumption
 - 6. Photometric data and adjustment factors based on laboratory tests, complying with IESNA Lighting Measurements Testing & Calculation Guides, of each lighting fixture type. The adjustment factors shall be for lamps, ballasts, and accessories identical to those indicated for the lighting fixture as applied in this Project.

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- a. Testing Agency Certified Data: For indicated fixtures, photometric data shall be certified by a qualified independent testing agency. Photometric data for remaining fixtures shall be certified by manufacturer.
- b. Manufacturer Certified Data: Photometric data shall be certified by a manufacturer's laboratory with a current accreditation under the National Voluntary Laboratory Accreditation Program for Energy Efficient Lighting Products.

B. Installation instructions.

1.5 CLOSEOUT SUBMITTALS

A. Operation and Maintenance Data: For lighting equipment and fixtures to include in emergency, operation, and maintenance manuals.

1. Provide a list of all lamp types used on Project; use ANSI and manufacturers' codes.

1.6 MAINTENANCE MATERIAL SUBMITTALS

A. Furnish extra materials that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.

1. Lamps: 10 of each type and rating installed. Furnish at least one of each type.
2. Plastic Diffusers and Lenses: One of each type and rating installed. Furnish at least one of each type.
3. Ballasts: 2 of each type and rating installed. Furnish at least one of each type.
4. Globes and Guards: 1 of each type and rating installed. Furnish at least one of each type.

1.7 QUALITY ASSURANCE

A. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.

B. Comply with NFPA 70.

1.8 COORDINATION

A. Coordinate layout and installation of lighting fixtures and suspension system with other construction that penetrates ceilings or is supported by them, including HVAC equipment, fire-suppression system, and partition assemblies.

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PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, product(s) indicated on Drawings.

2.2 GENERAL REQUIREMENTS FOR LIGHTING FIXTURES AND COMPONENTS

- A. Recessed Fixtures: Comply with NEMA LE 4 for ceiling compatibility for recessed fixtures.
- B. Metal Parts: Free of burrs and sharp corners and edges.
- C. Sheet Metal Components: Steel unless otherwise indicated. Form and support to prevent warping and sagging.
- D. Doors, Frames, and Other Internal Access: Smooth operating, free of light leakage under operating conditions, and designed to permit relamping without use of tools. Designed to prevent doors, frames, lenses, diffusers, and other components from falling accidentally during relamping and when secured in operating position.
- E. Diffusers and Globes:
 - 1. Acrylic Lighting Diffusers: 100 percent virgin acrylic plastic. High resistance to yellowing and other changes due to aging, exposure to heat, and UV radiation.
 - a. Lens Thickness: At least 0.125 inch (3.175 mm) minimum unless otherwise indicated.
 - b. UV stabilized.
 - 2. Glass: Annealed crystal glass unless otherwise indicated.

2.3 LEDs:

- 1. The light source of the luminaires shall consist of LED arrays or bars. If required, the LED arrays or bars shall be removable.
- 2. The LEDs shall be either white or RGB, according to the light fixture schedule and Drawings. For luminaires specified with white light, it is not acceptable to provide RGB LEDs mixed to produce white light.
- 3. Refer to the light fixture schedule and Drawings for the specified correlated color temperature (CCT) of each luminaire.
- 4. Individual LEDs shall be binned by manufacturer to comply with ANSI C78.377.
- 5. The LEDs shall be manufactured by Cree, Philips, Toshiba, Osram, Samsung, or Nichia, unless otherwise noted.

2.4 DRIVERS:

- 1. The driver or power supply for the luminaire shall be modular and replaceable.

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2. The rated life of the driver shall match the rated life of the LEDs and luminaire.
3. In general, the drive current rating of the driver shall be minimized, while still maintaining the required lumen output, to improve luminaire efficiency and life.
4. The driver shall meet the emission standards of IEC EN-61000-6-3 at a minimum. For healthcare or other applications with EMI sensitive equipment, provide drivers that meet more stringent standards as required.

2.5 EXIT SIGNS

- A. General Requirements for Exit Signs: Comply with UL 924; for sign colors, visibility, luminance, and lettering size, comply with authorities having jurisdiction.
- B. Internally Lighted Signs:
 1. Lamps for AC Operation: LEDs, 50,000 hours minimum rated lamp life.
 2. Self-Powered Exit Signs (Battery Type): Integral automatic charger in a self-contained power pack.
 - a. Battery: Sealed, maintenance-free, nickel-cadmium type.
 - b. Charger: Fully automatic, solid-state type with sealed transfer relay.
 - c. Operation: Relay automatically energizes lamp from battery when circuit voltage drops to 80 percent of nominal voltage or below. When normal voltage is restored, relay disconnects lamps from battery, and battery is automatically recharged and floated on charger.
 - d. Test Push Button: Push-to-test type, in unit housing, simulates loss of normal power and demonstrates unit operability.
 - e. LED Indicator Light: Indicates normal power on. Normal glow indicates trickle charge; bright glow indicates charging at end of discharge cycle.

2.6 EMERGENCY LIGHTING UNITS

- A. General Requirements for Emergency Lighting Units: Self-contained units complying with UL 924.
 1. Battery: Sealed, maintenance-free, lead-acid type.
 2. Charger: Fully automatic, solid-state type with sealed transfer relay.
 3. Operation: Relay automatically turns lamp on when power-supply circuit voltage drops to 80 percent of nominal voltage or below. Lamp automatically disconnects from battery when voltage approaches deep-discharge level. When normal voltage is restored, relay disconnects lamps from battery, and battery is automatically recharged and floated on charger.
 4. Test Push Button: Push-to-test type, in unit housing, simulates loss of normal power and demonstrates unit operability.
 5. LED Indicator Light: Indicates normal power on. Normal glow indicates trickle charge; bright glow indicates charging at end of discharge cycle.

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PART 3 - EXECUTION

3.1 INSTALLATION

A. Lighting fixtures:

1. Set level, plumb, and square with ceilings and walls unless otherwise indicated.
2. Install lamps in each luminaire.

B. Temporary Lighting: If it is necessary, and approved by Architect, to use permanent luminaires for temporary lighting, install and energize the minimum number of luminaires necessary. When construction is sufficiently complete, remove the temporary luminaires, disassemble, clean thoroughly, install new lamps, and reinstall.

C. Suspended Lighting Fixture Support:

1. Pendants and Rods: Where longer than 48 inches (1200 mm), brace to limit swinging.
2. Stem-Mounted, Single-Unit Fixtures: Suspend with twin-stem hangers.
3. Continuous Rows: Use tubing or stem for wiring at one point and tubing or rod for suspension for each unit length of fixture chassis, including one at each end.
4. Do not use grid as support for pendant luminaires. Connect support wires or rods to building structure.

D. Connect wiring according to Section 260519 "Low-Voltage Electrical Power Conductors and Cables."

3.2 IDENTIFICATION

A. Install labels with panel and circuit numbers on concealed junction and outlet boxes. Comply with requirements for identification specified in Section 260553 "Identification for Electrical Systems."

3.3 FIELD QUALITY CONTROL

A. Test for Emergency Lighting: Interrupt power supply to demonstrate proper operation. Verify transfer from normal power to battery and retransfer to normal.

3.4 ADJUSTING

A. Occupancy Adjustments: When requested within 12 months of date of Substantial Completion, provide on-site assistance in adjusting aimable luminaires to suit actual occupied conditions. Provide up to two visits to Project during other-than-normal occupancy hours for this purpose. Some of this work may be required after dark.

1. Adjust aimable luminaires in the presence of Architect.

END OF SECTION 265100

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SECTION 271500 - COMMUNICATIONS HORIZONTAL CABLING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section Includes:

1. UTP cabling.
2. Coaxial cable.
3. Cable connecting hardware, patch panels, and cross-connects.
4. Telecommunications outlet/connectors.
5. Cabling system identification products.
6. Cable management system.

- B. OIT will be responsible for all Data/Audio/cable TV lines including racks/hardware in OIT Room. Electrical Contractor will be responsible for the security loops/panels and related equipment.

- C. The Electrical Contractor shall coordinate with the Project Manager and OIT on installations in OIT Room.

1.3 DEFINITIONS

- A. BICSI: Building Industry Consulting Service International.
- B. Cross-Connect: A facility enabling the termination of cable elements and their interconnection or cross-connection.
- C. EMI: Electromagnetic interference.
- D. IDC: Insulation displacement connector.
- E. LAN: Local area network.
- F. Outlet/Connectors: A connecting device in the work area on which horizontal cable or outlet cable terminates.
- G. RCDD: Registered Communications Distribution Designer.
- H. UTP: Unshielded twisted pair.

1.4 ADMINISTRATIVE REQUIREMENTS

- A. Coordinate layout and installation of telecommunications cabling with Owner's telecommunications and LAN equipment and service suppliers.

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- B. Coordinate telecommunications outlet/connector locations with location of power receptacles at each work area.

1.5 ACTION SUBMITTALS

- A. Product Data: For each type of product.
 - 1. For coaxial cable, include the following installation data for each type used:
 - a. Nominal OD.
 - b. Minimum bending radius.
 - c. Maximum pulling tension.

1.6 CLOSEOUT SUBMITTALS

- A. Maintenance Data: For splices and connectors to include in maintenance manuals.

1.7 MAINTENANCE MATERIAL SUBMITTALS

- A. Furnish extra materials that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.
 - 1. Patch-Panel Units: One of each type.
 - 2. Connecting Blocks: One of each type.
 - 3. Device Plates: One of each type.

1.8 QUALITY ASSURANCE

- A. Installer Qualifications: Cabling Installer must have personnel certified by BICSI on staff.
 - 1. Layout Responsibility: Preparation of Shop Drawings, Cabling Administration Drawings, and field testing program development by an RCDD.
 - 2. Installation Supervision: Installation shall be under the direct supervision of Registered Technician, who shall be present at all times when Work of this Section is performed at Project site.
 - 3. Testing Supervisor: Currently certified by BICSI as an RCDD to supervise on-site testing.

1.9 DELIVERY, STORAGE, AND HANDLING

- A. Test cables upon receipt at Project site.
 - 1. Test each pair of UTP cable for open and short circuits.

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PART 2 - PRODUCTS

2.1 HORIZONTAL CABLING DESCRIPTION

- A. The maximum allowable horizontal cable length is 295 feet (90 m). This maximum allowable length does not include an allowance for the length of 16 feet (4.9 m) to the workstation equipment or in the horizontal cross-connect.

2.2 PERFORMANCE REQUIREMENTS

- A. General Performance: Horizontal cabling system shall comply with transmission standards in TIA/EIA-568-B.1 when tested according to test procedures of this standard.
- B. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.
- C. Grounding: Comply with J-STD-607-A.

2.3 UTP CABLE

- A. Manufacturers: Subject to compliance with requirements, provide products by the following:
 - 1. ADC.
 - 2. Belden Inc.
 - 3. CommScope, Inc.
 - 4. Genesis Cable Products; Honeywell International, Inc.
 - 5. Mohawk; a division of Belden Networking, Inc.
 - 6. 3M Communication Markets Division.
 - 7. Tyco Electronics Corporation; AMP Products.
- B. Description: 100-ohm, four-pair UTP, covered with a blue thermoplastic jacket.
 - 1. Comply with ICEA S-90-661 for mechanical properties.
 - 2. Comply with TIA/EIA-568-B.1 for performance specifications.
 - 3. Comply with TIA/EIA-568-B.2, Category 6.
 - 4. Listed and labeled by an NRTL acceptable to authorities having jurisdiction as complying with UL 444 and NFPA 70 for the following types:
 - a. Communications, General Purpose: Type CM or CMG.
 - b. Communications, Plenum Rated: Type CMP, complying with NFPA 262.
 - c. Communications, Riser Rated: Type CMR, complying with UL 1666.
 - d. Communications, Limited Purpose: Type CMX.
 - e. Multipurpose: Type MP or MPG.
 - f. Multipurpose, Plenum Rated: Type MPP, complying with NFPA 262.
 - g. Multipurpose, Riser Rated: Type MPR, complying with UL 1666.
- C. Jacket Colors:
 - a. Blue for Telephone
 - b. Green for data

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2.4 UTP CABLE HARDWARE

- A. Manufacturers: Subject to compliance with requirements, provide products by the following:
 - 1. ADC.
 - 2. American Technology Systems Industries, Inc.
 - 3. Belden Inc.
 - 4. Dynacom Inc.
 - 5. Hubbell Premise Wiring.
 - 6. Leviton Commercial Networks Division.
 - 7. Molex Premise Networks; a division of Molex, Inc.
 - 8. Panduit Corp.
 - 9. Siemon Co. (The).
 - 10. Tyco Electronics Corporation; AMP Products.
- B. General Requirements for Cable Connecting Hardware: Comply with TIA/EIA-568-B.2, IDC type, with modules designed for punch-down caps or tools. Cables shall be terminated with connecting hardware of same category or higher.
- C. Connecting Blocks: 110-style IDC for Category 6. Provide blocks for the number of cables terminated on the block, plus 25 percent spare. Integral with connector bodies, including plugs and jacks where indicated.
- D. Cross-Connect: Modular array of connecting blocks arranged to terminate building cables and permit interconnection between cables.
 - 1. Number of Terminals per Field: One for each conductor in assigned cables.
- E. Patch Panel: Modular panels housing multiple-numbered jack units with IDC-type connectors at each jack for permanent termination of pair groups of installed cables.
- F. Jacks and Jack Assemblies: Modular, color-coded, eight-position modular receptacle units with integral IDC-type terminals.
- G. Patch Cords: Factory-made, four-pair cables in 36-inch (900 mm) lengths; terminated with eight-position modular plug at each end.
 - 1. Patch cords shall have bend-relief-compliant boots and color-coded icons to ensure Category 6 performance. Patch cords shall have latch guards to protect against snagging.

2.5 COAXIAL CABLE

- A. Manufacturers: Subject to compliance with requirements, provide products by the following:
 - 1. Alpha Wire Company.
 - 2. Belden Inc.
 - 3. Coleman Cable, Inc.
 - 4. CommScope, Inc.
 - 5. Draka Cableteq USA.
- B. Cable Characteristics: Broadband type, recommended by cable manufacturer specifically for broadband data transmission applications. Coaxial cable and accessories shall have 75-ohm nominal impedance with a return loss of 20 dB maximum from 7 to 806 MHz.

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- C. RG-6/U: NFPA 70, Type CATV or CM.
 - 1. No. 16 AWG, solid, copper-covered steel conductor; gas-injected, foam-PE insulation.
 - 2. Double shielded with 100 percent aluminum-foil shield and 60 percent aluminum braid.
 - 3. Jacketed with black PVC or PE.
 - 4. Suitable for indoor installations.

2.6 COAXIAL CABLE HARDWARE

- A. Manufacturers: Subject to compliance with requirements, provide products by the following:
 - 1. Emerson Network Power Connectivity Solutions.
 - 2. Leviton Commercial Networks Division.
 - 3. Siemon Co. (The).
- B. Coaxial-Cable Connectors: F Type.

2.7 TELECOMMUNICATIONS OUTLET/CONNECTORS

- A. Jacks: 100-ohm, balanced, twisted-pair connector; four-pair, eight-position modular. Comply with TIA/EIA-568-B.1.
 - 1. Plastic Faceplate: High-impact plastic. Coordinate color with Section 262726 "Wiring Devices."
 - 2. For use with snap-in jacks accommodating any combination of UTP and coaxial work area cords.
 - 3. Legend: Snap-in, clear-label covers and machine-printed paper inserts.

2.8 GROUNDING

- A. Comply with J-STD-607-A.

2.9 IDENTIFICATION PRODUCTS

- A. Comply with TIA/EIA-606-A and UL 969 for labeling materials, including label stocks, laminating adhesives, and inks used by label printers.
- B. Comply with requirements in Section 260553 "Identification for Electrical Systems."

PART 3 - EXECUTION

3.1 WIRING METHODS

- A. Install cables in pathways and cable trays except within consoles, cabinets, desks, and counters and except in accessible ceiling spaces and in gypsum board partitions where unenclosed wiring method may be used. Conceal pathways and cables except in unfinished spaces.
 - 1. Install plenum cable in environmental air spaces, including plenum ceilings.
- B. Conceal conductors and cables in accessible ceilings, walls, and floors where possible.

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C. Wiring within Enclosures:

1. Bundle, lace, and train conductors to terminal points with no excess and without exceeding manufacturer's limitations on bending radii.
2. Install lacing bars and distribution spools.
3. Install conductors parallel with or at right angles to sides and back of enclosure.

3.2 INSTALLATION OF CABLES

A. Comply with NECA 1.

B. General Requirements for Cabling:

1. Comply with TIA/EIA-568-B.1.
2. Comply with BICSI ITSIM, Ch. 6, "Cable Termination Practices."
3. Install 110-style IDC termination hardware unless otherwise indicated.
4. MUTOA shall not be used as a cross-connect point.
5. Terminate conductors; no cable shall contain unterminated elements. Make terminations only at indicated outlets, terminals, cross-connects, and patch panels.
6. Cables may not be spliced. Secure and support cables at intervals not exceeding 30 inches (760 mm) and not more than 6 inches (150 mm) from cabinets, boxes, fittings, outlets, racks, frames, and terminals.
7. Install lacing bars to restrain cables, to prevent straining connections, and to prevent bending cables to smaller radii than minimums recommended by manufacturer.
8. Bundle, lace, and train conductors to terminal points without exceeding manufacturer's limitations on bending radii, but not less than radii specified in BICSI ITSIM, "Cabling Termination Practices" Chapter. Install lacing bars and distribution spools.
9. Do not install bruised, kinked, scored, deformed, or abraded cable. Do not splice cable between termination, tap, or junction points. Remove and discard cable if damaged during installation and replace it with new cable.
10. Cold-Weather Installation: Bring cable to room temperature before dereeling. Heat lamps shall not be used for heating.
11. In the communications equipment room, install a 10-foot- (3-m-) long service loop on each end of cable.
12. Pulling Cable: Comply with BICSI ITSIM, Ch. 4, "Pulling Cable." Monitor cable pull tensions.

C. UTP Cable Installation:

1. Comply with TIA/EIA-568-B.2.
2. Do not untwist UTP cables more than 1/2 inch (12 mm) from the point of termination to maintain cable geometry.

D. Open-Cable Installation:

1. Install cabling with horizontal and vertical cable guides in telecommunications spaces with terminating hardware and interconnection equipment.
2. Suspend UTP cable not in a wireway or pathway a minimum of 8 inches (200 mm) above ceilings by cable supports not more than 60 inches (1524 mm) apart.
3. Cable shall not be run through structural members or in contact with pipes, ducts, or other potentially damaging items.

E. Group connecting hardware for cables into separate logical fields.

F. Separation from EMI Sources:

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1. Comply with BICSI TDMM and TIA-569-B for separating unshielded copper voice and data communication cable from potential EMI sources, including electrical power lines and equipment.
2. Separation between open communications cables or cables in nonmetallic raceways and unshielded power conductors and electrical equipment shall be as follows:
 - a. Electrical Equipment Rating Less Than 2 kVA: A minimum of 5 inches (127 mm).
 - b. Electrical Equipment Rating between 2 and 5 kVA: A minimum of 12 inches (300 mm).
 - c. Electrical Equipment Rating More Than 5 kVA: A minimum of 24 inches (610 mm).
3. Separation between communications cables in grounded metallic raceways and unshielded power lines or electrical equipment shall be as follows:
 - a. Electrical Equipment Rating Less Than 2 kVA: A minimum of 2-1/2 inches (64 mm).
 - b. Electrical Equipment Rating between 2 and 5 kVA: A minimum of 6 inches (150 mm).
 - c. Electrical Equipment Rating More Than 5 kVA: A minimum of 12 inches (300 mm).
4. Separation between communications cables in grounded metallic raceways and power lines and electrical equipment located in grounded metallic conduits or enclosures shall be as follows:
 - a. Electrical Equipment Rating Less Than 2 kVA: No requirement.
 - b. Electrical Equipment Rating between 2 and 5 kVA: A minimum of 3 inches (76 mm).
 - c. Electrical Equipment Rating More Than 5 kVA: A minimum of 6 inches (150 mm).
5. Separation between Communications Cables and Electrical Motors and Transformers, 5 kVA or HP and Larger: A minimum of 48 inches (1200 mm).
6. Separation between Communications Cables and Fluorescent Fixtures: A minimum of 5 inches (127 mm).

3.3 FIRESTOPPING

- A. Comply with TIA-569-B, Annex A, "Firestopping."
- B. Comply with BICSI TDMM, "Firestopping Systems" Article.

3.4 IDENTIFICATION

- A. Identify system components, wiring, and cabling complying with TIA/EIA-606-A. Comply with requirements for identification specified in Section 260553 "Identification for Electrical Systems."
 1. Administration Class: Coordinate with owners IT department.
 2. Color-code cross-connect fields. Apply colors to voice and data service backboards, connections, covers, and labels.
- B. Cable Schedule: Post in prominent location in each equipment room and wiring closet. List incoming and outgoing cables and their designations, origins, and destinations. Protect with rigid frame and clear plastic cover. Furnish an electronic copy of final comprehensive schedules for Project.
- C. Cabling Administration Drawings: Show building floor plans with cabling administration-point labeling. Identify labeling convention and show labels for telecommunications closets, terminal hardware and positions, horizontal cables, work areas and workstation terminal positions, grounding buses and pathways, and equipment grounding conductors. Follow convention of TIA/EIA-606-A. Furnish electronic record of all drawings, in software and format selected by Owner.

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D. Cable and Wire Identification:

1. Label each cable within 4 inches (100 mm) of each termination and tap, where it is accessible in a cabinet or junction or outlet box, and elsewhere as indicated.
2. Each wire connected to building-mounted devices is not required to be numbered at device if color of wire is consistent with associated wire connected and numbered within panel or cabinet.
3. Label each terminal strip and screw terminal in each cabinet, rack, or panel.
 - a. Individually number wiring conductors connected to terminal strips, and identify each cable or wiring group being extended from a panel or cabinet to a building-mounted device shall be identified with name and number of particular device as shown.
 - b. Label each unit and field within distribution racks and frames.
4. Identification within Connector Fields in Equipment Rooms and Wiring Closets: Label each connector and each discrete unit of cable-terminating and connecting hardware. Where similar jacks and plugs are used for both voice and data communication cabling, use a different color for jacks and plugs of each service.

E. Labels shall be preprinted or computer-printed type with printing area and font color that contrasts with cable jacket color but still complies with requirements in TIA/EIA-606-A.

1. Cables use flexible vinyl or polyester that flex as cables are bent.

3.5 FIELD QUALITY CONTROL

A. Testing Agency: Engage a qualified testing agency to perform tests and inspections.

B. Perform the following tests and inspections:

1. Visually confirm Category 6, marking of outlets, cover plates, outlet/connectors, and patch panels.
2. Visually inspect cable placement, cable termination, grounding and bonding, equipment and patch cords, and labeling of all components.
3. UTP Performance Tests:
 - a. Test for each outlet and MUTOA. Perform the following tests according to TIA/EIA-568-B.1 and TIA/EIA-568-B.2:
 - 1) Wire map.
 - 2) Length (physical vs. electrical, and length requirements).
 - 3) Insertion loss.
 - 4) Near-end crosstalk (NEXT) loss.
 - 5) Power sum near-end crosstalk (PSNEXT) loss.
 - 6) Equal-level far-end crosstalk (ELFEXT).
 - 7) Power sum equal-level far-end crosstalk (PSELFEXT).
 - 8) Return loss.
 - 9) Propagation delay.
 - 10) Delay skew.

C. Document data for each measurement. Data for submittals shall be printed in a summary report that is formatted similar to Table 10.1 in BICSI TDMM, or transferred from the instrument to the computer, saved as text files, and printed and submitted.

D. End-to-end cabling will be considered defective if it does not pass tests and inspections.

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- E. Prepare test and inspection reports.

3.6 DEMONSTRATION

- A. Train Owner's maintenance personnel in cable-plant management operations, including changing signal pathways for different workstations, rerouting signals in failed cables, and keeping records of cabling assignments and revisions when extending wiring to establish new workstation outlets.

END OF SECTION 271500

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SECTION 311000 - SITE CLEARING

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. Protecting existing trees to remain.
 - 2. Protecting existing site utilities to remain.
 - 3. Removing existing trees.
 - 4. Clearing and grubbing.
 - 5. Stripping and stockpiling topsoil.
- B. Related Sections include the following:
 - 1. Division 01 Section "Temporary Facilities and Controls" for temporary utilities, temporary construction and support facilities, temporary security and protection facilities.
 - 2. Division 02 Section "Selective Site Demolition" for demolition of above and below grade site improvements and utilities.
 - 3. Division 31 Section "Earth Moving" for soil materials, excavating, backfilling, and site grading.
 - 4. Division 31 Section "Erosion and Sedimentation Controls" for materials and installation of erosion control measures.

1.3 DEFINITIONS

- A. Topsoil: Natural or cultivated surface-soil layer containing organic matter and sand, silt, and clay particles; friable, pervious, and black or a darker shade of brown, gray, or red than underlying subsoil; reasonably free of subsoil, clay lumps, gravel, and other objects more than 2 inches in diameter; and free of subsoil and weeds, roots, toxic materials, or other nonsoil materials.
- B. Tree Protection Zone: Area surrounding individual trees or groups of trees to be protected during construction, and defined by the drip line of individual trees or the perimeter drip line of groups of trees, unless otherwise indicated.

1.4 MATERIAL OWNERSHIP

- A. Except for stripped topsoil or other materials indicated to remain Owner's property, cleared materials shall become Contractor's property and shall be removed from Project site.

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1.5 PROJECT CONDITIONS

- A. Prior to excavation, verify the underground utilities, pipes, structures, and facilities. Maine Dig-Safe law requires at least the following minimum measures:
1. Pre-mark the boundaries of your planned excavation with white paint, flags or stakes, so utility crews know where to mark their lines.
 2. Call Dig Safe, at 1-888-DIGSAFE, at least three business days - but no more than 30 calendar days - before starting work. Don't assume someone else will make the call.
 3. Wait three business days for lines to be located and marked with color-coded paint, flags or stakes. Note the color of the marks and the type of utilities they indicate. Transfer these marks to the As-Built drawings.
 4. Contact the landowner and other non-member@ utilities (water, sewer, gas, etc.), for them to mark the locations of their underground facilities. Transfer these marks to the As-Built drawings.
 5. Re-notify Dig Safe and the non-member utilities if the digging, drilling or blasting does not occur within 30 calendar days, or if the marks are lost due to weather conditions, site work activity or any other reason.
 6. Hand dig within 18 inches in any direction of any underground line until the line is exposed. Mechanical methods may be used for initial site penetration, such as removal of pavement or rock.
 7. Dig Safe requirements are in addition to town, city and/or state DOT street opening permit requirements.
 8. For complete Dig Safe requirements, call the PUC or visit their website.
 9. If you damage, dislocate or disturb any underground utility line, immediately notify the affected utility. If damage creates safety concerns, call the fire department and take immediate steps to safeguard health and property.
 10. Any time an underground line is damaged or disturbed, or if lines are improperly marked, you must file an Incident Report with the PUC. For an Incident Report form. visit www.state.me.us/mpuc or call the PUC at 800-452-4699.
- B. Traffic: Minimize interference with adjoining roads, streets, walks, and other adjacent occupied or used facilities during site-clearing operations.
1. Do not close or obstruct streets, walks, or other adjacent occupied or used facilities without permission from Owner and authorities having jurisdiction.
 2. Provide alternate routes around closed or obstructed traffic ways if required by authorities having jurisdiction.
- C. Do not commence site clearing operations until temporary erosion and sedimentation control measures are in place.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION

3.1 PREPARATION

- A. Protect and maintain benchmarks and survey control points from disturbance during construction.

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- B. Locate and clearly flag trees and vegetation to remain or to be relocated.
- C. Protect existing site improvements to remain from damage during construction.
 - 1. Restore damaged improvements to their original condition, as acceptable to Owner.

3.2 TEMPORARY EROSION AND SEDIMENTATION CONTROL

- A. Provide temporary erosion and sedimentation control measures to prevent soil erosion and discharge of soil-bearing water runoff or airborne dust to adjacent properties and walkways, according to Drawings and Section 312500 “Erosion and Sedimentation Control.”
- B. Inspect, repair, and maintain erosion and sedimentation control measures during construction until permanent vegetation has been established.
- C. Remove erosion and sedimentation controls and restore and stabilize areas disturbed during removal.

3.3 UTILITIES

- A. Existing Utilities: Do not interrupt utilities serving facilities occupied by Owner or others unless permitted under the following conditions and then only after arranging to provide temporary utility services according to requirements indicated:
 - 1. Notify Architect not less than two days in advance of proposed utility interruptions.
 - 2. Do not proceed with utility interruptions without Architect's written permission.
- B. Removal of underground utilities is included in Section 024113 “Selective Site Demolition.”

3.4 CLEARING AND GRUBBING

- A. Remove obstructions, trees, shrubs, grass, and other vegetation to permit installation of new construction.
 - 1. Do not remove trees, shrubs, and other vegetation indicated to remain or to be relocated.
 - 2. Cut minor roots and branches of trees indicated to remain in a clean and careful manner where such roots and branches obstruct installation of new construction.
 - 3. Grind stumps and remove roots, obstructions, and debris extending to a depth of 18 inches below exposed subgrade.
 - 4. Use only hand methods for grubbing within tree protection zone.
 - 5. Chip removed tree branches and dispose of off-site.
- B. Fill depressions caused by clearing and grubbing operations with satisfactory soil material unless further excavation or earthwork is indicated.
 - 1. Place fill material in horizontal layers not exceeding a loose depth of 8 inches, and compact each layer to a density equal to adjacent original ground.

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3.5 TOPSOIL STRIPPING

- A. Remove sod and grass before stripping topsoil.
- B. Strip topsoil to whatever depths are encountered in a manner to prevent intermingling with underlying subsoil or other waste materials.
 - 1. Remove subsoil and nonsoil materials from topsoil, including trash, debris, weeds, roots, and other waste materials.
- C. Where trees are indicated to be left standing, stop topsoil stripping a sufficient distance to prevent damage to main root system.
- D. Stockpile topsoil materials away from edge of excavations without intermixing with subsoil. Grade and shape stockpiles to drain surface water. Cover to prevent windblown dust.
 - 1. Stockpile topsoil in storage piles in areas shown, or where directed by Owner.
 - 2. Do not stockpile topsoil within tree protection zones.
 - 3. Stockpile surplus topsoil to allow for respreading deeper topsoil.

3.6 SITE IMPROVEMENTS

- A. Remove existing above- and below-grade improvements as indicated and as necessary to facilitate new construction.
- B. Remove slabs, paving, curbs, gutters, and aggregate base as indicated.
 - 1. Unless existing full-depth joints coincide with line of demolition, neatly saw-cut length of existing pavement to remain before removing existing pavement. Saw-cut faces vertically.

3.7 DISPOSAL

- A. Disposal: Remove surplus soil material, unsuitable topsoil, obstructions, demolished materials, and waste materials including trash and debris, and legally dispose of them off Owner's property.

END OF SECTION 311000

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SECTION 312000 - EARTH MOVING

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. Preparing subgrades for slabs-on-grade, walks, pavements, and lawns and grasses.
2. Subbase and base course for concrete walks.
3. Subbase and base course for asphalt paving.
4. Excavating and backfilling for site utility trenches.
5. Excavating and backfilling trenches for buried mechanical and electrical utilities and pits for buried utility structures.
6. Excavation and off-site disposal of all unsuitable and excess materials and stockpiling of all suitable onsite materials required for reuse.
7. Provision, transportation and placement of all required fill and backfill materials.

- B. Related Sections include the following:

1. Division 01 Section "Construction Progress Documentation" for recording preexcavation and earthwork progress.
2. Division 01 Section "Temporary Facilities and Controls" for temporary controls, utilities, and support facilities.
3. Divisions 21, 22, 23, 26, 27, and 28 Sections for installing underground mechanical and electrical utilities and buried mechanical and electrical structures.
4. Division 31 Section "Site Clearing" for temporary erosion and sedimentation control measures, site stripping, grubbing, stripping and stockpiling topsoil, and removal of above- and below-grade improvements and utilities.
5. Division 31 Section "Excavation Support and Protection" for shoring, bracing, and sheet piling of excavations.

1.3 DEFINITIONS

- A. Backfill: Soil material or controlled low-strength material used to fill an excavation.
 1. Initial Backfill: Backfill placed beside and over pipe in a trench.
 2. Final Backfill: Backfill placed over initial backfill to fill a trench.
- B. Base Course: Aggregate layer placed between the subbase course and hot-mix asphalt paving.
- C. Bedding Course: Aggregate layer placed over the excavated subgrade in a trench before laying pipe.

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- D. Borrow Soil: Satisfactory soil imported from off-site for use as fill or backfill.
- E. Excavation: Removal of material encountered above subgrade elevations and to lines and dimensions indicated.
 - 1. Authorized Additional Excavation: Excavation below subgrade elevations or beyond indicated lines and dimensions as directed by Architect. Authorized additional excavation and replacement material will be paid for according to Contract provisions for unit prices.
 - 2. Unauthorized Excavation: Excavation below subgrade elevations or beyond indicated lines and dimensions without direction by Architect. Unauthorized excavation, as well as remedial work directed by Architect, shall be without additional compensation.
- F. Fill: Soil materials used to raise existing grades.
- G. Rock: Rock material in beds, ledges, unstratified masses, conglomerate deposits, and boulders of rock material that exceed 1 cu. yd. for footing, trench, and pit excavation that cannot be removed by rock excavating equipment equivalent to the following in size and performance ratings, without systematic drilling, ram hammering, ripping, or blasting, when permitted:
 - 1. Excavation of Footings, Trenches, and Pits: Late-model, track-mounted hydraulic excavator; equipped with a 42-inch-wide, maximum, short-tip-radius rock bucket; rated at not less than 138-hp flywheel power with bucket-curling force of not less than 28,090 lbf and stick-crowd force of not less than 18,650 lbf; measured according to SAE J-1179.
- H. Structures: Buildings, footings, foundations, retaining walls, slabs, tanks, curbs, mechanical and electrical appurtenances, or other man-made stationary features constructed above or below the ground surface.
- I. Subbase Course: Aggregate layer placed between the subgrade and base course.
- J. Subgrade: Uppermost surface or elevation remaining after completing excavation, or top surface of a fill or backfill immediately below subbase, drainage fill, or topsoil materials.
- K. Utilities: On-site underground pipes, conduits, ducts, and cables, as well as underground services within buildings.

1.4 SUBMITTALS

- A. Material Test Reports: From a qualified testing agency indicating and interpreting test results for compliance of the following with requirements indicated:
 - 1. Classification according to ASTM D 2487 of each on-site and borrow soil material proposed for fill and backfill.
 - 2. Laboratory compaction curve according to ASTM D 1557 for each on-site and borrow soil material proposed for fill and backfill.
- B. Blasting Plan: For record purposes.

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- C. Preexcavation Photographs or Videotape: Show existing conditions of adjoining construction and site improvements, including finish surfaces, that might be misconstrued as damage caused by earthwork operations. Submit before earthwork begins.
- D. Up to three test series (gradation and laboratory compaction) will be completed by the geotechnical engineer or owner's agent for off-site borrow sources for each category of earth materials defined in Part 2 of this Section at the Contractor's cost. Testing of additional samples or sources shall be at the Contractor's cost. Retesting of failed results as noted above shall be at the Contractor's cost.
 - 1. Sieve analysis to be based on washed sieve analysis in accordance with appropriate ASTM Standard.

1.5 QUALITY ASSURANCE

- A. Blasting: Comply with applicable requirements in NFPA 495, "Explosive Materials Code," and prepare a blasting plan reporting the following:
 - 1. Types of explosive and sizes of charge to be used in each area of rock removal, types of blasting mats, sequence of blasting operations, and procedures that will prevent damage to site improvements and structures on Project site and adjacent properties.
 - 2. Seismographic monitoring during blasting operations.
- B. Seismic Survey Agency: An independent testing agency, acceptable to authorities having jurisdiction, experienced in seismic surveys and blasting procedures to perform the following services:
 - 1. Report types of explosive and sizes of charge to be used in each area of rock removal, types of blasting mats, sequence of blasting operations, and procedures that will prevent damage to site improvements and structures on Project site and adjacent properties.
 - 2. Seismographic monitoring during blasting operations.
- C. Earthwork Observation and Testing:
 - 1. The owner and/or owner's agent will retain a qualified Geotechnical Engineer and/or testing agency to perform onsite observation and testing during work under this and related sections and as indicated in the "Schedule of Special Inspections." The services of the geotechnical engineer/testing agency may include, but not be limited to, the following:
 - a. Observation during excavation, subgrade preparation and backfill for footings, slabs-on-grade, and subsurface drainage construction, etc.
 - b. Determination of requirements for additional excavation to remove unsuitable materials.
 - c. Observation and testing during placement and compaction of fill and backfill.
 - d. Laboratory testing and analysis of fill materials specified.
 - e. Review of submittals.
 - 2. During the course of construction the Geotechnical Engineer/testing agency shall advise the owner's agent, in writing, with a copy to the Architect and Contractor, if at any time,

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in his opinion, the work is not in substantial conformity with the plans and specifications. The Geotechnical Engineer's and/or testing agency's presence does not include supervision or direction of the actual work by the Contractor, his employees, subcontractors or agents. Neither the presence of the geotechnical engineer and/or testing agency, nor any observations and testing performed by him shall excuse the Contractor from defects discovered in his work.

3. Testing equipment will be provided by and testing performed by the Geotechnical Engineer and/or testing agency, except as otherwise provided by contract. Upon request by the owner's agent, the Contractor shall provide such auxiliary personnel and services as needed to accomplish testing work and to repair damage caused thereby to permanent work.
4. References herein to observations, testing and determinations by the "Engineer" include services to be provided by the Geotechnical Engineer and/or testing agency when appropriate and when so authorized by the engineer or owner.

1.6 PROJECT CONDITIONS

- A. Traffic: Minimize interference with adjoining roads, streets, walks, and other adjacent occupied or used facilities during earth moving operations.
 1. Do not close or obstruct streets, walks, or other adjacent occupied or used facilities without permission from Owner and authorities having jurisdiction.
 2. Provide alternate routes around closed or obstructed traffic ways if required by Owner or authorities having jurisdiction.
- B. Existing Utilities: Do not interrupt utilities serving facilities occupied by Owner or others unless permitted in writing by Architect and then only after arranging to provide temporary utility services according to requirements indicated.
 1. Notify Architect not less than three days in advance of proposed utility interruptions.
 2. Do not proceed with utility interruptions without Architect's written permission.
 3. Contact utility-locator service for area where Project is located before excavating.
- C. Existing Utilities:
 1. Notify utility locator service for area where project is located before site clearing or excavating. Contact Dig Safe not less than 3 business days before starting the work. Dig Safe requirements are in addition to local and/or State DOT street opening permit requirements
 2. Hire private utility markout service for areas not marked by utility companies. See the "General Conditions" of the construction contract.
 3. Before starting excavation, establish location and extent of any underground utilities occurring in work area. Make arrangements with appropriate utility company for removal and relocation of lines which are in the way of excavation. If utilities are to remain in place, provide adequate means of support and protection during earthwork operations.
 4. Should uncharted or incorrectly charted piping or other utilities be encountered during excavation, consult utility owner immediately for direction. Cooperate with owner, owner's agent, and utility companies in keeping respective services and facilities in operation. Repair damaged utilities to satisfaction of utility owner.

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- 5. Inactive or abandoned utilities encountered during construction operations shall be removed, plugged or capped. The location of such utilities shall be noted on record drawings and reported in writing to owner’s agent. Demolish and completely remove from site existing underground utilities indicated to be removed. Coordinate with utility companies for shutoff services if lines are active.
 - 6. Do not interrupt existing utilities serving facilities occupied and used by owner or others, during occupied hours, except when permitted in writing by owner’s agency and then only after arranging to provided acceptable temporary utility services. Provide minimum of 72 hour notice to owner’s agent and receive written notice to proceed before interrupting any utility. Do not proceed with utility interruptions without owner’s written permission.
- D. Demolish and completely remove from site existing underground utilities indicated to be removed. Coordinate with utility companies to shut off services if lines are active.

PART 2 - PRODUCTS

2.1 SOIL MATERIALS - GENERAL

- A. General: Provide borrow soil materials when sufficient satisfactory soil materials are not available from excavations.
- B. On-Site Material: Any suitable material from on-site excavation.
- C. Common Borrow: Inorganic mineral soil suitable for embankment construction free from frozen material, perishable rubble, peat and other unsuitable material.
- D. Backfill and Fill: Satisfactory soil materials.
- E. Unless indicated otherwise, materials shall conform to the "Standard Specification for Highways and Bridges" revision of March 2020, Maine Department of Transportation (abbreviated as Maine DOT "Standard Specification").
- F. Granular Borrow: Granular borrow shall be obtained from suitable excavated onsite soil or offsite borrow sources for use as fill and backfill below and interior to building areas except where other materials are specified or detailed, and as detailed on the drawings. Granular fill shall consist of non-plastic naturally or artificially graded mixture of sound coarse and fine aggregates free of debris, waste, frozen materials and organics and conforming to Maine DOT 703.19
- G. Structural fill: Use aggregate material for fill operations. Maine DOT Standard Specification 703.16, Type D. Sieve analysis by weight:

<u>Sieve Designation</u>	<u>Percent by Weight Passing Square Mesh Sieve</u>
3-Inch	100
¼_inch	25-90
No.40	0-30
No.200	0-6

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- H. 3/4 Inch Crushed Stone: Crushed stone shall be a quarry product 3/4 inch or washed gravel stone obtained from offsite sources for use as detailed on the drawings. Crushed stone shall consist of durable crushed rock or gravel stone essentially free of silt, clay, loam or other deleterious materials and shall conform to the following gradation requirements of MaineDOT 703.13
- I. Sand: ASTM C 33; fine aggregate, natural, or manufactured sand. Sieve analysis by weight:

<u>Sieve Designation</u>	<u>Percent by Weight Passing Square Mesh Sieve</u>
3/8 Inch	100
No.4	95-100
No. 16	50-85
No. 100	2-10

2.2 SOIL MATERIALS FOR ROADWAYS AND PARKING LOTS

- A. Aggregate Subbase Material: Shall meet the requirements of Maine Department of Transportation Standard Specifications Section 703.06(c), Type D.
- B. Aggregate Base Materials: Shall meet the requirements of MDOT Standard Specifications Section 703.06(a), Type A,

2.3 PIPE BEDDING MATERIALS

- A. 3/4" Crushed Stone Pipe Bedding Material: Shall be screened or crushed stone free of organic matter, silt, or clay lumps, and deleterious material. Shall meet the requirements of Maine DOT Specifications Section 703.13 and shall meet the following gradation requirements:

<u>Sieve Designation</u>	<u>Percent by Weight Passing Square Mesh Sieve</u>
1 Inch	100
3/4 Inch	90-100
1/2 Inch	20-55
3/8 Inch	0-15
No. 4	0-5

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2.4 RIGID INSULATION

- A. Extruded closed – cell rigid foamed polystyrene, 2 inch thickness, width of trench, Styrofoam HI-60 by Dow Chemical, or approved equal.

2.5 ACCESSORIES

- A. Detectable Warning Tape: Acid- and alkali-resistant polyethylene film warning tape manufactured for marking and identifying underground utilities, a minimum of 6 inches wide and 4 mils thick, continuously inscribed with a description of the utility, with metallic core encased in a protective jacket for corrosion protection, detectable by metal detector when tape is buried up to 30 inches deep; colored as follows:
 - 1. Red: Electric.
 - 2. Yellow: Gas, oil, steam, and dangerous materials.
 - 3. Orange: Telephone and other communications.
 - 4. Blue: Water systems.
 - 5. Green: Sewer systems.

PART 3 - EXECUTION

3.1 PREPARATION

- A. Protect structures, utilities, sidewalks, pavements, and other facilities from damage caused by settlement, lateral movement, undermining, washout, and other hazards created by earthwork operations.
- B. Preparation of subgrade for earthwork operations including removal of vegetation, topsoil, debris, obstructions, and deleterious materials from ground surface is specified in Division 31 Section "Site Clearing."
- C. Protect and maintain erosion and sedimentation controls, which are specified in Division 31 Section "Site Clearing," during earthwork operations.
- D. Provide protective insulating materials to protect subgrades and foundation soils against freezing temperatures or frost.
- E. Paved surfaces: Do not operate equipment on paved surfaces that will damage surface.

3.2 DEWATERING

- A. Refer to Section 312319 "Dewatering."

3.3 SHEETING, SHORING AND BRACING

- A. Refer to Section 315000 "Excavation Support and Protection."

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3.4 EXPLOSIVES

- A. Explosives: Do not use explosives.

3.5 EXCAVATION, GENERAL

- A. Stability of Excavations:

1. Slope sides of excavations to comply with OSHA regulations and local codes. Shore and brace where sloping is not possible because of space restrictions or stability to material excavated.
2. Maintain sides and slopes of excavations in a safe condition until completion of backfilling.

- B. Unclassified Excavation: Excavate to subgrade elevations regardless of the character of surface and subsurface conditions encountered. Unclassified excavated materials may include rock, soil materials, and obstructions. No changes in the Contract Sum or the Contract Time will be authorized for rock excavation or removal of obstructions.

1. If excavated materials intended for fill and backfill include unsatisfactory soil materials and rock, replace with satisfactory soil materials.
2. Remove rock to lines and grades indicated to permit installation of permanent construction without exceeding the following dimensions:
 - a. 6 inches beneath bottom of concrete slabs on grade.
 - b. 6 inches beneath pipe in trenches, and horizontally 24 inches wider than the nominal diameter of pipe or conduit as indicated in the Contract Documents.
 - c. For Tanks, Vaults, Manholes, Pits, Etc.: The excavation shall extend 24 inches greater in both length and width or diameter than the actual exterior dimensions of the structures and vertically 12 inches below the bottom elevation of structure as indicated in the Contract Documents.

3.6 EXCAVATION FOR STRUCTURES

- A. Excavate to indicated elevations and dimensions within a tolerance of plus or minus 1 inch. If applicable, extend excavations a sufficient distance from structures for placing and removing concrete formwork, for installing services and other construction, and for inspections.

1. Excavation for Underground Tanks, Basins, and Mechanical or Electrical Utility Structures: Excavate to elevations and dimensions indicated within a tolerance of plus or minus 1 inch. Do not disturb bottom of excavations intended as bearing surfaces.

- B. Subgrade for Slabs-on-Grade:

1. Slabs-on-grade shall be supported on subbase/base course(s) as indicated on the drawings.
2. Remove and replace excessively wet, disturbed or unstable material and proof compact the subgrade for the slab subbase/base course with at least six passes of a vibratory plate or vibratory roller compactor immediately prior to placement of slab base course material unless otherwise directed.

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3. The final surface of the subgrade for the moisture retarder membrane and/or slabs-on-grade shall be proof rolled with at least four passes of an approved vibratory plate or vibratory drum compactor immediately prior to placing the membrane, reinforcing or concrete (as may be applicable).

3.7 EXCAVATION FOR WALKS AND PAVEMENTS

- A. Excavate surfaces under walks and pavements to indicated lines, cross sections, elevations, and subgrades.
- B. Saw cut pavement prior to excavation to provide a clean, uniform edge. Minimize disturbance of remaining pavement. Cut and remove the minimum amount of pavement required to do the work.
- C. Use shoring and bracing where sides of excavation will not stand without undermining pavement.

3.8 EXCAVATION FOR UTILITY TRENCHES

- A. Excavate trenches to indicated gradients, lines, depths, and elevations.
 1. Beyond building perimeter, excavate trenches to allow installation of top of pipe below frost line.
- B. Excavate trenches to uniform widths as indicated on the drawings. Excavate trench walls vertically from trench bottom to 12 inches higher than top of pipe or conduit, unless otherwise indicated.
 - 1.
- C. Trench Bottoms: Excavate trenches 6 inches deeper than bottom of pipe elevation to allow for bedding course. Hand excavate for bell of pipe.

3.9 SUBGRADE INSPECTION

- A. Notify Engineer and Owner's agent when excavations have reached required subgrade.
- B. If Engineer determines that unsatisfactory soil is present, continue excavation and replace with compacted backfill or fill material as directed and in accordance with Article "Excavation for Structures" of this section.
- C. Proof-roll subgrade below the gravel road, pavements, and fill areas with heavy pneumatic-tired equipment to identify soft pockets and areas of excess yielding. Do not proof-roll wet or saturated subgrades.
 1. Completely proof-roll subgrade in one direction. Limit vehicle speed to 3 mph.
 2. Proof-roll with a loaded 10-wheel, tandem-axle dump truck weighing not less than 15 tons.
 3. Excavate soft spots, unsatisfactory soils, and areas of excessive pumping or rutting, as determined by Engineer, and replace with compacted backfill or fill as directed.

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- D. Authorized Additional Excavation: In the case that unsuitable materials, as determined by the engineer, are encountered at the specified subgrade elevation, the engineer may direct the removal of the unsuitable material and refill with granular fill placed and compacted in accordance with the requirements of this Section. This work will be paid for according to Contract provisions for changes in the Work.
- E. Reconstruct subgrades damaged by freezing temperatures, frost, rain, accumulated water, or construction activities, as directed by Engineer, without additional compensation.

3.10 UNAUTHORIZED EXCAVATION

- A. Unauthorized Excavation: Unauthorized excavation consists of removal of materials beyond indicated subgrade elevations or dimensions without specific direction of the engineer or owner's agent. Unauthorized excavation, as well as remedial work specified by the engineer, shall be at the Contractor's expense.
 - 1. In areas below structures, utility pipes, pavements and walks, backfill unauthorized excavation with granular borrow placed and compacted in accordance with this Section, unless otherwise directed by the engineer.
 - 2. Elsewhere, backfill and compact unauthorized excavations with common borrow, compacted to the requirements of this Section.
 - 3. Where the excavation of otherwise suitable materials is required due to these materials being rendered unsuitable due to disturbance, construction activity, freezing or lack of protection from the elements, the Contractor shall excavate these materials and provide remedial work as specified above at no additional cost to the owner.

3.11 STORAGE OF SOIL MATERIALS

- A. Stockpile borrow soil materials and excavated satisfactory soil materials without intermixing. Place, grade, and shape stockpiles to drain surface water. Cover to prevent windblown dust.
 - 1. Stockpile soil materials away from edge of excavations. Do not store within drip line of remaining trees.

3.12 BACKFILL

- A. Backfilling Prior to Acceptance of Work Installed:
 - 1. Do not allow or cause the work performed or installed to be covered up or enclosed by work of this Section prior to all required inspections, tests and acceptances.
 - 2. Should any of the work be so enclosed or covered up before it has been accepted, uncover all such work at no additional cost to the owner.
 - 3. After the work has been completed, tested, inspected and accepted, make all repairs and replacements necessary to restore the work to the condition in which it was found at the time of uncovering, all at no additional cost to the owner.
- B. Place and compact backfill in excavations promptly, but not before completing the following:
 - 1. Surveying locations of underground utilities for Record Documents.

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2. Testing and inspecting underground utilities.
 3. Removing concrete formwork.
 4. Removing trash and debris.
 5. Removing temporary shoring and bracing, and sheeting.
- C. Place backfill on subgrades free of mud, frost, snow, or ice.
- D. All vegetation, peat, organic topsoil or subsoil, trash, debris, roots, stumps, and any compressible or otherwise deleterious materials shall be stripped from the existing ground surface and removed from excavations prior to placement of fill or backfill.
- E. All fill and backfill materials shall be placed in horizontal layers. Each layer shall be spread evenly and thoroughly mixed during spreading to ensure uniformity of material in each layer. Layer thickness shall not exceed 12-inches and may be thinner as necessary for the compaction equipment being used.
- F. Where horizontal fill layers meet a natural or excavated slope, the layer shall be keyed into the slope by cutting a bench. The surface of benches shall be compacted to the same requirements as apply to the area being filled.
- G. In no instance place fill over materials that were permitted to freeze prior to compaction or over ice or snow. Removal of such materials will be required as directed by the engineer. In no case will frozen material be allowed for use in fill or backfill.
- H. No fill shall be placed or compacted during unfavorable weather conditions. When work is interrupted by heavy rains or snow, fill operations shall not be resumed until the moisture content and density of previously placed fill are as specified hereinafter.

3.13 UTILITY TRENCH BACKFILL

- A. Place backfill on subgrades free of mud, frost, snow, or ice.
- B. Place and compact bedding course on trench bottoms and where indicated. Shape bedding course to provide continuous support for bells, joints, and barrels of pipes and for joints, fittings, and bodies of conduits.
- C. Backfill under all existing utility pipes crossed during construction operations with $\frac{3}{4}$ -inch crushed stone. Crushed stone backfill shall extend continuously from the bedding of new utility pipes to the utility pipe crossed, including a 6-inch thick envelope of crushed stone all around the existing utility pipes. Crushed stone backfill shall stand at its own angle of repose. No “haunching” or “forming” with common fill will be allowed.
- D. Place and compact bedding materials, to a height of 12 inches over the utility pipe or conduit.
1. Carefully compact initial backfill under pipe haunches and compact evenly up on both sides and along the full length of utility piping or conduit to avoid damage or displacement of piping or conduit. Coordinate backfilling with utilities testing.
- E. Electrical and Telecommunications Conduit:

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1. Electrical Conduits: Bury beneath finish grade a minimum of 30 inches to top of conduit, or as required by the National Electrical Code or local utility company, whichever is deeper. Surround conduits by a minimum of 6 inches of sand or bedding material.
 2. Telephone and Communication Conduits: Bury beneath finish grade a minimum of 30 inches to top of conduit, or as required by the local utility company, whichever is deeper. Surround conduits by a minimum of 6 inches of sand or bedding material.
- F. Backfill voids with satisfactory soil while installing and removing shoring and bracing.
- G. Install warning tape directly above utilities, 12 inches below finished grade, except 6 inches below subgrade under pavements and slabs.
- H. Coordinate backfilling with utilities testing.

3.14 SOIL FILL

- A. Plow, scarify, bench, or break up sloped surfaces steeper than 1 vertical to 4 horizontal so fill material will bond with existing material.
- B. Place and compact fill material in layers to required elevations as follows:
1. Under grass and planted areas, use common borrow.
 2. Under walks, gravel roads, and pavements, use granular borrow.
- C. Place soil fill on subgrades free of mud, frost, snow, or ice.

3.15 SOIL MOISTURE CONTROL

- A. Uniformly moisten or aerate subgrade and each subsequent fill or backfill soil layer before compaction to within 2 percent of optimum moisture content.
1. Do not place backfill or fill soil material on surfaces that are muddy, frozen, or contain frost or ice.
 2. Remove and replace, or scarify and air dry otherwise satisfactory soil material that exceeds optimum moisture content by 2 percent and is too wet to compact to specified dry unit weight.
- B. Moisture Control:
1. Water shall be added to fill material which does not contain sufficient moisture to be compacted to the specified densities. Fill and backfill material containing excess moisture shall be required to dry prior to or during compaction to a moisture content not greater than two percentage points above optimum except that material which displays pronounced elasticity or deformation underfoot or under load shall be required to dry to optimum moisture content before it is placed and compacted, if that is required to achieve specified compaction. At the Contractor's option, material which is too wet may be removed and replaced with satisfactory material at no additional cost to the owner.

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2. The Contractor is alerted to the potential silty nature of the onsite soil which renders them sensitive to moisture. Onsite silty soils are difficult to handle and compact and are easily disturbed when wet. The Contractor shall plan and conduct his excavation and filling operations considering the nature of the onsite materials.

3.16 COMPACTION OF SOIL BACKFILLS AND FILLS

- A. Place backfill and fill soil materials in layers not more than 12 inches in loose depth for material compacted by heavy compaction equipment, and not more than 6 inches in loose depth for material compacted by hand-operated tampers.
- B. Place backfill and fill soil materials evenly on all sides of structures to required elevations, and uniformly along the full length of each structure.
- C. Compact soil materials to not less than the following percentages of maximum dry unit weight according to ASTM D 1557:
 1. Under structures, building slabs, steps, and pavements, scarify and recompact top 12 inches of existing subgrade and each layer of backfill or fill soil material at 95 percent.
 2. Under walkways, scarify and recompact top 6 inches below subgrade and compact each layer of backfill or fill soil material at 95 percent.
 3. Under lawn or unpaved areas, scarify and recompact top 6 inches below subgrade and compact each layer of backfill or fill soil material at 90 percent.
 4. For utility trenches, compact each layer of initial and final backfill soil material at 95 percent.
- D. The term "under," as applied to building, structures and paved areas, shall be construed to include all materials immediately below the plan area of the building, as well as those materials within a line sloping at one vertical to one horizontal drawn downward and outward from the exterior of building foundation, structure foundation or paved area.
- E. Compaction shall be by mechanical means designed specifically for compaction and approved by the engineer. The engineer reserves the right to disapprove any device or inadequate capacity or of type unsuited to the character of the material being compacted. In areas which are too restricted to permit the use of mechanical compactors, fill may be placed in 3 inch layers and compacted by hand rammer or pneumatic tools.
- F. Where the engineer determines that fill or backfill does not conform to the compacted density specified, or did not receive the minimum compactive effort specified, such fill shall be removed and replaced with conforming materials at the Contractor's own cost.

3.17 GRADING

- A. General: Uniformly grade areas to a smooth surface, free of irregular surface changes. Comply with compaction requirements and grade to cross sections, lines, and elevations indicated.
 1. Provide a smooth transition between adjacent existing grades and new grades.

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2. Cut out soft spots, fill low spots, and trim high spots to comply with required surface tolerances.
- B. Site Grading: Slope grades to direct water away from buildings and to prevent ponding. Finish subgrades to required elevations within the following tolerances:
1. Lawn or Unpaved Areas: Plus or minus 1 inch.
 2. Walks: Plus or minus 1/2 inch.
 3. Pavements: Plus or minus 1/2 inch.
- C. Maintenance:
1. Protection of Graded Areas: Protect newly graded areas from traffic and erosion. Keep free of trash and debris.
 2. Reconditioning Compacted Areas: Where completed compacted areas are disturbed by subsequent construction operations or adverse weather, scarify surface, re-shape, and compact to required density prior to further construction.

3.18 SUBBASE AND BASE COURSES

- A. Place subbase and base course on subgrades free of mud, frost, snow, or ice.
- B. On prepared subgrade, place subbase and base course under pavements and walks as follows:
1. Shape subbase and base course to required crown elevations and cross-slope grades.
 2. Place subbase and base course 6 inches or less in compacted thickness in a single layer.
 3. Place subbase and base course that exceeds 6 inches in compacted thickness in layers of equal thickness, with no compacted layer more than 6 inches thick or less than 3 inches thick.
 4. Compact subbase and base course at optimum moisture content to required grades, lines, cross sections, and thickness to not less than 95 percent of maximum dry unit weight according to ASTM D 1557.

3.19 FIELD QUALITY CONTROL

- A. Testing Agency: Owner will engage a qualified independent geotechnical engineering testing agency to perform field quality-control testing.
- B. Allow testing agency to inspect and test subgrades and each fill or backfill layer. Proceed with subsequent earthwork only after test results for previously completed work comply with requirements.
- C. Testing agency will test compaction of soils in place according to ASTM D 1556, ASTM D 2167, ASTM D 6938, and ASTM D 2937, as applicable.
1. Field in-place density tests may also be performed by the nuclear method according to ASTM D 6938, provided that calibration curves are periodically checked and adjusted to correlate to tests performed using ASTM D1556. With each density calibration check, check the calibration curves furnished with the moisture gages according to ASTM D 3017.

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2. When field in-place density tests are performed using nuclear methods, make calibration checks for both density and moisture gages at the beginning of work, on each different type of material encountered and at intervals as directed by the engineer.
 3. Trench Backfill: At each compacted initial and final backfill layer, at least one test for every 150 feet or less of trench length, but no fewer than two tests.
 4. Pavement areas: At subgrade and at each compacted fill and backfill layer, at least one test for every 2500 sq. ft. or less of paved area or building slab, but in no case fewer than three tests.
- D. When testing agency reports that subgrades, fills, or backfills have not achieved degree of compaction specified, scarify and moisten or aerate, or remove and replace soil to depth required; recompact and retest until specified compaction is obtained.

3.20 PROTECTION

- A. Protecting Graded Areas: Protect newly graded areas from traffic, freezing, and erosion. Keep free of trash and debris.
- B. Repair and reestablish grades to specified tolerances where completed or partially completed surfaces become eroded, rutted, settled, or where they lose compaction due to subsequent construction operations or weather conditions.
1. Scarify or remove and replace soil material to depth as directed by Architect; reshape and recompact.
- C. Where settling occurs before Project correction period elapses, remove finished surfacing, backfill with additional soil material, compact, and reconstruct surfacing.
1. Restore appearance, quality, and condition of finished surfacing to match adjacent work, and eliminate evidence of restoration to greatest extent possible.

3.21 DISPOSAL OF SURPLUS AND WASTE MATERIALS

- A. Disposal: Transport surplus satisfactory soil to designated storage areas on Owner's property. Stockpile or spread soil as directed by Architect.
1. Remove waste material, including unsatisfactory soil, trash, and debris, and legally dispose of it off Owner's property.
- B. If hazardous waste or special waste as defined by the U.S. Environmental Protection Agency or State Department of Environmental Protection is encountered during excavation, the Contractor shall avoid disturbance of that material, and shall notify the Engineer immediately. The State Bureau of Oil and Hazardous Waste Control shall be notified and consulted prior to disturbance of the waste or contaminated soil. Removal and disposal of contaminated materials is not included in the Contract, and will be paid for by appropriate change order.

END OF SECTION 312000

SECTION 312319 - DEWATERING

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 construction dewatering.
- B. Related Sections:
 - 1. Division 31 Section "Earth Moving" for excavating, backfilling, site grading, and for site utilities.
 - 2. Division 31 Section "Excavation Support and Protection" for shoring, bracing, and sheet piling of excavations.

1.3 PERFORMANCE REQUIREMENTS

- A. Dewatering Performance: Design, furnish, install, test, operate, monitor, and maintain dewatering system of sufficient scope, size, and capacity to control hydrostatic pressures and to lower, control, remove, and dispose of ground water and permit excavation and construction to proceed on dry, stable subgrades.
 - 1. Delegated Design: Design dewatering system, including comprehensive engineering analysis by a qualified professional engineer, using performance requirements and design criteria indicated.
 - 2. Continuously monitor and maintain dewatering operations to ensure erosion control, stability of excavations and constructed slopes, that excavation does not flood, and that damage to subgrades and permanent structures is prevented.
 - 3. Prevent surface water from entering excavations by grading, dikes, or other means.
 - 4. Accomplish dewatering without damaging existing buildings, structures, and site improvements adjacent to excavation.
 - 5. Remove dewatering system when no longer required for construction.

1.4 ACTION SUBMITTALS

- A. Delegated-Design Submittal: For dewatering system indicated to comply with performance requirements and design criteria, including analysis data signed and sealed by the qualified professional engineer responsible for their preparation.

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1.5 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For qualified Installer.
- B. Field quality-control reports.
- C. Other Informational Submittals:
 - 1. Show existing conditions of adjoining construction and site improvements that might be misconstrued as damage caused by dewatering operations.

1.6 QUALITY ASSURANCE

- A. Installer Qualifications: An experienced installer that has experience in dewatering work.
- B. Regulatory Requirements: Comply with governing EPA notification regulations before beginning dewatering. Comply with hauling and disposal regulations of authorities having jurisdiction.

1.7 PROJECT CONDITIONS

- A. Project-Site Information: A geotechnical report has been prepared for this Project and is available for information only. The opinions expressed in this report are those of geotechnical engineer and represent interpretations of subsoil conditions, tests, and results of analyses conducted by geotechnical engineer. Owner will not be responsible for interpretations or conclusions drawn from this data.
 - 1. Make additional test borings and conduct other exploratory operations necessary for dewatering.
 - 2. The geotechnical report is referenced elsewhere in the Project Manual.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION

3.1 PREPARATION

- A. Protect structures, utilities, sidewalks, pavements, and other facilities from damage caused by settlement, lateral movement, undermining, washout, and other hazards created by dewatering operations.
 - 1. Prevent surface water and subsurface or ground water from entering excavations, from ponding on prepared subgrades, and from flooding site and surrounding area.
 - 2. Protect subgrades and foundation soils from softening and damage by rain or water accumulation.

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- B. Install dewatering system to ensure minimum interference with roads, streets, walks, and other adjacent occupied and used facilities.
 - 1. Do not close or obstruct streets, walks, or other adjacent occupied or used facilities without permission from Owner and authorities having jurisdiction. Provide alternate routes around closed or obstructed traffic ways if required by authorities having jurisdiction.
- C. Provide temporary grading to facilitate dewatering and control of surface water.
- D. Monitor dewatering systems continuously.
- E. Promptly repair damages to adjacent facilities caused by dewatering.
- F. Protect and maintain temporary erosion and sedimentation controls, which are specified in Section "Erosion and Sedimentation Controls" and Division 31 Section "Site Clearing" during dewatering operations.

3.2 INSTALLATION

- A. Install dewatering system utilizing wells, well points, or similar methods complete with pump equipment, standby power and pumps, filter material gradation, valves, appurtenances, water disposal, and surface-water controls.
 - 1. Space well points or wells at intervals required to provide sufficient dewatering.
 - 2. Use filters or other means to prevent pumping of fine sands or silts from the subsurface.
- B. Before excavating below ground-water level, place system into operation to lower water to specified levels. Operate system continuously until drains, sewers, and structures have been constructed and fill materials have been placed or until dewatering is no longer required.
- C. Provide an adequate system to lower and control ground water to permit excavation, construction of structures, and placement of fill materials on dry subgrades. Install sufficient dewatering equipment to drain water-bearing strata above and below bottom of foundations, drains, sewers, and other excavations.
 - 1. Do not permit open-sump pumping that leads to loss of fines, soil piping, subgrade softening, and slope instability.
- D. Reduce hydrostatic head in water-bearing strata below subgrade elevations of foundations, drains, sewers, and other excavations.
- E. Dispose of water removed by dewatering in a manner that avoids endangering public health, property, and portions of work under construction or completed. Dispose of water and sediment in a manner that avoids inconvenience to others. Provide sumps, sedimentation tanks, and other flow-control devices as required by authorities having jurisdiction.
- F. Provide standby equipment on site, installed and available for immediate operation, to maintain dewatering on continuous basis if any part of system becomes inadequate or fails. If dewatering

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requirements are not satisfied due to inadequacy or failure of dewatering system, restore damaged structures and foundation soils at no additional expense to Owner.

1. Remove dewatering system from Project site on completion of dewatering. Plug or fill well holes with sand or cut off and cap wells a minimum of 36 inches below overlying construction.
- G. Damages: Promptly repair damages to adjacent facilities caused by dewatering operations.

END OF SECTION 312319

SECTION 312500 - EROSION AND SEDIMENTATION CONTROL

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. The Work of this Section is integral with the whole of the Contract Documents and is not intended to be interpreted outside that context.
- C. Erosion control narrative and details shown on the project plans.
- D. Maine Department of Transportation Standard Specifications March 2020 Edition including supplemental specifications.
- E. Maine Department of Environmental Protection Erosion and Sediment Control Best Management Practices Manual (October 2016) and Field Guide for Contractors (2014).

1.2 SUMMARY

- A. Provide all labor, materials, equipment, services and accessories necessary to furnish and install the Work of this Section, complete and functional, as indicated in the Contract Documents and as specified herein.
- B. This Section includes but may not be limited to the following:
 - 1. Temporary and permanent erosion and sedimentation control measures to prevent soil erosion and discharge of soil-bearing water runoff or airborne dust to adjacent properties and walkways.
 - 2. Inspection, repair, and maintenance of erosion and sedimentation control measures during construction until permanent vegetation has been established.
 - 3. Removal of erosion and sedimentation controls and restoration and stabilization of areas disturbed during removal.
- C. Related Sections include the following:
 - 1. Division 31 Section "Site Clearing" for site stripping, grubbing, stripping and stockpiling topsoil.
 - 2. Division 31 Section "Earth Moving" for soil materials, excavating, backfilling, and site grading.
 - 3. Division 31 Section "Riprap."

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1.3 DEFINITIONS

- A. MDOT: Maine Department of Transportation.
- B. MDEP: Maine Department of Environmental Protection.

1.4 PERFORMANCE REQUIREMENTS

- A. Environmental Licensing Requirements: All construction is subject to review and/or inspection by local, State, and Federal agencies for adequacy of erosion and sedimentation control measures. Take necessary steps to prevent soil erosion. Refer to publications of the Maine DEP (MDEP) and the Maine Soil and Water Conservation Commission for additional prevention measures to stop soil erosion and follow MDEP "Best Management Practices."
- B. Erosion and Sedimentation Control Guidelines: "Maine Erosion and Sediment Control BMPS," published by the Bureau of Land and Water Quality Maine Department of Environmental Protection, latest revision March 2015.

1.5 SUBMITTALS

- A. Product Data: For each manufactured product indicated. Include manufacturer's instructions for installation.
- B. Provide to the Engineer, in writing, a time schedule outlining the sequence of construction for site Work.

1.6 SEQUENCING AND SCHEDULING

- A. Conduct operations in conformity with all Federal and State permit requirements. Plan the sequence of construction so that the smallest practical area of land is exposed at any one time during construction. Schedule the Work such that sedimentation barriers are installed early in the construction sequence, to prevent sediments from uphill areas reaching streams, wetlands, or property lines.
- B. Provide to the Engineer, in writing, a time schedule outlining the sequence of construction for site Work.
- C. See Plans for erosion and sedimentation control requirements.
- D. See plans for fall and winter (September 15 or Later) stabilization requirements.
- E. Stabilize exposed soils throughout the project site.

PART 2 - PRODUCTS

2.1 MATERIALS

- A. Seed, Fertilizer and Lime: Shall be as specified under Erosion Control Notes on Drawings.
- B. Mulch: Comply with the requirements of MDOT Standard Specification, Section 619.
- C. Erosion Control Mesh: North American Green DS150 blanket conforming to MDOT Standard Specification, Section 613 or as approved by the Engineer
- D. Siltation Fence:
 - 1. Support Fence: 30 inch high livestock fence, or high strength plastic mesh.
 - 2. Post: Rolled steel manufactured line post or 2 inch diameter hardwood post, 4.5 feet in length.
 - 3. Fabric: Pervious sheet of synthetic polymer meeting the following minimum requirements.
 - a. Mirafi Silt Fence or approved equal.
 - 4. Pre-manufactured Silt Fencing systems: Separate support fence may be eliminated if fabric is manufactured with reinforcement, including top cord,
 - a. ProPex Silt Stop; Amoco Fabrics and Fibers Co.
- E. Crushed Stone: Durable, clean, angular rock fragments obtained by breaking and crushing rock material; 2 to 3-inch stone.
- F. Filter Fabric: Woven fabric composed of high-tenacity polypropylene yarns for sediment riser pipes and block and stone catch basin inlet traps.
 - 1. Product: Mirafi 100X; Mirafi Construction Products or equal
- G. Erosion Control Mix: Mix may be manufactured on or off project site.
 - 1. Mix shall consist primarily of organic material, separated at the point of generation, and may include shredded bark, stump grindings, composted bark, or flume grit and fragmented wood generated from water-flume log handling systems.
 - a. Wood chips, ground construction debris, reprocessed wood products, or bark chips shall not be acceptable as the organic component of the mix.
 - 2. Mix shall contain well-graded mixture of particle sizes and may contain rocks less than 4 inches in diameter. Mix shall be free of refuse, physical contaminants, and material toxic to plant growth.
 - 3. Mix composition shall meet the following standards:
 - a. Organic matter content shall be between 20 and 100 percent, dry weight basis.

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- b. Particle size by weight shall be 100 percent passing a 6-inch screen, and a minimum of 70 percent and a maximum of 85 percent passing a 0.75-inch screen.
 - c. Organic portion shall be fibrous and elongated.
 - d. Large portions of silts, clays or fine sands are not acceptable in the mix.
 - e. Soluble salts content shall be less than 4.0 mmhos/cm.
 - f. Mix pH shall fall between 5.0 and 8.0.
- H. Water, calcium chloride, or crushed stone for prevention of airborne dust.

PART 3 - EXECUTION

3.1 GENERAL REQUIREMENTS

- A. Prior to grubbing, stripping, excavation, placement of fill, temporary or permanent placement of excavated materials, or other earthwork, the Contactor shall implement erosion and sedimentation control measures as specified herein and indicated on the plans.
- B. A silt fence, filter berm, or stone sediment dam shall be installed along the down-slope side of the construction site, as necessary, to prevent soil sediment migration away from the site. Install silt fence or filter berm along the down-slope side of all top-soil and subsoil stockpiles.
- C. Temporary measures for controlling erosion and sedimentation may include, but are not limited to, the following:
 - 1. Siltation fencing around the downslope periphery of areas to be disturbed by construction.
 - 2. Filter Berm around the downslope periphery of areas to be disturbed by construction.
 - 3. Temporary seeding and mulching of soil stockpiles or disturbed areas.
 - 4. Temporary sedimentation basins, siltation traps, stone check dams and other temporary practices as approved by the Engineer.
- D. Permanent measures for controlling erosion and sedimentation shall be provided as shown on the drawings or required by these Specifications.
- E. Where disturbed areas cannot be permanently stabilized within 14 days of exposure of the soil, the areas shall be temporarily seeded and mulched, or otherwise stabilized as approved by the Engineer.
- F. Permanent soil stabilization measures for all slopes, channels, ditches, or any disturbed land area shall be completed within 7 calendar days after final grading has been completed. Where such permanent erosion control measures are not possible or practical to implement, and upon approval by the Engineer, temporary stabilization practices shall be applied as in 3.1.C above.
- G. All temporary and permanent control measures shall be periodically inspected and maintained by the Contractor for the duration of the construction and warranty period of this Contract. Sediment collection devices shall be cleaned periodically as required, and the removed material reused or disposed of at an approved disposal area.

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3.2 SURFACE WATER DIVERSION

- A. Build, maintain, and operate all cofferdams, channels, flumes, sumps, and other temporary diversion and protection Works needed to divert streamflow and other surface water through or around the construction site and away from the construction Work while construction is in progress.
- B. Outlet diverted stormwater and water from excavations to sedimentation trap or basin or other approved sedimentation control measure.

3.3 SILTATION FENCE

- A. Construct siltation fences at the locations and to the dimensions indicated, and as required to meet specified criteria.
- B. Set fence post 6 feet O.C. to a depth of 2 feet. Attach support fence to post with fencing staples or appropriate wire ties.
- C. Overlap joints in support fence 12 inches. Apply fabric to full height of support fence and secure to prevent sagging, blow off, and loss. A 12-inch overlap of fabric for vertical piecing shall be maintained, folded to a 3 inch width and securely attached to supports.
- D. No horizontal joints will be allowed.
- E. The bottom of the fabric shall be trenched into the existing ground a minimum of 6 inches. In addition, hay bales or ditch checks shall be installed along the silt fence to create sedimentation pools in low areas where run-off concentrates.
- F. Prior to removal of the silt fence, all retained soil or other material shall be removed and disposed of at an approved disposal area.

3.4 FILTER BERM

- A. Place un-compacted erosion control mix in a windrow at locations shown on the plan or as directed by the Engineer.
 - 1. At a minimum the berm shall be 3 feet wide at the base and 2 feet high at the center of all points along its length.
 - 2. Berm material, where the berm is still required, which has decomposed, clogged with sediment, eroded, or becomes ineffective, shall be replaced.
 - 3. The berm shall be removed from the site when no longer required, as determined by the Engineer.

3.5 TEMPORARY SEEDING AND MULCHING

- A. Topsoil stripped and stockpiled on site shall be immediately seeded with erosion control seed mix and mulched with hay.

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- B. Exposed earthwork areas, which will not be worked on for one week, shall be hay mulched. Unfinished areas which are not to be worked on for one month, or will be wintered, shall be seeded with erosion control mix at a rate of 4 pounds of seed per 1000 sq. ft. and mulched with hay. Apply hay mulch at the rate of 3 tons per acre such that no soil is exposed. Anchor mulch to prevent wind blown movement.
- C. In sensitive areas (within 25 ft. of stream or wetland edge) temporary mulch must be applied within 7 days of initial disturbance and prior to any storm event.
- D. Winter Mulch: If the catch of grass is less than 75% by November 15, apply additional hay mulch to achieve a protective layer of 5 tons per acre. Anchor mulch with mesh to prevent wind blown movement.
- E. No fill shall be placed on hay mulch. Dispose of used hay mulch off site.

3.6 FALL AND WINTER STABILIZATION

- A. Stabilize exposed soils throughout the project site with permanent seed and mulch by September 15, with the exception of areas undergoing active earthmoving operations. These construction areas are primarily in the immediate vicinity of the building. For proposed grass areas not stabilized by permanent seed and mulch by this date, provide the following stabilization measures at no additional cost to the Owner. Select the appropriate methods from the options listed and obtain approval from the Engineer prior to installation.
 1. Stabilize the soil with temporary vegetation, except for ditches, by October 1. Place winter rye seed at the rate of 3 pounds per 1000 sq. ft. and lightly mulch with hay or straw at 75 pounds per 1000 sq. ft. Place erosion control mesh over mulch and anchor.
 2. For slopes flatter than 3H:1V, place sod over the exposed soil by October 1. Roll the sod, anchor it with wire pins, and water it to promote growth.
 3. For grassed areas flatter than 10H:1V, stabilize the disturbed soil by November 1 with temporary winter mulching by applying hay or straw at a rate of at least 150 pounds per 1000 sq. ft., such that no soil is visible through the mulch. Anchor mulch with erosion control mesh.
 4. For slopes steeper than 10H:1V and flatter than 2H:1V, place a 6" layer of erosion control soil/bark mix on the disturbed soil by November 1. Remove snow accumulated on the slope prior to installation. If groundwater seeps are pre-sent, place stone rip rap to thickness shown on drawing details over non-woven geotextile.
 5. For drainage ditches or channels, place a sod lining by October 1 or place a rip rap lining by November 1. Sod shall be rolled, fastened with wire pins, anchored with erosion control mesh, and watered. Rip rap shall be placed at the thickness shown on the drawing details over a layer of non-woven geotextile.
- B. If the catch of permanent or temporary grass is less than 3" tall or covers less than 75% of the disturbed soil by November 1, apply additional hay mulch at a rate of 150 pounds per 1000 sq. ft. Anchor mulch with erosion control mesh.

3.7 DRAINAGE DITCHES AND EMBANKMENTS

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- A. Drainage ditches shall be provided with filter berm silt dams or rock check dams spaced no greater than 100 feet apart.
 - 1. Temporary ditch dams shall be constructed where indicated, using composted bark soil mix or rocks in the configurations shown. Additional temporary ditch dams shall be installed from time to time during the construction where necessary to prevent soil particle migration from the work area. Where necessary due to terrain configuration, earth berms shall be constructed at one or both ends of the ditch check so as to contain runoff. The tops of earth berms shall be higher than the tops of the dams so that runoff will occur only over the dams. Sand bags may be used instead of earth berms at the Contractor's option but shall be faced with earth placed against the upstream face.
- B. Grassed drainage ditches and swales shall be lined with a continuous mat of erosion control mesh for full bottom width and side slopes to 12" above bottom, to stabilize the loam, seed and mulch.
- C. Where erosive velocities in ditches or embankments are anticipated or experienced, and soil cannot be stabilized with mulch and mesh alone, substitute erosion control soil mix in place of loam. For this use, screen erosion control soil mix to remove wood, bark, and stones one-inch in size and greater. If erosion control soil/bark mix is used in ditches, and erosive velocities are excessive, provide a 12" thick stone rip rap lining along ditch bottom and up side slopes to one foot above the bottom elevation. Place non-woven geotextile beneath stone.
- D. Stabilize pond embankments (interior and exterior), slopes steeper than 3 horizontal to one vertical, and drainage ditches by September 15. Stabilization shall consist of permanent seeding and mulch, temporary winter seeding (winter rye) and winter mulch. If this date cannot be met, provide alternative permanent or temporary stabilization described as Fall and Winter Stabilization.
- E. Install erosion control mesh over mulch on slopes steeper than 6 horizontal to one vertical (16%) and in conformance to DOT Standard Specifications, latest Edition, paragraphs 613.03 through 613.05. Anchor mesh as recommended by manufacturer.
- F. Permanently rip-rap inlets and outlets of culverts and pipe outfalls as specified in Section 312000“Earth Moving”, and as shown on the Drawings.
- G. Install permanent erosion control blanket around culvert inlets and outlets as shown on the Drawings, and according to manufacturer’s recommendations.
 - 1. Prepare soil with loam, fertilizer, and seed as specified in Section 329300 “Landscape Work” prior to installing erosion control blanket.
 - 2. Install permanent erosion control blanket 5 feet minimum in all directions around culvert inlets.
 - 3. Install permanent erosion control blanket 5 feet minimum in all directions around culvert outlets, and a 6 feet width centered along the outlet channel for 10 feet.
 - 4. Install staples as shown on the erosion control blanket detail on the Drawings, and throughout the blanket in an 18 by 18 inch grid.

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3.8 INSTALLATION OF RIPRAP APRON

- A. Construct riprap aprons (riprap outlet protection) at the locations and to the dimensions indicated.
- B. Clear and grub the surface of all areas where riprap aprons will be constructed. Dispose of unsatisfactory material at designated disposal areas.
- C. There shall be no overfall from the end of the apron to the surface of the receiving channel. The area to be riprapped shall be at the same grade (flush) with the surface of the receiving channel.
- D. Apron dimensions and riprap thickness shall be as indicated.
- E. Placing of fill in the receiving channel shall not be allowed.
- F. Riprap construction shall conform to the specified requirements for riprap in Section 313700 "Riprap."

3.9 EROSION CONTROL MIX-MULCH

- A. Apply mix of the following thicknesses based on length and steepness of slope:
 - 1. On Slopes of 3:1 or Less: 2 inches plus an additional 1/2-inch per 20 feet of slope up to 100 feet.
 - 2. On Slopes Between 3:1 and 2:1: 4 inches plus an additional 1/2-inch per 20 feet of slope up to 100 feet.
 - 3. The thickness of the mulch at the bottom of the slope shall be as follows:
 - a. Less Than 3:1 Slope Slopes Between 3:1 and 2:1
 - b. Less than 20 Feet of Slope: 2.0 inches 4.0 inches
 - c. Less than 60 Feet of Slope: 2.5 inches 5.0 inches
 - d. Less than 100 Feet of Slope: 3.0 inches 6.0 inches

3.10 DUST CONTROL

- A. Provide dust control measures to prevent off-site damage, health hazard to humans, wildlife and plant life, or become a traffic safety hazard.
- B. To the maximum extent as is practicable
 - 1. Use traffic control to restrict traffic to predetermined routes.
 - 2. Maintain as much natural vegetation as possible.
 - 3. Use phasing of construction to reduce the area of land disturbed at any one time.
 - 4. Use temporary mulching, permanent mulching, temporary vegetative cover, permanent vegetative cover, or seeding to reduce the need for dust control.
 - 5. Use mechanical sweepers on paved surfaces where necessary to prevent dust buildup.
 - 6. Stationary sources of dust, such as rock crushers, shall utilize fine water sprays to control dust.

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- C. Moisten exposed soil surface periodically with adequate water to control dust.
- D. Where other methods are not practical, use of calcium chloride will be permitted. Spreader at a rate that will keep surface moist but not cause pollution or plant damage. To reduce potential for environmental degradation, use only when other methods are not practical. In areas adjacent to waterways and sensitive environmental areas, verify materials and procedures with governing authority.
- E. Cover surface with crushed stone or coarse gravel. In areas adjacent to waterways, use chemically stable aggregate.
- F. When temporary dust control measures are used, repetitive treatment shall be applied as needed to accomplish control.

3.11 CONSTRUCTION DEWATERING

- A. Water from construction dewatering operations shall be cleaned of sediment before reaching wetlands, water bodies, streams, or site boundaries. Utilize temporary sediment basins, erosion control soil filter berms, silt fencing, block and gravel catch basin inlet protection, or other approved Best Management Practices (BMPS).
- B. In sensitive areas, near streams or ponds, discharge the water from the de-watering operation into a temporary sediment basin created by a surrounding filter berm of uncompacted erosion control soil mix. Locate the temporary sediment basin at least 100 feet from the nearest water body, such that the filtered water will flow through undisturbed vegetated soil areas prior to reaching the water body or property line.

3.12 ADDITIONAL MEASURES

- A. Areas outside the Contract Work limits shall be protected from lubricants, fuel, sediment and other pollutants.
- B. Inspect erosion and sedimentation control weekly and after every storm and maintain in good working condition for project duration.

3.13 REMOVAL AND DISPOSAL

- A. After permanent soil stabilization has been achieved, temporary materials and devices that are not readily degradable shall be removed and disposed of offsite. Silt fences, filter berms, and catch basin sediment filters shall be fully removed.
- B. Repair areas disturbed by temporary materials and removal operations to match surrounding finished surfaces. At natural vegetation areas to remain, restore to match existing.

END OF SECTION 312500

SECTION 315000 - EXCAVATION SUPPORT AND PROTECTION

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 temporary excavation support and protection systems.
- B. Related Sections:
 - 1. Division 01 Section "Temporary Facilities and Controls" for temporary utilities and support facilities.
 - 2. Division 31 Section "Earth Moving" for excavating and backfilling, for controlling surface-water runoff and ponding, and for dewatering excavations.

1.3 PERFORMANCE REQUIREMENTS

- A. Design, furnish, install, monitor, and maintain excavation support and protection system capable of supporting excavation sidewalls and of resisting soil and hydrostatic pressure and superimposed and construction loads.
 - 1. Delegated Design: Design excavation support and protection system, including comprehensive engineering analysis by a qualified professional engineer, using performance requirements and design criteria indicated.
 - 2. Prevent surface water from entering excavations by grading, dikes, or other means.
 - 3. Install excavation support and protection systems without damaging existing buildings, structures, and site improvements adjacent to excavation.
 - 4. Monitor vibrations, settlements, and movements.

1.4 PROJECT CONDITIONS

- A. Project-Site Information: A geotechnical report has been prepared for this Project and is available for information only. The opinions expressed in this report are those of geotechnical engineer and represent interpretations of subsoil conditions, tests, and results of analyses conducted by geotechnical engineer. Owner will not be responsible for interpretations or conclusions drawn from the data.
 - 1. Make additional test borings and conduct other exploratory operations necessary for excavation support and protection.
 - 2. The geotechnical report is referenced elsewhere in the Project Manual.

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PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION

3.1 PREPARATION

- A. Protect structures, utilities, sidewalks, pavements, and other facilities from damage caused by settlement, lateral movement, undermining, washout, and other hazards that could develop during excavation support and protection system operations.
 - 1. Shore, support, and protect utilities encountered.

3.2 INSTALLATION – GENERAL

- A. Location excavation support and protection systems clear of the permanent construction, so that construction and finishing of other work is not impeded.
- B. Install excavation support and protection systems to ensure minimum interference with roads, streets, walks, and other adjacent occupied and used facilities.
 - 1. Do not close or obstruct streets, walks, or other adjacent occupied or used facilities without permission from Owner and authorities having jurisdiction. Provide alternate routes around closed or obstructed traffic ways if required by authorities having jurisdiction.
- C. Monitor excavation support and protection systems daily during excavation progress and for as long as excavation remains open. Promptly correct bulges, breakage, or other evidence of movement to ensure that excavation support and protection systems remain stable.
- D. Promptly repair damages to adjacent facilities caused by installing excavation support and protection systems.

3.3 REMOVAL

- A. Remove excavation support and protection systems when construction has progressed sufficiently to support excavation and bear soil and hydrostatic pressures. Remove in stages to avoid disturbing underlying soils or damaging structures, pavements, facilities, and utilities.

END OF SECTION 315000

SECTION 321216 - ASPHALT PAVING

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. Hot-mix asphalt paving
 - 2. Hot-mix asphalt patching.
 - 3. Asphalt surface treatments.
- B. Related Sections:
 - 1. Division 31 Section "Earth Moving" for aggregate subbase and base courses and for aggregate pavement shoulders.

1.3 DEFINITION

- A. Hot-Mix Asphalt Paving Terminology: Refer to ASTM D 8 for definitions of terms.

1.4 SUBMITTALS

- A. Product Data: For each type of product indicated. Include technical data and tested physical and performance properties.
 - 1. Job-Mix Designs: Maine DOT Certification of approval of each job mix proposed for the Work.
- B. Material Certificates: Contractor shall submit certificates stating that asphalt mix to be supplied complies with the specifications of the Maine Department of Transportation, latest revisions, as well as copies the regulatory specifications corresponding to the asphalt mix formula and material. The certificates shall be signed by the asphalt mix producer and the Contractor.

1.5 QUALITY ASSURANCE

- A. Manufacturer Qualifications: Manufacturer shall be registered with and approved by authorities having jurisdiction and the MDOT.

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- B. Qualifications of Bituminous Concrete Producer: Use only materials which are furnished by a bulk bituminous concrete producer regularly engaged in production of hot-mix, hot-laid bituminous concrete.
- C. Paving Contractor: Paving contractor shall be listed in the MDOT prequalified contractor list for paving projects and shall be valid at time of bidding and scheduled paving operations.
- D. Testing Agency Qualifications: Use only recognized commercial testing laboratories with not less than 5 years experience in conducting tests and evaluations of bituminous concrete materials and design.
- E. Regulatory Requirements: Comply with materials, workmanship, and other applicable requirements of Sections 401 and 403 of the Maine DOT Standard Specifications for asphalt paving work.
 - 1. Measurement and payment provisions and safety program submittals included in standard specifications do not apply to this Section.

1.6 DELIVERY, STORAGE, AND HANDLING

- A. Deliver pavement-marking materials to Project site in original packages with seals unbroken and bearing manufacturer's labels containing brand name and type of material, date of manufacture, and directions for storage.
- B. Store pavement-marking materials in a clean, dry, protected location within temperature range required by manufacturer. Protect stored materials from direct sunlight.

1.7 PROJECT CONDITIONS

- A. Environmental Limitations: Do not apply asphalt materials if subgrade is wet or excessively damp, if rain is imminent or expected before time required for adequate cure, or if the following conditions are not met:
 - 1. Tack Coat: Minimum ambient temperature in the shade is 40 degree F and rising, immediately prior to application;
 - 2. Asphalt Base Course: Minimum surface temperature of 40 degree F and rising at time of placement;
 - 3. Asphalt Surface Course: Minimum surface temperature is above 50 degree F at time of placement.
- B. Pavement-Marking Paint: Proceed with pavement marking only on clean, dry surfaces and at a minimum ambient or surface temperature of 55 deg F for water-based materials, and not exceeding 95 deg F.

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PART 2 - PRODUCTS

2.1 AGGREGATES

- A. General: Use materials and gradations that have performed satisfactorily in previous installations.
- B. Aggregates: Conform to Section 703 of MDOT Specifications, latest revision.

2.2 ASPHALT MATERIALS

- A. Asphalt Cement: Conform to Section 702 of MDOT Specifications.
- B. Tack Coat - emulsified asphalt applications shall meet the requirements of AASHTO M140 and meet MDOT specifications.

2.3 MIXES

- A. Hot Mix Asphalt – Per MDOT approved mix.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Verify that subgrade is dry and in suitable condition to begin paving.
- B. Proceed with paving only after unsatisfactory condition have been corrected.

3.2 PREPARATION

- A. Protection: Provide protective materials, procedures, and worker training to prevent asphalt materials from spilling, coating, or building up on curbs, driveway aprons, manholes, and other surfaces adjacent to the Work.

3.3 SURFACE PREPARATION

- A. Proofroll crushed aggregate base in conformance with Section 312000 Earthwork, immediately prior to paving.
- B. Immediately before placing asphalt materials, remove loose and deleterious material from substrate surfaces. Ensure that prepared subgrade is ready to receive paving.
- C. Tack Coat: Apply uniformly to surfaces of existing pavement at a rate of 0.05 to 0.15 gal./sq. yd..

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1. Allow tack coat to cure undisturbed before applying hot-mix asphalt paving.
2. Avoid smearing or staining adjoining surfaces, appurtenances, and surroundings. Remove spillages and clean affected surfaces.
3. Adequate traffic control shall be provided to prohibit traffic from traversing applied area.
4. Any foreign matter on tack coat is to be removed and area re-tacked before applying pavement.

3.4 HOT-MIX ASPHALT PLACEMENT

- A. Plant Mix Hot Bituminous Pavement: Produce and place in conformance with Section 401 of MDOT Specifications, latest revision.
- B. Machine place hot-mix asphalt on prepared surface, spread uniformly, and strike off. Place asphalt mix by hand to areas inaccessible to equipment in a manner that prevents segregation of mix. Place each course to required grade, cross section, and thickness when compacted.
 1. Spread mix at minimum temperature of 275 deg F and maximum temperature of 325 deg F.
 2. Begin applying mix along centerline of crown for crowned sections and on high side of one-way slopes unless otherwise indicated.
 3. Regulate paver machine speed to obtain smooth, continuous surface free of pulls and tears in asphalt-paving mat.
- C. Place paving in consecutive strips not less than 10 feet wide unless infill edge strips of a lesser width are required.
 1. After first strip has been placed and rolled, place succeeding strips and extend rolling to overlap previous strips. Complete a section of asphalt base course before placing asphalt surface course.
- D. Promptly correct surface irregularities in paving course behind paver. Use suitable hand tools to remove excess material forming high spots. Fill depressions with hot-mix asphalt to prevent segregation of mix; use suitable hand tools to smooth surface.

3.5 PERMANENT TRENCH PAVEMENT REPAIR

- A. Saw edges of existing pavement to provide a clean vertical bonding face.
- B. Remove sawn out existing paving.
- C. Apply a tack coat to the sawn edges and existing pavement that abuts proposed pavement.
- D. Apply hot mix asphalt as directed by Contract Documents.
- E. Roller compact both courses, compacting the final wear course to meet existing pavement surfaces exactly

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3.6 JOINTS

- A. Construct joints to ensure a continuous bond between adjoining paving sections. Construct joints free of depressions, with same texture and smoothness as other sections of hot-mix asphalt course.
 - 1. Clean contact surfaces and apply tack coat to joints.
 - 2. Offset longitudinal joints, in successive courses, a minimum of 6 inches.
 - 3. Offset transverse joints, in successive courses, a minimum of 24 inches.
 - 4. Construct transverse joints at each point where paver ends a day's work and resumes work at a subsequent time. Construct these joints using either "bulkhead" or "papered" method according to AI MS-22, for both "Ending a Lane" and "Resumption of Paving Operations."
 - 5. Compact joints as soon as hot-mix asphalt will bear roller weight without excessive displacement.
 - 6. Compact asphalt at joints to a density within 2 percent of specified course density.

3.7 COMPACTION

- A. General: Begin compaction as soon as placed hot-mix paving will bear roller weight without excessive displacement. Compact hot-mix paving with hot, hand tampers or with vibratory-plate compactors in areas inaccessible to rollers.
 - 1. Complete compaction before mix temperature cools to 185 deg F.
- B. Breakdown Rolling: Complete breakdown or initial rolling immediately after rolling joints and outside edge. Examine surface immediately after breakdown rolling for indicated crown, grade, and smoothness. Correct laydown and rolling operations to comply with requirements.
- C. Intermediate Rolling: Begin intermediate rolling immediately after breakdown rolling while hot-mix asphalt is still hot enough to achieve specified density. Continue rolling until hot-mix asphalt course has been uniformly compacted to the following density:
 - 1. Average Density: 95% \pm 2.5% of reference maximum theoretical density according to ASTM D2041 for base courses.
- D. Finish Rolling: Finish roll paved surfaces to remove roller marks while hot-mix asphalt is still warm.
- E. Edge Shaping: While surface is being compacted and finished, trim edges of pavement to proper alignment. Bevel edges while asphalt is still hot; compact thoroughly.
- F. Repairs: Remove paved areas that are defective or contaminated with foreign materials and replace with fresh, hot-mix asphalt. Compact by rolling to specified density and surface smoothness.
- G. Protection: After final rolling, do not permit vehicular traffic on pavement until it has cooled and hardened.
- H. Erect barricades to protect paving from traffic until mixture has cooled enough not to become marked.

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3.8 INSTALLATION TOLERANCES

- A. Pavement Thickness: Compact each course to produce the thickness indicated within the following tolerances:
 - 1. Base Course: Plus or minus 1/4 inch.
 - 2. Surface Course: Plus or minus 1/4 inch.
- B. Pavement Surface Smoothness: Compact each course to produce a surface smoothness within the following tolerances as determined by using a 10-foot straightedge applied transversely or longitudinally to paved areas:
 - 1. Base Course: 1/4 inch.
 - 2. Surface Course: 1/4 inch.
- C. Contractor's duties relating to testing include:
 - 1. Notify Owner 72 hours prior to asphalt paving;
 - 2. Notifying laboratory of conditions requiring testing; and
 - 3. Coordinate with laboratory for field testing.

3.9 FIELD QUALITY CONTROL

- A. Testing Agency: Owner will engage a qualified testing agency to perform tests and inspections. Testing agency shall be paid by the Owner.
- B. Thickness: The Owner may pay for and have testing agency take 4-inch diameter cores of base course, at locations selected by Owner, for thickness tests according to ASTM D 3549. Contractor shall repair holes resulting from coring to match existing paving. The Owner reserves the right to take additional testing and should these tests show insufficient thickness, all areas shall be remediated.
- C. Surface Smoothness: Finished surface of each hot-mix asphalt course will be tested for compliance with smoothness tolerances.
- D. Replace and compact hot-mix asphalt where core tests were taken.
- E. Remove and replace or install additional hot-mix asphalt where test results or measurements indicate that it does not comply with specified requirements at no cost to the Owner.

3.10 DISPOSAL

- A. Remove excavated materials from Project site and legally dispose of them in an EPA-approved landfill.

END OF SECTION 321216

SECTION 32 93 00 - PLANTING

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 Drawing Designation: L1

1.3 SUMMARY

A. Section Includes:

- 1. Preparation of Backfill Mix
- 2. Furnish and install trees, shrubs, grasses
- 3. Maintenance.

B. Related Sections:

- 1. Division 32 Section 32 94 00 Topsoil
- 2. Division 32 Section 32 92 00 Lawns and Meadow Grasses

1.4 ALLOWANCES

- A. As described in Division 01 Section 01 21 00.

1.5 DEFINITIONS

- A. Applicable specifications and publications, referred to herein, form a part of these Specifications:

- 1. Standard Specification: The State of Maine Department of Transportation, Standard Specification for Highways Bridges, latest edition.
- 2. ASTM: American Society of Testing Materials
- 3. AASHTO: American Association of State Highway and Transportation Officials

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4. AAN: American Association of Nurserymen
 5. AOAC: Association of Official Agricultural Chemists
- B. All work shall conform to the Drawings and Specifications and comply with applicable codes and regulations.
- C. All areas to be planted to be inspected by the Contractor before starting work and any defects such as incorrect grading, etc., to be reported to the Owners Representative prior to beginning this work and subsequently corrected to the satisfaction of the Owners Representative. The commencement of Work by the Contractor indicates his acceptance of the areas to be planted, and he is to assume full responsibility for the work of this section.
- D. Contractor: Remove from site all waste material resulting from planting.

1.6 SUBMITTALS

- A. Prior to ordering the below listed materials, submit representative samples to Owners Representative for selection and approval as follows. Do not order material until Owners Representative's approval has been obtained. Delivered materials to match the approved samples.
1. Pine Bark Mulch: Submit one (1) cubic foot sample.
 2. Peat: Submit one (1) cubic foot sample.
 3. Compost: Submit Certificate of Compliance listing analysis.
 4. Anti-dessicant: Submit manufacturer.
 5. Fertilizer: Submit Certificate of Compliance listing analysis.
 6. Tree Stakes and Webbing: 1 Stake with approved stain (if applicable) and 3 foot length of webbing.
 7. Tree Stakes and Webbing: Product label and manufacturers certificate(s).

1.7 QUALITY ASSURANCE

- A. Plant names shall comply with nomenclature of Hortus, latest edition. Sizing and grading shall be in accordance with ANSI Z60.1-86.
- B. Notify Owners Representative in writing at least 15 days before plant delivery. All plant materials shall be available for inspection at the nursery or collection source before plants are

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dug. Approval at plant source shall not be considered final acceptance.

1.8 PRODUCT HANDLING

A. Delivery:

1. **Packaged Materials:** Deliver in original, unopened containers showing weight, analysis, and manufacturer.
2. **Plant Material:** Before digging deciduous trees and shrubs in leaf and evergreen trees for shipping, apply anti-desiccant. Carefully pack plants to prevent breaking, damage to bark, branches, and root systems, and root ball cracking. Provide adequate ventilation. Protect roots and balls from sun, drying wind, and frost. Do not drop plants from vehicles. Legibly label plants with correct botanical name and common name.
3. **Storage:** Place plants not planted on the day of arrival in shaded storage, protected from wind and freezing. Open bundles and separate plants. Heel in bare root plants immediately on delivery and protect roots by puddling or other means to prevent drying. Cover root balls with moist sawdust, wood chips, shredded bark, peat moss, or other approved mulching material. Leave container grown plants in containers until planting. Keep all plants moist.
4. Store packaged materials in dry locations away from contaminants. Separate anti-desiccants and pesticides from other landscape materials.

1.9 COORDINATION

- A. **Contractor:** Submit to the Owners Representative for approval a progress schedule as specified herein.
- B. **Contractor:** Coordinate the Work with other trades so as not to interfere with the progress of the Work.

1.9 WARRANTY

- A. Plants to be guaranteed for a period of one year after inspection from the date of substantial completion or completion thereafter on punch-out list and to be alive and in satisfactory growth at the end of the guarantee period.
- B. At the end of the guarantee period, inspection will be made. Any plant required under this contract that is dead or unsatisfactory to be removed from the site.
- C. All replacements to be plants of the same kind and size specified in the PLANT LIST. The cost to be borne by the CONTRACTOR, except for possible replacements due to vandalism or neglect on the part of others. Furnish plants, stake and wrapped if necessary, and mulch as required.

PART 2 - PRODUCTS

2.1 SOIL ADDITIVES

A. Commercial fertilizer, peat, humus or other additives to be used to counteract soil deficiencies as recommended by the soil analysis and as directed by the Owners Representative.

1. Commercial fertilizer to be a product complying with the State and United States Fertilizer Laws. Deliver to the site in the original unopened containers which to bear the manufacturer's Certificate of Compliance covering analysis which shall be furnished to the Owners Representative. At least 50% by weight of the nitrogen content will be derived from organic materials. A minimum of 35% of the nitrogen will be water insoluble. Fertilizer to contain not less than percentage of weight of ingredients as follows or as recommended by soil analysis:

	Nitrogen	Phosphorus	Potash
For deciduous (dry)	10%	6%	4%
trees & shrubs (water soluble)	16%	19%	16%
For evergreen (dry)	7%	7%	7%
trees & shrubs (water soluble)	21%	7%	7%

B. Humus will be natural humus, reed peat, or sedge peat. It to be free from excessive amounts of zinc, low in wood content, free from hard lumps and in a shredded or granular form and to pass through a 1/2 inch mesh screen. According to the methods of testing of A.O.A.C., latest edition, the acidity range to be approximately 5.5 pH to 7.6 pH and the organic content to be not less than 60% as determined by drying at 105 degrees C. The minimum water absorbing ability to be 200% by weight on an oven-dry basis.

C. Peat Moss to be composed of the partly decomposed stems and leaves of any or several species of sphagnum moss. It is to be free from wood, decomposed colloidal residue, and other foreign matter. It is to have an acidity range of 3.5 ph to 5.5 pH as determined in accordance with the methods of testing of A.O.A.C., latest edition. Its water absorbing ability to be a minimum of 1,100% by weight on an oven-dry basis.

D. Compost to be well-rotted, unleached, stable manure not less than eight months and not more than two years old. It to be free from sawdust, shavings, or refuse of any kind and to not contain over 25% straw. The CONTRACTOR to furnish information as to kind of disinfectant or chemicals, if any, that may have been used in storage of the manure.

E. Bone meal to be fine ground, steam-cooked, packing house bone with a minimum analysis of 23% phosphoric acid and 1.0% of nitrogen.

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- F. Leaf mold to be a highly organic dark brown to black spongy residue resulting from the well aerated composting of deciduous tree parts, free of plants and their roots, debris and other extraneous matter and to be uncontaminated by foreign matter and substances harmful to plant growth. The organic matter to not be less than 85% by weight as determined by the loss on ignition of oven-dried samples. Test samples to be oven-dried to a constant weight at a temperature of 16 degrees C. The inorganic residue after ignition to not be finer textured than 4% by weight passing the number 200 sieve with washing.
- G. Sulfur for adjustment of loam pH to be commercial or flour sulfur, unadulterated, and to be delivered in containers with the name of the manufacturer, material, analysis, and net weight appearing on each container.
- H. Dolomitic limestone for adjustment of loam pH to contain not less than 85% of total carbonates and to be ground to such fineness that 40% will pass through 100-mesh sieve and 95% will pass through a 20-mesh sieve. Coarser materials will be accepted provided the specified rates of application are increased proportionately on the basis of quantities passing the 100-mesh sieve.

2.2 PLANT MATERIALS

- A. The CONTRACTOR will furnish and install all plants shown on the Drawings, as specified, and in quantities listed on the Plant List. No substitutions will be permitted without the written approval of Owners Representative. In case of conflict between the Planting Plan and the Plant List, Contractor to supply the plant material necessary to complete the Work as shown on the Drawings. All plants to be nursery grown unless specifically authorized to be collected.
- B. Plants to be in accordance with the U.S.A. Standard for Nursery Stock of the American Association of Nurserymen, Latest edition.
- C. All trees and shrubs to conform to the trade classification of "heavy specimen" and will exhibit distinctive character and form.
- D. All Plants to be typical of their species or variety and to have a normal habit of growth and be legibly tagged with the proper name. Only plant stock within the hardiness Zone 1 through 5, as established by the Arnold Arboretum, Jamaica Plain, Massachusetts, will be accepted. The CONTRACTOR's suppliers must certify in writing that the stock has actually been grown under Zone 5 or hardier conditions. Plants not so certified will not be accepted.
- E. The root system of each shall be well provided with fibrous roots. All parts to be moist and show active green cambium when cut. They to be sound, healthy and vigorous, well branched, and densely foliated when in leaf. They shall be free of disease, insect pests, eggs, or larvae.
- F. All plants must be moved with the root systems as solid units with balls of earth firmly wrapped with untreated eight-ounce burlap, firmly held in place by a stout cord or wire. The diameter and depth of the balls of earth must be sufficient to encompass the fibrous and root feeding system necessary for the healthy development of the plant. No plant to be accepted when the ball of earth surrounding its roots has been badly cracked or broken prior to or during the process of planting or after the burlap, staves, ropes or platform required in connection with

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its transplanting have been removed. The plants and rootballs to remain intact during all operations. All plants that cannot be planted at once must be heeled in by setting in the ground and covering the rootballs with soil and then watering them.

- G. Take caliper measurement six inches above ground for deciduous trees. Evergreen trees to be of specified height with spread in proportion to height, as designated in A.A.II. U.S.A. STANDARD FOR NURSERY STOCK, latest edition, and to be well branched to the ground. The trunk of each tree to be a single trunk, unless listed as multi-stemmed in the plant list, growing from a single crown of roots. No part of the trunk to be conspicuously crooked as compared with normal trees of the same variety. The trunk to be free from sun scald, frost cracks, or wounds resulting from abrasions, fire, or other causes. No pruning wounds to be present having a diameter exceeding two inches and such wounds must show vigorous bark on all edges. Plants shall not be pruned prior to delivery. Pruning wounds over 3/4" in diameter must be completely callused over. Evergreen trees shall be branched to within one foot of the ground.
- H. At least 50% of the plants furnished for each size range shown on the plants to be at or above the average between the maximum and minimum size specified. If a nursery supplies material at a specific size (not a range), then the larger size of the specified range to be furnished.
- I. Plants delivered by truck and plants requiring storage on site to be properly wrapped and covered to prevent wind-drying and desiccation of branches, leaves or buds. Plant balls should be firmly bound, unbroken and reasonably moist to indicate watering prior to delivery and during storage. Tree trunks should be free from fresh scars and damage in handling. No trees with double-leaders or twin-heads to be accepted without the written approval of the Owners Representative. The CONTRACTOR to reject such plants at time of delivery by the nursery/supplier unless such plants were selected by the Owners Representative as indicated by tags and seals. No plant material from cold storage will be accepted unless pre-selected by the Owners Representative.
- J. Plant material which is to be planted after the specified seasons for planting shall be dug during the normal season for digging of the particular plant material and be stored and maintained in good health until planting. The CONTRACTOR shall assume all costs for maintaining plant material while it is being stored.
- K. All plants to be free from plant diseases and insect pests, and to comply with all applicable State and Federal laws with respect to inspection for plant diseases and infestations.
- L. All plant materials shall be available for inspection in the nursery or collecting fields before it is dug. The CONTRACTOR to provide a list of suppliers in sufficient time to allow the Owners Representative to inspect nurseries on a timely basis. Approval to move nursery Materials shall not be considered as final acceptance.
- M. All planting stock to conform to the laws of The State of Maine and to be inspected before removal from the nursery, by authorized Federal, State or other authorities as may be required in the area where the nursery is located. The invoice or order for each shipment of plants to contain the project name and quantity and variety of plant material delivered. An inspection certificate to certify that the plants are free of disease and insect pests of all kinds shall

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accompany each shipment. Disease certificates and delivery slips to be given to the Owners Representative upon arrival of the plant material at the point of delivery.

- N. Plants to be dug with care and skill. Special precautions to be taken to avoid any unnecessary injury to or removal of fibrous roots. Each species or variety to be handled and packed in the approved manner for that particular plant. All precautions to be taken to insure the arrival of plants at the project site in good condition for successful growth.
- O. Balled and Burlapped Plants Rootball: Firm and composed of the original, undisturbed soil in which the plant has been grown. The plant shall be handled in such a manner that the soil in the ball will not drop away from the roots and will not cause stripping of the small, fibrous roots. The ball shall be wrapped with burlap or other approved material and tightly laced to hold the desired shape. No balled plants will be accepted if the ball is cracked or broken. A substitute for burlap may be approved provided it can be demonstrated that the material is tight enough to retain the soil ball securely. Any synthetic material used to wrap the rootball, which will not readily disintegrate in the ground, shall be removed or extensively cut to allow the roots to grow through freely.
- P. Container Grown Plants: Well established in the container in which they are sold, and shall have sufficient roots to hold earth intact after removal, without being in a root bound condition. Plant shall remain in container until planted.
- Q. Shrubs and Small Plants: All shrubs and small plants, unless otherwise designated, shall be well-formed and bushy with well-spaced side branches, and shall have a crown and stem(s) typical of the species and variety.
- R. All soil in rootballs, containers, bare root stock and native sods shall be free from weeds, non native seeds and non native or noxious insects.
- S. Requests for plant substitutions shall be made at least 14 days before the plants are to be delivered and such requests shall list at least 5 major nursery sources contacted for confirmation of unavailability.
- T. The CONTRACTOR to notify the Owners Representative not less than 5 days in advance of delivery of plants.

2.3 TREE STAKING

- A. Stakes: Sound cedar, fir or other suitable wood 2" x 2" or 2" x 4", as required, pointed at one end and stained at the discretion of the Owners Representative. Tree anchors, if required, to be malleable iron, "Universal Ground Anchor" or approved equal.
- B. Tree-stake webbing: Consist of ¾" wide polypropylene with a 900 lb. Breaking strength. Color: olive drab or black as manufactured by Eaton Brothers Corporation, PO Box 68, Hamburg NY 14875. or "ADJ-A-TYE" heavy-duty poly chain lock, color: olive drab or black, as distributed by A.M. Leonard Inc, 241 Fox Drive, Piqua OH 45356-0816. or approved equal.

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2.4 WATERING

- A. The Owner will furnish the Contractor upon request with an adequate source and supply of water at no charge. However, if the Owner's water supply is not available or not functioning, the Contractor will be held responsible to furnish adequate supplies at his own cost. All injured or damaged plant material due to the lack of water, or the use of too much water, to be the Contractor's responsibility to correct. Water to be free from impurities injurious to vegetation. Contractor to supply their own hoses and sprinklers.

2.5 ANTI-DESICCANT

- A. Anti-desiccant: Provide a natural product for the purpose of preventing desiccation to plant material derived from the resin of the pine tree which is called a polyterpene polymer or more specifically a beta-pinene polymer which is a film forming short chain of polymer component. Anti-desiccant to contain two sub-units in the polymer for a molecular weight of 275. Anti-desiccant to be non-toxic and suitable for food crops. Potential manufacturer:
 - 1. “Wilt-Pruf”, available from Nursery Specialty Products, Inc., New York, NY, or approved equal, delivered in the manufacturer’s container and used according to the manufacturer's instructions and per Owners Representative’s approval.

2.6 MULCH

- A. Mulch: Consist of the outer bark of evergreen trees and a minimum of hardwood bark, and shall be aged for a period of at least 6 months, and not longer than 2 years. The bark must be partially decomposed and dark brown in color, free of dirt and materials deleterious to plant life. No chunks 3 inches or more in size, and thicker than 1/4 inch shall be left on the site.

2.7 TREE WOUND DRESSING

- A. Tree Wound Dressing: Non-toxic product for aesthetic purposes only specifically designed for tree wounds.

2.8 METAL WIRE FENCING FOR PLANT PROTECTION

- A. Metal wire fencing for plant protection: 14 ga. Galvanized 1 inch by 1 inch square openings Wire fencing. Fencing to be 24” above ground (minimum) with 4 inches buried into the ground. Provide a 12” tall by 1 inch by 1 inch square openings fencing firmly secured to the top of the 24” ht. Fence at a 60 degree angle to the outside of the fenced area. Secure fence with hardwood stakes 4 feet O.C. as approved by the Owners Representative. Exact layout of fencing to be determined on site immediately after planting to protect material from porcupine damage.

PART 3 - EXECUTION

3.1 EXAMINATION

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- A. Examine site conditions and other conditions affecting performance of the Work. Insure the sub-grade is properly graded and at correct levels prior to spreading of topsoil, or if the topsoil has been spread, is at the proper depths and finish grades.
- B. Examine specified materials before installation. Reject plant materials that are damaged or otherwise not as specified and shown on the Drawings. Reject soil amendments that are wet, moisture damaged, or mold damaged.
- C. Proceed with installation only after unsatisfactory conditions have been corrected and approved by the Owners Representative.

3.2 PLANTING

- A. Planting of any plant material includes: Coordination with the nursery, shipment from the nursery, the digging of the holes, provision of the soil additives and loam, furnishing the plants of specified size with roots in the specified manner, the labor of planting and mulching and guying and staking where called for, and the removal of all excess or debris material created as a result of the work.
- B. Coordination with Existing Conditions: Prior to excavating for any plants, and before installation of location stakes, the CONTRACTOR shall review all existing conditions below grade. Underground obstructions may exist in the form of project-installed improvements and/or pre-existing conditions. The CONTRACTOR to be liable for any damages resulting from his failure to ascertain subsurface conditions before proceeding with the work.
- C. Planting:
 - 1. Location for all plants to be staked on the ground by the CONTRACTOR for approval by the Owners Representative before any plant pits are dug. The CONTRACTOR shall move stakes as necessary to obtain the Owners Representative's approval. Once the staking is approved and all the trees have arrived, the CONTRACTOR to place all the trees at the staked locations for the Owners Representative's secondary approval. The CONTRACTOR shall move trees as required by the Owners Representative. Then each plant location to be marked by outlining the rootball with a light application of lime. At this point the CONTRACTOR to begin excavating the planting pits. Once all the trees are placed in the planting pits, the Owners Representative to make a final inspection of the pits. Before beginning any backfilling, the CONTRACTOR shall, if necessary, rotate plants and/or correct plant pits as required by the Owners Representative. Once final approval has been given by the Owners Representative, the CONTRACTOR can proceed with the backfilling.
 - 2. At least ten (10) days prior to the expected planting date, the CONTRACTOR shall request, in writing, that the Owners Representative provide a representative to select and tag stock to be planted under this Section. The CONTRACTOR shall pay for transportation and overnight accommodations, if necessary, for the Owners Representative's representative during the period of time required to select and tag the plant material.

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3. Plants to be selected by the Owners Representative's representative at the place of growth for conformity to specification requirements as to quality, size, and variety. Such approval to not impair the right of inspection and rejection upon delivery at the site or during the progress of the work. Cost of replacement to be borne by the CONTRACTOR.
4. Delivery and Temporary Storage: Plants shall be delivered in a moist, vigorous condition, free from dead wood, bruises, or other root or branch injuries. Insofar as is practical, plant material shall be planted on the day of delivery. All unplanted material shall be protected at all times from sun and drying winds. Plants that are not planted immediately shall have their root balls well watered and covered with approved mulching materials. No plants shall remain unplanted for longer than 3 days. Plants shall not be bound with wire or rope at any time so as to damage bark, break branches, or cause any injury.
5. Planting Dates: Unless otherwise specified, planting shall be done after the frost leaves the ground until July 1, and from September 15 to November 1.
6. Maintain at all times during the planting operations one or more stockpiles of approved planting mix.
5. Plant pits to be excavated with vertical sides. Holes for trees to be at least two feet greater in diameter than the ball and one foot deeper than the ball.
6. Loam, organic material and fertilizer mix for use as planting mix shall be thoroughly premixed in the following proportions unless directed otherwise:
 - a. one cubic yard of accepted loam
 - b. 2 to 3 cubic feet of well rotted cow manure
 - c. 4 cubic feet of sphagnum peat moss
 - d. 10 pounds of fertilizer (minimum 35% water insoluble (WIN))
 - e. 12 pounds of dolomitic limestone.
7. All plant roots and earth balls must be damp and thoroughly protected from sun and wind from the beginning of the digging operation, during transportation and through final planting. The plants shall be planted in the center of the holes and at the same depth as they previously grew. Remove burlap, rope, from sides and tops of root balls. Do not pull burlap out from under root balls. If a wire basket is present, cut and remove all wire keeping the rootball intact. Cleanly cut off broken or frayed roots. Backfill topsoil in layers of not more than 6 inches and water each layer sufficiently before the next layer is placed. Use enough backfill material to bring the surface to finished grade when settled. Form a saucer around each tree to a height of 4 inches.
8. Shrub, perennial and groundcover beds: Score and spread roots on container grown plants on 4 equal areas on sides of roots/soil, scarify and spread roots on bottom of plant. Dig to a depth of one foot (1') below final grade or as shown on the drawings. Supply sufficient planting soil mix to provide one foot (1') deep beds. Water thoroughly after planting.

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- D. All plants to be flooded with water twice within the first 24 hours of the time of planting and all plants during the maintenance period to be watered at least twice each week. At each watering the soil around each tree or shrub to be thoroughly saturated. If sufficient moisture is retained in the soil, as determined by the Owners Representative, the required watering may be reduced. Trees will require a minimum of ten gallons of water each.
- E. Mulch material to be placed over entire saucer areas of individual trees to a depth of two inches, not later than one week after planting. No mulch shall be placed within 2” of the trunk. No mulch to be applied prior to the first watering of plant materials.
- F. Pruning: Prune plant material after the plant has been completely planted. Make all large pruning cuts, 1/2 inch diameter and larger on the trunk and main stem, so as not to interfere with the branch collar. Make all pruning cuts less than 1/4 inch diameter with a sharp pair of hand pruners as close to the main stem as possible without damaging the cambium or bud. Remove all sucker growth, water sprouts, crossing or rubbing branches, dead or dying limbs and tips, broken branches, diseased or insect infested limbs and crotches to prevent storm damage. Questionable weak limb and branch removal that may disfigure the tree or shrub should be left for final approval by the Owners Representative. Pinaceae species transplanted during the candle stage should have candles reduced from 1/2 to 2/3 inch. Treatment of all cuts and wounds with a non-toxic tree wound dressing is optional. Never cut a leader.
- G. Apply Anti-desiccant to all plants prior to being dug at the nursery and/or as directed by the Owners Representative once the plants have been delivered to the site.
- H. If planting is done after lawn preparation or installation, proper protection of lawn areas shall be provided and any damage resulting from planting operations shall be repaired immediately at no cost to the OWNER.
- I. In the event that underground construction work, rock or obstructions are encountered in any plant pit or bed excavation work to be done under this Contract, alternate locations may be selected by the Owners Representative.
- J. Absolutely no debris may be left on site. Excavated material shall be removed as directed by the Owners Representative. Repair any damage to the site or structures to restore them to their original condition as directed by the Owners Representative, at no cost to the OWNER.

3.3 FERTILIZATION

- A. Initial fertilization to consist of the use of dry fertilizer, water-soluble fertilizer or a combination of both.
- B. When not included in the planting mix, dry fertilizer, including fertilizer for acid-loving plants, shall be uniformly spread about the plants at the following rate:
 - 1. Trees: 1-1/2 pounds per inch of caliper.

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- C. Water-soluble fertilizer to be dissolved in water at 2 times the rate recommended by the manufacturer. The thoroughly mixed solution to be applied at the time of initial planting after the water used for back fill soaking has leached away. Care to be taken to prevent any water from washing plant saucers away either during the original watering or while applying water-soluble fertilizer.
- D. The fertilizer solution to be applied at the following rates:
 - 1. Plants above 6 feet and up to 12 feet to receive 12 quarts
 - 2. Plants above 12 feet to receive 16 quarts.
- E. Unless otherwise approved, re-fertilization to be by a water-soluble fertilizer applied in conjunction with watering or by itself. No re-fertilization will be allowed between September 20 and plant dormancy and between frozen ground and March 21.
- F. All plants to be fertilized at least once between April 1 and October 15 with water-soluble fertilizer mixed and applied as herein specified or as directed when applied with a watering.
- G. When the CONTRACTOR's guarantee period extends Spring to Spring, all plants shall receive an additional application of fertilizer in the spring prior to final acceptance.

3.4 MAINTENANCE

- A. Maintenance shall begin immediately after each plant is planted and shall continue in accordance with the following requirements:
 - 1. All plants shall be watered at least twice each week during the maintenance period. At each watering, the soil around each tree or shrub shall be thoroughly saturated. If sufficient moisture is retained in the soil, as directed by the Owners Representative, the required watering may be reduced. Trees will require a minimum of ten gallons of water each.
 - 2. All plants shall remain plumb. Any plants that settle out of plumb shall be promptly reset.
 - 3. Individual plant pits shall be kept free of weeds and mulch and shall be replaced as required to maintain a 2" layer of mulch. Individual pits to be neat in appearance and maintained to the lines originally laid out.
 - 4. Contractor: Replace all plants that die during the maintenance period as directed by the Owners Representative.
 - 5. Acts of vandalism, vehicle accidents or fire, if unrelated to construction operations and which cause damage in excess of five trees in one location, will be reasons for consideration of extra payment for approved replacement. Excessive damage due to

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heavy insect infestations, if all reasonable precautions are taken by the CONTRACTOR, will also be reason for consideration of extra payment for approved replacements.

6. Spraying for both insect pests and diseases shall be included during the maintenance period as required and as directed by the Owners Representative.
 7. The Owners Representative may order or the CONTRACTOR may request the use of a suitable insecticide or fungicide when it is determined that infestations of insects or plant disease require the use of such material. No pesticides, insecticides or fungicides may be used without the expressed written permission of the Owners Representative.
- B. All herbicides, insecticides, and fungicides to be applied as prescribed by their manufacturer and in accordance with National Park Service, State of Maine, and any local laws. The CONTRACTOR to either possess from the State of Maine the proper registrations and permits for application of such materials or have the applications made by an approved, qualified firm holding such registrations and permits. Copies of all permits in connection with such materials to be furnished to the Owner. No pesticides, insecticides or fungicides may be used without the expressed written permission of the Owners Representative.
- C. Keep clean sidewalks and other paved areas during the planting and maintenance operations.
- B. Maintenance shall consist of keeping the plants in a healthy growing condition, including watering, weeding, cultivating, re-mulching, removal of dead material, resetting plants plumb and to proper grades and maintaining the planting saucer.
- C. If a substantial number of plants are sickly and dead at the time of inspection for punch-out list items, acceptance will not be granted, and it is the contractor's responsibility for maintenance of all the plants to be extended until replacements are made. All dead and unsatisfactory plants to be promptly removed from the project. Replacements to conform in all respects to the specifications for new plants and to be planted in the same manner.

3.5 STANDARDS FOR COMPLETION

- A. Conditions for Completion:
1. Each plant to show at least 90% healthy growth and to have the natural character of a plant of its species in accordance with the American Nurseryman's Association Standards. The plants will be replaced live during the normal planting season, until the plants live through one year. Contractor: Promptly notify the Owners Representative of any removals and/or replacements.
- B. Inspection and Completion:
1. Upon request of the Contractor in writing, The Owners Representative to inspect the plant material to determine completion of Contract work. The request must be submitted at least 10 days prior to the anticipated inspection date.

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2. If the planting are deemed complete to the Owners Representative, a meeting will be arranged with Contractor and Owner to review the planting work. A final inspection is a part of this meeting to insure completion and any punch list items.

C. Cleanup:

1. Contractor: Following the completion of planting operations, immediately remove from the site all materials and equipment not required for any other planting or maintenance work. Store materials and equipment remaining on site in locations which do not interfere with the Owner's maintenance of completed planting or other construction operations.
2. The Contractor is responsible for keeping all paving, building surfaces, signs, posts, and all site improvements clean during planting operations. Clean up spills etc. immediately. Completion of the Work shall not be granted until this condition is met.

END OF SECTION 32 92 00

SECTION 330513 – MANHOLES AND CATCH BASINS

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 storm drainage structures outside the building, with the following components:
 - 1. Precast drainage manholes.
 - 2. Frames, covers and grates.
- B. Related Sections include the following:
 - 1. Division 31 Section "Earth Moving" for soil materials, excavating, backfilling, and site grading.
 - 2. Division 31 Section "Dewatering" for dewatering of excavations.
 - 3. Division 31 Section "Excavation Support and Protection" for protection of excavations.

1.3 SUBMITTALS

- A. Product Data: Manufacturers' product data and installation instructions for frames, covers, grates, precast items, manhole sleeves, joint sealants and frost barrier.
- B. Shop Drawings: For the following:
 - 1. Manholes: Include plans, pipe penetrations, elevations, sections, details, and frames and covers. Include design calculations, and concrete design-mix report for cast-in-place manholes.
- C. Antifloatation Slab Design Certificate: The Contractor may provide the precast structures requiring antifloatation slabs as one complete unit. If provided as a monolithic unit, submit a certificate of design signed by a Professional Engineer licensed in the State of Maine, certifying that the structure including the slab has been designed to withstand all forces including soil, traffic and hydrostatic in accordance with all applicable laws, regulations, rules and codes.

1.4 QUALITY ASSURANCE

- A. Provide complete manhole, catch basin, and precast concrete structures capable of supporting AASHTO H20 loading.

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- B. All precast concrete shall comply with ASTM C913 “Standard Specification for Precast Concrete Water and Wastewater Structures.”
- C. Precast Manhole and Catch Basin Components: ASTM C478.
- D. Average strength of 4,000 psi at 28 days. Light pole bases shall have an average strength of 5,000 psi at 28 days.

1.5 DELIVERY, STORAGE, AND HANDLING

- A. Handle manholes according to manufacturer's written rigging instructions.
- B. Structure shall be stored in a manner that will not cause harm to the integrity of the structure of to the general public.

PART 2 - PRODUCTS

2.1 MANHOLES

- A. All sewer construction shall comply with the standards and specifications of the local Sewerage District.
- B. Provide complete manhole and precast concrete structures capable of supporting AASHTO H-20 loading. Precast concrete shall comply with ASTM C913 "Standard Specification for Precast Concrete Water and Wastewater Structures
- C. Base Sections: Precast monolithic construction with steps.
- D. Barrel Sections: Precast with steps.
- E. Top Sections: Precast eccentric cone with steps. Use flat cover only if shown on drawings.
- F. Steps: Conform to ASTM C478 for load carrying capacity and pull out resistance, installed at 12- inches on center forming a continuous ladder. Acceptable manufacturers: Reliable Steel Products, Inc., M.A. Industries, Inc. or equal to above.
- G. Pipe to Manhole Connections:
 - 1. Pipe to Manhole connections shall be flexible, watertight manhole sleeves.
 - 2. Cast into the manhole base and sized to the type of pipe being used
 - 3. Type of flexible joint being used shall be approved by the Engineer. Install materials according to the Manufacturer’s instruction. Acceptable manufacturers; Kor N Seal by Trelleborg, PSX by Press-Seal Gasket Corporation, or approved equivalent.
- H. Joints Between Precast Sections: Watertight, shiplap type, seal with two rings of 1-inch diameter butyl rubber sealant.
- I. Waterproofing: The exterior surface of all manholes shall be given two coats of bituminous waterproofing material at an application rate of 75-100 square feet per gallon, per coat. The coating shall be applied after the manholes have cured adequately and can be applied by brush

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or spray in accordance with the manufacturers writing instruction. Sufficient time shall be allowed between coats to permit sufficient drying so that the application of the second coat has no effect on the first.

2.2 MASONRY MATERIALS

- A. Concrete Masonry Units: ASTM C139.
- B. Mortar: Type M, ASTM C270. Use Type II Portland cement, Type S lime. Proportions for Mortar: 1 part Portland cement, 1/4 part hydrated lime, 3 to 3 3/4 parts sand.

2.3 BRICK

- A. Brick for manholes shall meet the latest AASHTO Specification Designation M-91.

2.4 FRAMES, GRATES AND COVERS

- A. Cast iron: ASTM A48 Class 30.
- B. Castings shall be smooth with no sharp edges.
- C. Constructed to support H-20 loading.
- D. Manhole frames and covers: Minimum 24" dia. opening, minimum weight 300 pounds.
 - 1. Standard frame and cover: Castings shall be from East Jordan Foundry, refer to Contract Documents for casting model number and application.
 - 2. Special frame and cover: Castings shall be 30" Pamrex Hinged Locking Cover by Pam
 - 3. Access Covers, or approved equal. Refer to Contract Documents.
 - 4. Utility name shall be cast into cover.

2.5 MISCELLANEOUS

- A. Joint Sealants: Butyl Rubber Sealant: One inch diameter strips as manufactured by Kent Seal, or Engineer approved equal.
- B. Damp proofing: Bituminous coating to be Dehydrate No. 4 Dampproof by W.R. Grace of Bitumastic Super Service Black by Koppers Co. for field application, or Engineer approved equal.

PART 3 - EXECUTION

3.1 EARTHWORK

- A. Excavation, trenching, and backfilling are specified in Division 31 Section "Earth Moving."

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3.2 MANHOLE INSTALLATION

- A. Placement: Place bases on compacted bedding material so manhole structure is plumb and pipe inverts are at proper elevations. Place barrel and top sections in the appropriate height combinations. Plug all lifting holes inside and out with non-shrink grout.
- B. Joints: Follow manufacturer's instructions for sealing joints between precast sections. Provide two rings of 1-inch diameter butyl rubber sealant. Point joints inside and out with butyl caulk.
- C. Frame and Covers: Set to final grade as shown on the Drawings or flush with pavement grade when not specified or 2" below finish grade in unpaved roads or 24" above grade in cross-country areas. Provide adequate temporary covers (conforming with applicable local, State and Federal regulations) to prevent accidental entry until final placement of frame and cover is made.
- D. Set manhole frames and covers to final grade only after pavement base course has been applied, or after final grading of gravel roads.
- E. Inverts: See detail on drawings.
- F. Steps: Replace steps out of plumb and out of proper horizontal placement.

3.3 FIELD QUALITY CONTROL

- A. Testing and Acceptance: All sanitary sewer components shall comply with the testing requirements of Division 33 Section "Sanitary Utility Sewerage Piping", "Pumping Station – Sanitary Sewerage", and "Force Mains – Sanitary Sewerage".
 - 1. General:
 - a. Perform either a vacuum test or combination of the exfiltration and infiltration tests on all manholes.
 - b. Suitably plug all pipes entering each manhole and brace plugs to prevent blow out.
 - 2. Manhole Repairs:
 - a. Correct leakage by reconstruction, replacement of gaskets and/or other methods as approved by the Engineer.
 - b. The use of lead-wood or expanding mortar will not be permitted.
 - 3. After the manholes have been backfilled and prior to final acceptance, any signs of leaks or weeping visible inside the manholes shall be repaired and the manhole made watertight.

END OF SECTION 330513

SECTION 331100 - WATER UTILITY DISTRIBUTION PIPING

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 water-distribution piping and related components outside the building for water service, with the following components:
 - 1. Water mains.
 - 2. Water services.
 - 3. Water fittings.

1.3 SUBMITTALS

- A. Product Data: For each type of product indicated.
- B. Operation and Maintenance Data: For water valves and specialties to include in emergency, operation, and maintenance manuals.
- C. Manufacturer's Certificate: Certify that products meet or exceed specified local requirements.

1.4 QUALITY ASSURANCE

- A. Regulatory Requirements:
 - 1. Comply with standards of authorities having jurisdiction for potable-water-service piping, including materials, installation, testing, and disinfection.
 - a. Drinking Water Compliance: Comply with NSF/ANSI Standard 61 - Drinking Water Systems Components, latest revision for all pipe materials, coatings, fittings, and installations.
- B. Piping materials shall bear label, stamp, or other markings of specified testing agency.

1.5 DELIVERY, STORAGE, AND HANDLING

- A. Store pipe, fittings, and seals in accordance with manufacturer's recommendations.
- B. Protect stored piping from moisture and dirt. Elevate above grade. Do not exceed structural capacity of floor when storing inside.

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- C. Protect flanges, fittings, and specialties from moisture and dirt.
- D. Store plastic piping protected from direct sunlight. Support to prevent sagging and bending.

1.6 PROJECT CONDITIONS

- A. Interruption of Existing Water-Distribution Service: Do not interrupt service to facilities occupied by Owner or others unless permitted under the following conditions and then only after arranging to provide temporary water-distribution service according to requirements indicated:
 - 1. Notify Owner's Representative no fewer than two days in advance of proposed interruption of service.
 - 2. Do not proceed with interruption of water-distribution service without written authorization from Owner's Representative.

1.7 COORDINATION

- A. Coordinate connection to well and water distribution system with Owner.

PART 2 - PRODUCTS

2.1 HDPE PIPE AND FITTINGS

- A. HDPE, ASTM Pipe: ASTM D 2239, PE 3408 to give pressure rating not less than the following:
 - 1. SIDR No. 9; 160 psig
 - 2. Insert Fittings for HDPE Pipe: ASTM D 2609, made of PA, PP, or PVC with serrated male insert ends matching inside of pipe. Include bands or crimp rings.
 - 3. Molded HDPE Fittings: ASTM D 3350, PE resin, socket- or butt-fusion type, made to match HDPE pipe dimensions and class.

2.2 CORPORATION STOPS

- A. Approved Manufacturers
 - 1. A.Y. McDonald
 - 2. Cambridge Brass
 - 3. Ford Meter Box Co.
 - 4. Mueller Co.
- B. Conforming to AWWA C-800.
- C. 3/4" to 2" curb stops shall be ball valve design with brass ball that is teflon coated or brass ball with teflon seats.

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- D. The ball shall be supported by seats which are water tight in either direction.
- E. The valve shall have a full port opening.
- F. The body of the corporation stop shall be of heavy duty design.
- G. The valve working pressure shall be 300 p.s.i.

2.3 CURB STOPS

- A. Approved Manufacturers
 - 1. A.Y. McDonald
 - 2. Cambridge Brass
 - 3. Ford Meter Box Co.
 - 4. Mueller Co.
- B. Conforming to AWWA C-800
- C. 3/4" to 2" curb stops shall be ball valve design with brass ball that is teflon coated or brass ball with teflon seats.
- D. The ball shall be supported by seats which are water tight in either direction.
- E. The valve shall have a full-port opening.
- F. The valve shall open with ¼ turn (90) with a check or stop.
- G. The valve shall not have a drain.
- H. The valve stem shall have 2 "O" rings and a bronze ring lock which holds the stem solidly in the valve body.
- I. The valve body shall be of heavy duty design.
- J. The valve working pressure shall be 300 p.s.i.

PART 3 - EXECUTION

3.1 EARTHWORK

- A. Refer to Division 31 Section "Earth Moving" for excavating, trenching, and backfilling.

3.2 INSTALLATION

- A. General:

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1. Install all pipe and fittings in strict accordance with the manufacturer's instructions and recommendations.
2. Install all pipes and fittings in accordance with the lines and grades shown on the Drawings and as required for a complete installation. Minimum depth of cover for water main shall be 4' – 0"
3. Install adapters, as required, when connecting pipes constructed from different materials.

B. Pipe Laying:

1. Firmly support the pipe and fittings on bedding material as shown on the Drawings and as specified in the appropriate Sections of these Specifications.
2. Do not permanently support the pipe or fittings on saddles, blocking stones, or any material which does not provide firm and uniform bearing along the outside length of the pipe.
3. Thoroughly compact the material under the pipe to obtain a substantial unyielding bed shaped to fully support the pipe.
4. Excavate suitable holes for the joints so that only the barrel of the pipe received bearing pressure from the supporting material after placement.
5. Lay each pipe length so it forms a close joint with the adjoining length and bring the inverts to the required grade.
6. Do not drive the pipe down to grade by striking it with a shovel handle, timber, rammer, or any other unyielding object.
7. When each pipe length has been properly set, place and compact enough of the bedding material between the pipe and the sides of the trench to hold the pipe in correct alignment.
8. After filling the sides of the trench, place and lightly tamp bedding material to complete the bedding as shown on the Drawings.
9. Take all necessary precautions to prevent flotation of the pipe in the trench.

C. Temporary Plugs:

1. When pipe installation work in trenches is not in progress, close the open ends of the pipe with temporary watertight plugs.
2. If water is in the trench when work is resumed, do not remove plugs until all danger of water entering the pipe is eliminated.
3. Do not use the pipelines as conductors for trench drainage during construction.

D. Pipe Cutting:

1. Cut in accordance with manufacturer's recommendations.
2. Cut the pipe with a hand saw, metal-inserted abrasive wheel (except asbestoscement pipe), or pipe cutter with blades (not rollers).
3. Examine all cut ends for possible cracks caused by cutting.

E. Pipe Insulation:

1. Install 2 in. thick x 4 ft. wide between pipe and culvert or over pipe when noted on plans.
2. Between culvert and pipe, extend insulation 6 ft. each side of the culvert along the pipe.
3. For dual pipe trenches the insulation shall be 8 ft. wide.
4. Provide 6 in. sand blanket above and below insulation or as shown on Drawings.

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F. Valve Installation:

1. Install in accordance with the specifications for the pipe to which they are to be connected.
2. Make up valve joints in accordance with the Contract Drawings.
3. The valves shall bear no stresses due to loads from the adjacent pipe.
4. Inspect, clean, and lubricate before installation.

G. Vertical Separation From Sanitary Sewer:

1. Whenever water mains must cross sewers, lay at such an elevation that the top of the sewer is at least 18 in. below the bottom of the water main.
2. When the elevation of the sewer cannot be buried to meet the above requirements, center one full length of water main over the sewer so that both joints will be as far from the sewer as possible.

H. Water Service Leads and Stops:

1. Provide and install corporation valves, water service leads, and curb stops for proposed building connections as shown on the Drawings, or where directed by the Architect.

3.3 PRESSURE TESTING AND DISINFECTION

- A. Pressure testing and disinfection shall be in accordance with AWWA C600 and AWWA C651 standards.
- B. Pressure testing and disinfection shall be performed in the presence of the representative of the Owner and the Engineer.

END OF SECTION 331100

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SECTION 333100 - SANITARY UTILITY SEWERAGE PIPING

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 gravity-flow, non-pressure sanitary sewerage outside the building.

1.3 PERFORMANCE REQUIREMENTS

- A. Gravity-Flow, Nonpressure, Drainage-Piping Pressure Rating: 10-foot head of water.

1.4 SUBMITTALS

- A. Product Data: For pipe and fittings.
- B. Manufacturer's Certificate: Certify that products meet or exceed specified local requirements.

1.5 DELIVERY, STORAGE, AND HANDLING

- A. Do not store plastic pipe, and fittings in direct sunlight.
- B. Protect pipe, pipe fittings, and seals from dirt and damage.

1.6 PROJECT CONDITIONS

- A. Portions of the existing sanitary sewer traversing the site shall remain active during construction and upon completion of project. Refer to Grading and Utility plan for proposed modification. Construction activities shall not interfere or impede existing flows. Damage to existing sewer infrastructure shall be repaired by Contractor at their expense.

PART 2 - PRODUCTS

2.1 PVC PIPE AND FITTINGS

- A. PVC Sewer Pipe and Fittings, NPS 15 and Smaller: ASTM D 3034, SDR 35, with bell-and-spigot ends for gasketed joints with ASTM F 477, elastomeric seals.

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- B. Provide commercially manufactured wyes or tees for service connections. Fitting must have single piece gasket.

2.2 NONPRESSURE-TYPE PIPE COUPLINGS

- A. Comply with ASTM C 1173, elastomeric, sleeve-type, reducing or transition coupling, for joining underground nonpressure piping. Include ends of same sizes as piping to be joined, and corrosion-resistant-metal tension band and tightening mechanism on each end.
- B. Sleeve Materials:
 - 1. For Plastic Pipes: ASTM F 477, elastomeric seal or ASTM D 5926, PVC.
 - 2. For Dissimilar Pipes: ASTM D 5926, PVC or other material compatible with pipe materials being joined.
- C. Unshielded Flexible Couplings: Elastomeric sleeve with stainless-steel shear ring and corrosion-resistant-metal tension band and tightening mechanism on each end.
 - 1. Available Manufacturers:
 - a. Dallas Specialty & Mfg. Co.
 - b. Fernco Inc.
 - c. Logan Clay Products Company (The).
 - d. Mission Rubber Company; a division of MCP Industries, Inc.
 - e. NDS Inc.
 - f. Plastic Oddities, Inc.

2.3 RIGID INSULATION

- A. Extruded closed – cell rigid foamed polystyrene, 2 inch thickness, width of trench, Styrofoam HI-60 by Dow Chemical, or approved equal.

PART 3 - EXECUTION

3.1 EARTHWORK

- A. Excavation, trenching, and backfilling are specified in Division 31 Section "Earth Moving."

3.2 PIPING INSTALLATION

- A. General Locations and Arrangements: Drawing plans and details indicate general location and arrangement of underground storm drainage piping. Location and arrangement of piping layout take design considerations into account. Install piping as indicated, to extent practical. Where specific installation is not indicated, follow piping manufacturer's written instructions.
- B. Install piping beginning at low point, true to grades and alignment indicated with unbroken continuity of invert. Place bell ends of piping facing upstream. Install gaskets, seals, sleeves,

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and couplings according to manufacturer's written instructions for use of lubricants, cements, and other installation requirements.

- C. Install gravity-flow, nonpressure drainage piping according to the following:
 - 1. Install piping pitched down in direction of flow, at minimum slope of 2 percent, unless otherwise indicated.
 - 2. Install piping NPS 6 and larger with restrained joints at tee fittings and at changes in direction. Use cast-in-place concrete supports or anchors.
 - 3. Install PVC sewer piping according to ASTM D 2321 and ASTM F 1668.
- D. No pipe installed will be allowed to begin at any point other than a manhole or other appurtenance without the expressed consent of the Owner's Representative. The interior of each length of pipe will be swabbed and wiped clean before installing the next length. No length of pipe shall be installed until the previous length has had sufficient fine material placed and tamped about it to secure it firmly in place to prevent any disturbance. Bell ends shall be installed uphill. Whenever the work is stopped temporarily, or for any reason whatsoever, the end of the pipe shall be carefully protected against dirt, water, or other extraneous material. Bedding shall be as shown on the drawings.
- E. The pipe shall be bedded in a compact granular or stone pipe bedding placed on a flat trench bottom to the limits indicated on the drawings.
- F. The pipe shall be cut as necessary for appurtenances. Sufficient short lengths of pipe shall be furnished so that pipe entering and leaving appurtenances shall not be more than 2 feet in length measured from the inside face of the manhole.
- G. Pipe Cutting: The cutting of the pipe shall be done in accordance with the pipe manufacturer's recommendations. The pipe material shall be cut by using a saw or milling process, approved by the pipe manufacturer and not by using any impact device, such as a hammer and chisel, to break the pipe. The pipe shall be cut, not broken. The cut end of the pipe shall be square to the axis of the pipe and any rough edges ground smooth.

3.3 PIPE JOINT CONSTRUCTION

- A. Join gravity-flow, nonpressure drainage piping according to the following:
 - 1. Join PVC sewer piping according to ASTM D 2321 and ASTM D 3034 for elastomeric-seal joints or ASTM D 3034 for elastomeric gasket joints.
 - 2. Join dissimilar pipe materials with nonpressure-type flexible couplings.

3.4 PIPE INSULATION

- A. Install 2-in. thick x 4-ft. wide insulation over pipe when noted on plans or as directed by the Owner's Representative.

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3.5 IDENTIFICATION

- A. Materials and their installation are specified in Division 31 Section "Earth Moving." Arrange for installation of green warning tape directly over piping and at outside edge of underground structures.
 - 1. Use detectable warning tape over nonferrous piping.

3.6 CLEANING

- A. Clean interior of piping of dirt and superfluous materials. Flush with potable water.

END OF SECTION 333100

SECTION 333213 - PUMPING STATION - SANITARY SEWERAGE

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. The work of this section includes furnishing all labor, materials, tools and equipment necessary to furnish and install 1 packaged submersible pumping station as specified herein and as shown on the drawings.
- B. Related Sections include the following:
 - 1. Division 33 Section "Force Mains - Sanitary Sewerage" for piping requirements.

1.3 DESIGN REQUIREMENTS

- A. The station shall be of circular precast reinforced concrete construction, complete with two submersible sewage pumps, motors, motor controls, interior electrical wiring and conduits, piping and valves, liquid level sensors, lift out assembly, entrance hatch, and other necessary appurtenances.

1.4 PERFORMANCE REQUIREMENTS

- A. The materials and equipment covered by this specification are intended to be standard materials and equipment of proven ability as manufactured by reputable concerns. Design equipment and construct in accordance with the best practice of the industry and shall be installed in accordance with the manufacturer's recommendations and the Contract Documents. The specifications call attention to certain features but do not purport to cover all details entering into the construction of the equipment.
- B. The performance criteria for each pump shall be as indicated on the drawings. Pumps shall be as indicated within contract plans. Do not overload the motor at any point on the pump curve above the static head.

1.5 SUBMITTALS

- A. Product Data: For equipment and components.
 - 1. Provide performance curves.

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2. Include complete master wiring diagrams and elementary or control schematics, including required coordination with other electrical control devices operating in conjunction with the pumping station. Due to the complexity of the control functions, it is imperative the above drawings be clear and carefully prepared to facilitate interconnections with other equipment. Standard preprinted sheets or drawings simply marked to indicate applicability to this contract will not be acceptable.

- B. Shop Drawings: For equipment and components.
- C. Operation and Maintenance Manual of the pumping station including equipment and components.
- D. Field quality-control test reports.

1.6 DELIVERY, STORAGE, AND HANDLING

- A. All materials and equipment shall be shipped, stored, handled and installed in such a manner as not to degrade quality, serviceability or appearance. Store equipment in a clean, dry location free from construction dust, precipitation and excess moisture. If stored for more than two weeks, the equipment shall receive all maintenance considerations required by the manufacturer for proper storage of the equipment.

1.7 SYSTEM STARUP

- A. Provide a minimum of two days for installation and startup.

1.8 EXTRA MATERIALS

- A. Provide one set of the following spare parts for each station:
 1. One set of Ball Bearings.
 2. One set of Mechanical Seals.
 3. One box of Pilot Lights for Each Type Used.
 4. Cord Set and Cable Connector Assembly.
- B. All lubricating oils required for the first year of operation shall be provided for each station.

PART 2 - PRODUCTS

2.1 PACKAGE PUMPING STATION.

- A. Pump Chamber. Show the precast reinforced concrete pump chamber as indicated on the drawings. Conform to the applicable requirements of ASTM C478. Wire fabric for reinforcement shall conform to the requirements of ASTM A185 and steel reinforcement shall conform to the requirements of ASTM A615 Grade 60. The precast structure shall be designed for hydrostatic head equal to depth of the structure and shall be capable of withstanding an H-20 truck load. The chamber shall be installed watertight.

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- B. Entrance Hatch. The access opening to the pump chamber shall have an entrance hatch mounted above the pumps and shall be of the style, type and size shown on the drawings. The manufacturer shall guarantee proper operation and against defects in material or workmanship for a period of five years. Provide an aluminum hatch as manufactured by Bilco Company, Babcock-Davis Associates, Inc., Products Division, Washington Aluminum Company, Inc., or equal. The hatch cover shall be single leaf, watertight self-draining type. Door leaf shall be of 1/4 inch thick aluminum diamond pattern plate capable of withstanding an H- 20 truck load. Channel frame shall be of 1/4 inch thick aluminum with anchor flange around the perimeter. The door leaf shall be equipped with a minimum of two stainless steel hinges with stainless steel pins, spring operators to afford easy operation, and an automatic hold-open arm with release handle. Provide hatch with a recessed padlock hasp and padlock as manufactured by Corbin (No. 2863, 1/4W) or equal by Schlage (No. 912). A 1-1/2 inch drainage coupling shall be located in the front right corner of the channel frame. Drain shall discharge into pump chamber. Provide stainless steel hardware, mill finish aluminum and bituminous coating applied to exterior of frame.

2.2 PUMPS AND RAIL ASSEMBLY.

- A. General. Furnish and install two (2) submersible wastewater pumps. Provide submersible effluent pumps designed with single vane impeller and submersible type motor.
- B. Construction. The pump and motor housing shall be of close grained cast iron construction with all interior and exterior surfaces coated with baked epoxy enamel. The pump shaft shall be of AISI Type 430 stainless steel with upper and intermediate ball bearings for radial and thrust loading and a lower sleeve bearing to minimize the overhang to the impeller and cutter load.
 - 1. Construct the pump housing with an intermediate oil- filled, seal chamber and the chamber shall be separate from the motor. Tandem, spring loaded, carbon and ceramic mechanical shaft seals shall be used to seal the pump casing from the seal chamber, and in turn from the motor housing.
 - 2. Check Valves. Provide each pump with a horizontal self contained, straight-through design, swing check valve constructed of thermoplastic materials and shall have flanged connections. Valve shall be designed for wastewater application and located as shown on the drawings.
- C. Rail Assembly. Arrange the pump and its check valve to allow easy removal, installation and adjustment without the necessity of personnel entering the chamber. Cast iron, non-sparking guide brackets with guide yokes of sufficient bearing length to prevent binding shall bolt to the pump. The yokes shall mate over guard rails of 1-1/4 inch stainless steel pipe running between an upper rail supporting casting, and a lower discharge casing. As the pump is lowered into position, a discharge nozzle shall be guided into a chamfered cavity in the discharge casing. A shoulder on the nozzle shall bottom on the discharge casing when the pump is properly located and shims shall not be required to insure alignment for a lead-tight seal. Dual O-rings shall affect the hydraulic seal around the nozzle when it is in its operation position. A brace, easily removable from the top of the chamber shall be provided to lock the parts together, preventing line surges from breaking the seal and allowing leakage. An upper guide plate shall be attached to each pump to support lift out fitting and guide the pump on the rails. A lifting eye shall be attached to each plate and shall be furnished with 5/16 inch stainless steel chain and clevis for lifting of the pump and assembly. The top chain and clevis for lifting of the pump and assembly. The top chain link shall be placed into a Type 304 stainless steel hook (one for each

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pump) which is attached to the wet-well wall or roof slab located as to allow easy access from the wet-well opening. The discharge case shall be three inch tapped discharge opening with piping to a coupling through the chamber wall. The discharge case shall be securely bolted to the basin floor.

- D. Corrosion Protection. Pre-treat all iron castings with phosphate and chromic rinse and painted with a high temperature baked epoxy before machining and all machined surfaces exposed to the sewage water to be re-painted with a high temperature baked epoxy. All fasteners shall be Type 302 stainless steel.
- E. Pipe Connections:
 - 1. Use pre-molded elastomeric sealed joints at the joints between the pipe (such as but not limited to influent sewer) and sewer manhole sections. Pre-molded elastomeric sealed joints shall be A-Lok, Res-Seal, Press-Wedge II, Lock Joints Flexible Manhole Sleeve, Kor-N-Seal Joint Sleeve, or equal.
 - 2. For pipes (such as but not limited to discharge pipe, vent) installed submerged or below grade, the annular space shall be sealed watertight with mechanically expanded interlocking synthetic rubber links of the Link-Seal type, or equal. Nuts and bolts shall be zinc coated steel.
 - 3. For pipes installed non-submerged or above grade, pack the annular space with jute and caulked flush at both ends with a polysulfide sealant.

2.3 MOTORS.

- A. Motors shall be submersible design and shall be connected to pumps, speed reducers or other driven equipment, through a coupling system suitable for imposed load, torque and end thrust conditions, as required by the equipment manufacturer.
- B. Motors shall have three bearings, two ball bearings to support the rotor and take radial and thrust loads and a sleeve bearing in the seal chamber to prevent shaft deflection at lower seal from radial thrust of grinder impeller. Bearings shall be designed for B-10 life of 30,000 hours.
- C. Furnish each motor with two cables (power cable and control cable). Power cord shall be Type S0 sized based on the requirements of the pumps, four conductor cord and control cord shall be Number 16 Type S0, five conductor cord with lengths to suit the installation without splices (control panel is remotely mounted) and provided with sufficient length to allow the pumps to be removed from the wet-well and placed adjacent to the wet-well opening for maintenance. In addition, the required cable for each pump within the wet-well shall be coiled and placed into a type 304 stainless steel hook (one for each pump) which is attached to the wet-well wall or roof slab located as to allow easy access from the wet-well opening. Cords shall withstand a pull of 150 pounds and be sealed watertight into the motor and connection points.
 - 1. Provide one end of each cable with one high impact plug, molded composition handle with mechanical cable grip and neoprene bushing constructed of copper free aluminum and rated for Class I, Groups C and D.
 - 2. Two, two gang angle type through feed, factory sealed receptacle assemblies shall be provided and attached to the wet-well wall or roof slab located as to allow easy access from the wet-well opening. Receptacle assemblies shall be constructed of copper free aluminum and rated for Class I, groups C and D.

2.4 CONTROL PANEL.

- A. General. The pump manufacturer shall provide a completely self-contained Duplex Motor Control Panel. The control panel shall provide short circuit and overload protection for each pump. An automatic alternator with manual override switch shall be provided to manually select the lead pump duty between the two pumps on successive cycles. A moisture sensing circuit shall be provided to detect water leakage into the cavity of the pump. The circuit shall latch through a contact, de-energize the motor, and energize a pilot light indicating a seal failure. A pushbutton shall be provided to detect abnormal and detrimental motor temperature, de-energize the motor, and energize a pilot light indicating temperature alarm. A pushbutton shall be provided to reset circuit after the over-temperature condition has been corrected. The control panel shall conform to National Electrical Manufacturer's Association (NEMA), Joint Industry Council (JIC), and National Electrical Code (NEC) specifications, and shall be Underwriters' Laboratories (UL) listed. The panel shall be factory wired and tested.
- B. Enclosure. The duplex motor controls and circuit breakers shall be housed in a NEMA 12 enclosure. Construct the enclosure of 14 gauge steel with continuous seam welds. The enclosure shall be provided with tamper-proof double door system consisting of a bland outer door and a second inner door on which all operating controls are located. The controls shall incorporate a "dead front" type of installation. Finish shall be baked enamel; white inside, gray outside. Provide a padlock hasp. House the control enclosure within the warehouse.
- C. Circuit Breakers. Provide three pole main and motor circuit breaker sized to NEC requirements. Circuit breakers shall be door operator interlocked to the enclosure so that the door cannot be opened with the circuit breakers energized. Provide operator with an interlock defeat device which requires a hand tool to operate and shall be lockable in the off position. Circuit breakers shall be thermal magnetic molded case type. The pump motors shall have an interrupting rating of 18,000 amperes symmetrical. Devices for operation on 120 volts shall have a 10,000 ampere rating.
- D. Starters. Provide each pump motor with a NEMA rated across the line motor starter in combination with a circuit breaker. The starters shall employ gravity drop-out armatures without bell cranks or other mechanical linkages which are subject to failure. Starter coils and contacts shall be easily replaceable with standard hand tools and without removing the starter from the panel. Equip starters with one ambient compensated quick-trip button to facilitate testing of the overload mechanism. Magnetic motor starters shall be full voltage, non-reversing type. Starters shall be furnished with a thermal overload protector, reset pushbutton and auxiliary contacts as required. Furnish a phase failure relay for each sewage pump motor and shall shut-off the pump motor on a phase failure condition.
- E. Alternator. Provide an electromechanical alternator to alternate the lead pump duty between the two pumps on successive cycles. The alternator shall be a single device; alternator circuits comprised of two or more relays shall not be considered equal. Provide a selector switch to bypass the alternator and select either pump as the lead pump. The selector switch shall be as specified.
- F. Selector Switch. Provide a hand-off-automatic selector switch for each pump. Selector switches shall be of oil-tight construction. Toggle switch types shall not be considered equal. Selector switch contacts shall be heavy duty, double-break, silver.

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- G. Relays. General purpose relays shall be NEMA 300 volt open frame industrial control type. Furnish intrinsically safe relays for interconnection of each non-mercury float switch with the control panel.
- H. Terminal Blocks. Provide terminal blocks for all external connections to the control panel and for all connections between the component mounting plate and enclosure mounted components to allow for easy removal of the component mounting plate if required for service. Terminal blocks shall consist of individual snap together contact sections mounted on a common mounting channel. Terminal block sections shall have tubular screw contacts mounted in a nylon housing to resist breakage; phenolic or other rigid, brittle materials shall not be considered equal. Plain screw contacts requiring lugs to be installed on wires shall not be considered equal.
- I. Control Circuit. The control circuit of the Duplex Motor Control Panel shall operate at 120 VAC and be fuse protected. Tripping the circuit breaker of either pump shall not disable the control circuit.
- J. Elapsed Time Meters. Provide a non-reset meter for each pump to indicate elapsed time of operation of the pump from 0 to 99,999.9 hours.
- K. Indicating Lights. In addition to the aforementioned indicating lights, provide a green "pump running" light for each pump. All indicating lights shall be transformer type, oil-tight, press-to-test with colored lens and legend plate.
- L. Alarm Circuit. Furnish an alarm circuit relay and reset pushbutton as a part of the control panel. The alarm relay shall be activated by the high-water level non-mercury float switch, and the moisture and temperature sensing relays. Provide one Type C dry contact for common remote indication of alarm condition. Provide a flasher circuit for connection to an alarm light.
- M. Nameplates. Furnish and install nameplates for all switches, control stations, motor starters, terminal cabinets, indicating lights, etc. to designate the equipment controlled and function. Nameplates shall be black and white laminated phenolic material having engraved letters approximately 1/2 inch high, extending through the black face into the white layer. Nameplates shall be attached to panels by self-tapping screws or rivets and shall be stainless steel. Attach a special nameplate to the pump housing which shall contain identification of housing and bearing numbers.
- N. Provide control panel with a 115 volt, single phase, 60 Hertz utility outlet receptacle.

2.5 PUMP CONTROLS.

- A. Pump Operation. The pump controls shall be located in the control panel and shall operate the pumps to maintain the liquid level between adjustable operating limits. Starting and stopping of each sewage pump shall be accomplished by float type non-mercury switches for start and stop levels. The automatic alternator shall alternate the pump sequence after each pump cycle. A means for manually bypassing the alternator and setting either of the pumps on automatic as the lead pump shall be provided. The pumps shall operate in parallel if the liquid level in the basin rises above the "Pump No. 2" on level.

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- B. Level Sensors. Provide four float type non-mercury switches, encapsulated within a solid polyurethane float ball. Provide level sensors with individual float weights to operate the pumps and to detect high water level in the basin addition. Provide a mounting bracket near the access opening to allow adjustment of the control and alarm levels as shown on the drawings. Furnish each non-mercury float switch with cable lengths to suit the installation without splices (control panel is remotely mounted). A properly rated electrical cable with a screwed, sealing type, cord-grip shall connect the switches to the electrical junction box.

2.6 STATION WIRING.

- A. The pumping station including control panels shall be completely wired and tested at the factory except for the power feed lines. The wiring shall be in accordance with the National Electrical Code and as hereinafter specified.
- B. Junction Box. Provide a waterproof junction box constructed of aluminum with a cast in sealing conduit and mount horizontally near the top of the basin for easy access. Fit the cover with an "O" ring for a watertight seal. Provide proper sealing compound to seal incoming power and control wiring from the control panel. Provide cord-grip rubber grommet seal fittings in the box to seal pump power, control and level sensor cords.
- C. All wiring shall be of annealed 98 percent conductivity, soft drawn copper. Wire insulation shall be either type THWN or type XHHW. Except for control and signal leads, no wire smaller than number 12 AWG shall be used.
- D. All wiring between the control panel and junction box shall be in watertight galvanized rigid steel conduit. Liquidtight flexible metal conduits shall be used for sewage pump motor terminations. Where galvanized finish is removed for threading, a protective finish shall be applied.

2.7 FACTORY TESTS

- A. Each entire package pumping station shall be given an operational test of all equipment at the factory to check for excessive vibration, for leaks in all piping or seals and for correct operation of the automatic control system and all auxiliary equipment. The pump suction and discharge lines shall be coupled to a reservoir and the pumps shall recirculate water for at least one hour under simulated service conditions. The automatic control shall be adjusted to start and stop the pumps at approximately the levels required by the job conditions. Certified copies of all test procedures and results shall be provided to the Engineer prior to shipment of the pumping station.

PART 3 - EXECUTION

3.1 EARTHWORK

- A. Excavating, trenching, and backfilling are specified in Division 31 Section "Earth Moving."

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3.2 INSTALLATION

- A. Install all materials and equipment in a neat, workmanlike manner.
- B. All wiring of the equipment shall be as specified under Division 16 of these specifications.
- C. Package Pumping Unit. Install the pumping station in accordance with written instructions provided by the manufacturer and as approved.

3.3 PAINTING

- A. Shop painting and the surface preparation is a part of the work specified in this section and shall be as specified in finish painting.

3.4 CLEAN UP

- A. Prior to start-up and field testing, remove all foreign matter from the pump chamber piping and pumps. Clean spillage of lubricants used in servicing the system from all equipment and concrete surfaces.

3.5 FIELD QUALITY CONTROL

- A. Field test each entire package pumping system as a system using clean fresh water prior to the acceptance of sewage to the station. Operate pumps continuously at the design conditions for at least 15 minutes. Operate all systems, controls, and sequences and demonstrated as operating as approved. The contractor shall perform all tests and shall be responsible for all necessary temporary connections, testing equipment and utilities and shall provide and dispose of all water used. A factory trained representative shall be present for the testing.

3.6 MANUFACTURER'S TRAINING

- A. Provide a minimum of one day for manufacturer's training.

END OF SECTION 333213

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SECTION 333400 - FORCE MAINS - SANITARY SEWERAGE

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. This Section includes force-main, pressure sanitary sewerage outside the building.

1.3 DEFINITIONS

- A. HDPE: High-density polyethylene pipe.

1.4 PERFORMANCE REQUIREMENTS

- A. Force-Main, Pressure-Piping Pressure Rating: At least equal to system operating pressure but not less than 150 psig.

1.5 SUBMITTALS

- A. Product Data: For piping and gaskets.
- B. Field quality-control test reports.

1.6 DELIVERY, STORAGE, AND HANDLING

- A. Do not store plastic manholes, pipe, and fittings in direct sunlight.
- B. Protect pipe, pipe fittings, and seals from dirt and damage.

PART 2 - PRODUCTS

2.1 PVC PIPE AND FITTINGS

- A. PVC Water-Service Pipe and Fittings: ASTM D 1785, Schedule 80 pipe, with plain ends for solvent-cemented joints with ASTM D 2467, Schedule 80, socket-type fittings.

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- B. PVC Pressure Pipe: AWWA C900, Class 200, for gasketed joints and using ASTM F 477, elastomeric seals.
 - 1. Fittings NPS 4 to NPS 8: PVC pressure fittings complying with AWWA C907, for gasketed joints and using ASTM F 477, elastomeric seals.
 - 2. Fittings NPS 10 and Larger: Ductile-iron, compact fittings complying with AWWA C153, for push-on joints and using AWWA C111, rubber gaskets.

2.2 HDPE PIPE AND FITTINGS

- A. HDPE, AWWA Pipe: AWWA D 2239; with HDPE 3408 to give pressure rating not less than the following
 - 1. DR No. 11; 160 psig
 - 2. HDPE, AWWA Fittings: AWWA C906, socket- or butt-fusion type, with DR number matching pipe and HDPE compound number required to give pressure rating as indicated.

2.3 PRESSURE-TYPE PIPE COUPLINGS

- A. Reducing or transition, metal, bolted, sleeve-type, reducing or transition coupling, for joining underground pressure piping. Include 150-psig minimum pressure rating and ends of same sizes as piping to be joined.
- B. Tubular-Sleeve Couplings: AWWA C219, with center sleeve, gaskets, end rings, and bolt fasteners.
 - 1. Available Manufacturers:
 - a. Cascade Waterworks Mfg.
 - b. Dresser, Inc.; DMD Div.
 - c. Ford Meter Box Company, Inc. (The); Pipe Products Div.
 - d. JCM Industries.
 - e. Romac Industries, Inc.
 - f. Smith-Blair, Inc.
 - g. Viking Johnson.
 - 2. Center-Sleeve Material: Manufacturer's standard.
 - 3. Gasket Material: Natural or synthetic rubber.
 - 4. Metal Component Finish: Corrosion-resistant coating or material.

2.4 PIPE INSULATION

- A. Extruded-Polystyrene Board Insulation: ASTM C 578, of type and density indicated below, with maximum flame-spread and smoke-developed indexes of 75 and 450, respectively:
 - 1. Available Manufacturers:
 - a. DiversiFoam Products.

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- b. Dow Chemical Company.
 - c. Owens Corning.
 - d. Pactiv Building Products Division.
2. Type IV, 1.60 lb/cu. ft., unless otherwise indicated.

PART 3 - EXECUTION

3.1 EARTHWORK

- A. Excavating, trenching, and backfilling are specified in Division 31 Section "Earth Moving."

3.2 PIPING INSTALLATION

- A. General Locations and Arrangements: Drawing plans and details indicate general location and arrangement of underground sanitary sewerage piping. Location and arrangement of piping layout take design considerations into account. Install piping as indicated, to extent practical. Where specific installation is not indicated, follow piping manufacturer's written instructions.
- B. Install proper size increasers, reducers, and couplings where different sizes or materials of pipes and fittings are connected. Reducing size of piping in direction of flow is prohibited.
- C. Install force-main, pressure piping according to the following:
1. Install piping with restrained joints at tee fittings and at horizontal and vertical changes in direction. Use corrosion-resistant rods, pipe or fitting manufacturer's proprietary restraint system, or cast-in-place-concrete supports or anchors.
 2. Install piping below frost line.
 3. NPS 4: HDPE, ASTM pipe; molded PE fittings; and heat-fusion joints.
- D. Clear interior of piping and manholes of dirt and superfluous material as work progresses. Maintain swab or drag in piping, and pull past each joint as it is completed. Place plug in end of incomplete piping at end of day and when work stops.

3.3 PIPE JOINT CONSTRUCTION

- A. Join force-main, pressure piping according to the following:
1. PE, AWWA pipe (for 3" to 8"); PE, AWWA fittings; and heat-fusion joints.
 2. Join dissimilar pipe materials with pressure-type couplings.

3.4 PIPE INSULATION

- A. Install 2-in. thick x 4-ft. wide insulation over pipe when noted on plans or as directed by the Owner's Representative.

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3.5 FIELD QUALITY CONTROL

- A. Test new piping systems, and parts of existing systems that have been altered, extended, or repaired, for leaks and defects.
 - 1. Do not enclose, cover, or put into service before inspection and approval.
 - 2. Test completed piping systems according to requirements of authorities having jurisdiction.
 - 3. Schedule tests and inspections by authorities having jurisdiction with at least 24 hours' advance notice.
 - 4. Submit separate report for each test.
 - 5. Hydrostatic Tests: Test sanitary sewerage according to requirements of authorities having jurisdiction and the following:
 - a. Allowable leakage is maximum of 50 gal./inch of nominal pipe size per mile of pipe, during 24-hour period.
 - b. Close openings in system and fill with water.
 - c. Purge air and refill with water.
 - d. Disconnect water supply.
 - e. Test and inspect joints for leaks.
 - 6. Force Main: Perform hydrostatic test after thrust blocks, supports, and anchors have hardened. Test at pressure not less than 1-1/2 times the maximum system operating pressure, but not less than 150 psig.
- B. Leaks and loss in test pressure constitute defects that must be repaired.
- C. Replace leaking piping using new materials, and repeat testing until leakage is within allowances specified.

END OF SECTION 333400

SECTION 334213 - PIPE CULVERTS

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 pipe culverts.

1.3 SUBMITTALS

- A. Product Data: For pipe and fittings.

1.4 DELIVERY, STORAGE, AND HANDLING

- A. Protect pipe, pipe fittings, and seals from dirt and damage.

PART 2 - PRODUCTS

2.1 HDPE PIPE AND FITTINGS

- A. Corrugated HDPE Pipe and Fittings NPS 12 to NPS 48: AASHTO M 294M, Type S, with smooth waterway for coupling joints.
 - 1. Silttight Couplings: HDPE sleeve with ASTM D 1056, Type 2, Class A, Grade 2 gasket material that mates with pipe and fittings.

PART 3 - EXECUTION

3.1 EARTHWORK

- A. Excavation, trenching, and backfilling are specified in Division 31 Section "Earth Moving."

3.2 PIPING INSTALLATION

- A. General Locations and Arrangements: Drawing plans and details indicate general location and arrangement of underground storm drainage piping. Location and arrangement of piping layout

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take design considerations into account. Install piping as indicated, to extent practical. Where specific installation is not indicated, follow piping manufacturer's written instructions.

- B. Gravity-Flow, Nonpressure Sewer Piping: Use the following pipe materials for each size range:
 - 1. NPS 4 and NPS 144: Corrugated PE drainage pipe and fittings, silttight couplings, and coupled joints.

3.3 PIPE JOINT CONSTRUCTION

- A. Join gravity-flow, nonpressure drainage piping according to the following:
 - 1. Join corrugated HDPE piping according to CPPA 100 and the following:
 - a. Use silttight couplings for Type 2, silttight joints.

3.4 CLEANING

- A. Clean interior of piping of dirt and superfluous materials.

END OF SECTION 332413

**Technical Specifications
For
Bathhouse & Site Upgrades
Water System Project**

for the

Maine DACF

Cobscook Bay State Park, Dennysville, Maine

March 2024

**Dirigo Engineering
2 Dirigo Drive
Fairfield, Maine 04937
(207) 453-2401**



Project #59301

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DIVISION 1
GENERAL REQUIREMENTS

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SECTION 01010
SUMMARY OF WORK

01010.01 LOCATION OF WORK

All work under this contract is located at Cobscook Bay State Park in Dennysville, Maine.

01010.02 SUPPLY OF MATERIALS

The Contractor shall supply all materials required for the completion of this project. Some materials or equipment at the facility is to be reused or maintained and not disturbed.

01010.03 CONTRACT CONDITIONS

The Contract Conditions including payment provisions, supervision, insurance, warranties and related items are not included in this document.

01010.04 WORK UNDER THIS CONTRACT

The work is described in general as the completion of a new water system. The work is shown on the plans entitled: *Cobscook Bay State Park Bathhouse & Site Improvements Water System* (Sheets 1-4) prepared by Dirigo Engineering and dated March 29, 2024. Work and equipment are specified on the plans and in this document. A summary of the required work is as follows:

- A.) Maintenance of Service - Plan and perform the work in such a manner that water service can be always maintained to the park. Provide temporary connections, temporary piping and other temporary equipment as required. Brief shut-down periods will be allowed for connection of temporary pipes and final connections at project startup.
- B.) Well Work:
 - a. New Well - Install new well pump, motor, pipe, pitless adapter, submersible pump wire, etc. as specified.
 - b. Well Conduit and Conductors – Install new buried conduits and conductors from the well to the pump station as shown on the site plan and the electrical drawings.
 - c. Well Piping – Install new buried water line with drain from proposed well to pump station and from existing well to pump station as indicated on the drawings.
 - d. Existing Well House - Install wire in conduit to existing well house from bath house, Install new water line with drain from existing well house to bath house, install new pump control box and Pump-Tec plus in existing well house.
- C.) Interior Existing Bathhouse:
 - a. Remove interior CMU partitions in bath portion.
 - b. Install 6' wide double doors.
 - c. Install 3 new WX-350 pressure tanks.
 - d. Install two new booster pumps
 - e. Install two, 1,650-gallon water storage tanks
 - f. Install interior piping, hose bibs for draining system, meters, pressure switches, floats and valves as shown on the plans.
 - g. Install dedicated outlet for chlorine pump, chlorine day tank, spill skid and chlorine day tank.
 - h. Install electric conduits and conductors connecting all equipment shown on the plans including, float switches, pressure switches, dedicated chlorine outlet, pumps, etc.
 - i. Install the pump control panel, starters, protection, controls and accessories as shown on the plans.
 - j. Daylight existing sewer drain to be used for draining system in winter.

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- D.) Startup – Startup the new system with the manufacturer’s representatives present to adjust their devices and confirm proper operation and provide training.
- E.) Provide all other work shown on the plans and specified herein.

SECTION 01011
SPECIAL CONDITIONS

1.) Safety Regulations:

The Contractor shall be knowledgeable of all OSHA regulations and observe same at all times.

2.) Coordination of Work:

The Contractor shall be responsible for coordination of activities of Subcontractors, Utilities and Others performing Work on the Site.

The Contractor shall not interrupt the normal operation of the Cobscook Bay State Park without the knowledge and approval of the Park Manager. In general, 48 hours' notice will be required for interruption of service. Coordination with the Park will be a requirement of this contract. The Contractor shall provide names and telephone numbers of contact person to the park for use in the event of night or weekend emergencies.

3.) Statutory Requirements in General:

The Contractor shall be knowledgeable of all State and Federal laws and municipal ordinances and regulations in any manner affecting those engaged or employed in the work, or the materials used or employed in the work, or in any way affecting the conduct of the work, and of all such orders and decrees having any jurisdiction or authority over the same and of all provisions required by law to be a part of this contract, all of which provisions are hereby incorporated by reference and made a part thereof. If any discrepancy or inconsistency is discovered in the drawings or specifications or contract for this work in relation to any such law, ordinance, regulation, order, or decree, he shall report the same to the Engineer in writing. He shall at all times himself observe and comply with, and shall cause all of his agents and employees to observe and comply with all such existing and future laws, ordinances, regulations, orders, and decrees; and shall protect and indemnify the Owner and Engineer and all of its and their officers, agents, and servants against any claim or liability arising from or based on the violation of any such law, ordinance, regulation, order, or decree whether by himself or his employees or subcontractors.

4.) Related Work at Site:

The Owner will be performing other Work related to the Project at the Site. Other Work is described below:

- Construction of a bathhouse
- Construction of a new septage pumping facility
- Construction of a new sewage disposal system
- Renovations of Gate House
- Parking, landscaping, grading and paving, etc.

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5.) Construction Materials:

The Contractor shall supply all new materials required for the completion of this project unless specifically noted otherwise. See Section 01010 for specifics.

6.) Special Care:

The Contractor shall take special care with all hazardous materials and chemicals that may be used in conjunction with the project. There shall be no dumping of motor oil, salt, form oils, chemicals, solvents, etc. on the site. When possible all such material will be stored off site. Comply with best management practices and recommendations of manufactures and MSDS requirements.

7.) Pre-Construction Conference:

The Contractor shall attend a pre-construction conference so that all parties are fully aware of the terms and conditions of this contract.

8.) Dig Safe Law:

The Contractor is required by law to contact Dig Safe and local water/sewer utilities at least 3 business days prior to beginning any excavation work. The Dig Safe telephone number is 1-888-DIG-SAFE.

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SECTION 01030
ABBREVIATIONS AND SYMBOLS

01030.01 GENERAL

The following abbreviations may be used in these contract documents:

AASHTO	American Association of State Highway and Transportation Officials	FRP	Fiber Reinforced Plastic
AC	Asbestos-Cement (transite)	GFI	Ground Fault Interrupter
ACI	American Concrete Institute	gpd	Gallons Per Day
AISC	American Institute of Steel Construction	gpm	Gallons Per Minute
ANSI	American National Standards Institute	HDPE	High Density Polyethylene
ARRA	American Recovery & Reinvestment Act-2009	ISA	Instrument Society of America
ASA	American Standards Association	MDOT	Maine Department of Transportation
ASCE	American Society of Civil Engineers	MGD	Million Gallons Per Day
ASHRAE	American Society of Heating, Refrigerating, and Air Conditioning Engineers	MJ	Mechanical Joint
ASME	American Society of Mechanical Engineers	MUTCD	Manual of Uniform Traffic Control Devices
ASTM	American Society for Testing and Materials	NEC	National Electrical Code
AWWA	American Water Works Association	NEMA	National Electrical Manufacturers Association
cfm	Cubic Foot Per Minute	NPT	National Pipe Thread
cfs	Cubic Foot Per Second	NRS	Non-Rising Stem
CI	Cast Iron	O.C.	On Center
CJ	Control Joint	OSHA	Occupational Safety & Health Administration
CMP	Corrugated Metal Pipe	OS&Y	Outside Screw and Yoke
CMU	Concrete Masonry Unit	PCA	Portland Cement Association
CPE	Corrugated Polyethylene	PE	Polyethylene
CPVC	Chlorinated Polyvinyl Chloride	ppm	Parts Per Million
DIPRA	Ductile Iron Pipe Research Association	psi	Pounds Per Square Inch
DIPS	Ductile Iron Pipe Size	psig	Pounds Per Square Inch Gage
CRSI	Concrete Reinforcing Steel Institute	PVC	Polyvinyl Chloride
CSI	Construction Specifications Institute	RECD	Rural Economic and Community Development (now called USDA-Rural Development)
CTS	Copper Tube Size	RCP	Reinforced Concrete Pipe
DEP	Maine Department of Environmental Protection	SF	Square Feet
DHHS	Maine Department of Health and Human Services	SS	Stainless Steel
DI	Ductile Iron	UD	Underdrain
EPA	U.S. Environmental Protection Agency	U.L.	Underwriters Laboratory
F.M.	Factory Mutual	VC	Vitrified Clay
FmHA	Farmers Home Administration (now called USDA-Rural Development)		
fps	Feet Per Second		

Where reference is made to a publication by one of the above mentioned or other association, it is understood that the latest revisions thereof shall apply unless otherwise designated. In case of conflict, the contract documents will take precedence over the above references.

SECTION 01106
SUBSTITUTIONS OR "OR-EQUAL" ITEMS

01106.01 GENERAL

This specification supplements the substitutions section of the general conditions.

01106.02 MATERIALS AND EQUIPMENT

Whenever materials or equipment are specified or described in the contract documents by using the name of a proprietary item or the name of a particular supplier, the naming of the item is intended to establish the type, function and quality required. Unless the name is followed by words indicating that no substitution is permitted, materials or equipment of other suppliers may be accepted by ENGINEER if sufficient information is submitted by CONTRACTOR to allow ENGINEER to determine that the material or equipment proposed is equivalent or equal to that named.

The procedure for review by ENGINEER will include the following as supplemented in the general conditions. Requests for review of substitute items of material and equipment will not be accepted by ENGINEER from anyone other than CONTRACTOR. If CONTRACTOR wishes to furnish or use a substitute item of material or equipment, CONTRACTOR shall make written application to ENGINEER for acceptance thereof, certifying that the proposed substitute will perform adequately the functions and achieve the results called for by the general design, be similar and of equal substance to that specified and be suited to the same use as that specified. The application will state that the evaluation and acceptance of the proposed substitute will not prejudice CONTRACTOR's achievement of Substantial Completion on time, whether or not acceptance of the substitute for use in the Work will require a change in any of the contract documents (or in the provisions of any other direct contract with OWNER for work on the Project) to adapt the design to the proposed substitute and whether or not incorporation or use of the substitute in connection with the Work is subject to payment of any license fee or royalty. All variations of the proposed substitute from that specified will be identified in the application and available maintenance, repair and replacement service will be indicated. The application will also contain an itemized estimate of all costs that will result directly or indirectly from acceptance of such substitute, including costs of redesign and claims of other contractors affected by the resulting change, all of which shall be considered by ENGINEER in evaluating the proposed substitute. ENGINEER may require CONTRACTOR to furnish at CONTRACTOR's expense additional data about the proposed substitute.

01106.03 MEANS, METHODS, TECHNIQUES AND PROCEDURES

If a specific means, method, technique, sequence or procedure of construction is indicated in or required by the contract documents, CONTRACTOR may furnish or utilize a substitute means, method, sequence, technique or procedure of construction acceptable to ENGINEER, if CONTRACTOR submits sufficient information to allow ENGINEER to determine that the substitute proposed is equivalent to that indicated or required by the contract documents. The procedure for review by ENGINEER will be similar to that provided in paragraph 01106.02 as applied by ENGINEER and as may be supplemented in the general conditions.

01106.04 ENGINEER'S REVIEW OF SUBSTITUTIONS

ENGINEER will be allowed a reasonable time within which to evaluate each proposed substitute. ENGINEER will be the sole judge of acceptability, and no substitute will be ordered, installed or utilized without ENGINEER's prior written acceptance which will be evidenced by either a Change Order or an approved Shop Drawing. OWNER may require CONTRACTOR to furnish at CONTRACTOR's expense a special performance guarantee or other surety with respect to any substitute. ENGINEER will record time required by ENGINEER and ENGINEER's consultants in evaluating substitutions proposed by CONTRACTOR and in making changes in the contract documents occasioned thereby. Whether or not

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ENGINEER accepts a proposed substitute, CONTRACTOR shall reimburse OWNER for the charges of ENGINEER and ENGINEER's consultants for evaluating each proposed substitute.

SECTION 01300
SUBMITTALS

01300.01 GENERAL

Submit to the Engineer shop drawings, project data and samples for all products, materials and equipment proposed for the completed project. A 14-day review period will be required for all submittals. Review of submittals is for general compliance with the contract documents. No responsibility is assumed by the Engineer for the correctness of dimensions or details.

Review of submittals by the Engineer shall not relieve the Contractor from responsibility for any variation from the requirements of the contract documents unless the Contractor has in writing called the Engineer's attention to each such variation at the time of submission and the Engineer has given written approval of each such variation by a specific written notation thereof. The Engineer's review of submittals shall not relieve the Contractor from responsibility for errors or omissions in the shop drawings.

Electronic copies of submittals are acceptable if they are in pdf format and legible. If submitting paper submittals, four (4) copies are required. Illegible copies will be rejected.

01300.02 SHOP DRAWINGS, PROJECT DATA, SAMPLES

All submittals shall bear a note and signature indicating that they were reviewed by the Contractor and found to be in conformance with the contract documents.

Any material or equipment submitted for review which is arranged differently or is 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 result will be compatible with the system or structure as designed.

Submittals for minor materials and equipment may be waived with the written approval of the Engineer.

01300.03 REQUIRED SUBMITTALS

A. Schedule of Values:

When requested by Engineer, submit a schedule of values for each bid item for use in determining partial payments for various bid items.

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B. Construction Schedule:

Submit a time schedule, showing complete sequence of construction by activity, prior to commencement of work. Update the schedule monthly showing changes occurring since previous submission.

Submit plan schedule or plan of work explaining how water service will be maintained to the Service Center.

Distribute copies of reviewed schedules to subcontractors and other concerned parties. Instruct recipients to report any inability to comply and provide detailed explanation with suggested remedies.

C. Erosion and Sediment Control Plan:

Submit a detailed erosion and sediment control plan showing materials, methods, and locations of proposed erosion and sediment control measures.

SECTION 01400
QUALITY CONTROL

01400.01 GENERAL

The Contractor shall at all times be responsible for maintaining all disturbed areas of the job site. This is to include periods of work suspended due to cold weather. When the Owner recognizes defective conditions he shall notify the Engineer who will in turn notify the Contractor. The Contractor will be given a reasonable amount of time, depending on the degree of the problem, to correct the condition. Examples of defective conditions shall include, but not necessarily be limited to, trench settlement, erosion, pot holes, washouts, etc.

01400.02 CONSTRUCTION MATERIALS

It is the Contractor's sole responsibility to provide and use only new materials, new products and new equipment that meet the requirements of the plans and specifications and will result in a completed project that is durable and of high quality in all respects. The Engineer may request samples of any material that the Contractor proposes to use. Such samples shall be of sufficient size and quantity to allow appropriate testing of the sample. The Owner shall bear all cost of obtaining and providing such sample. The Owner shall bear all cost of testing the sample. However, if testing shows that a sample does not meet the requirements of the plans and specifications, the Contractor shall reimburse the Owner for all costs incurred by the Owner as a result of testing the sample.

The Contractor shall provide equipment and parts from a single manufacturer to the greatest extent possible. This is to facilitate ease of service, maintenance and parts replacement. Engineer reserves the right to reject proposed equipment from various manufacturers if suitable materials are available from fewer manufacturers, and to require that source of materials be unified to the maximum extent possible.

01400.03 CONSTRUCTION REVIEW

The Owner or Engineer or his representative will provide whatever Construction Review that he feels is necessary. Such Construction Review in no way reduces the Contractor's responsibility for supervision or quality control. The Contractor shall cooperate fully in the Owner's or Engineer's Construction Review efforts. The Contractor shall keep the Engineer informed of work in progress as well as the schedule of work to be done. The Contractor shall allow complete access to the project by the Owner, Engineer, and any representatives of any regulatory or funding agencies. The Engineer will not be responsible for the construction means, controls, techniques, sequences, procedures, or construction safety.

01400.04 TESTING

The Contractor shall perform all testing specified in the contract documents unless the test is specifically noted to be done by the Owner or Engineer. The Contractor shall notify the Engineer at least 48 hours in advance of any proposed testing or disinfection, and obtain approval for the proposed testing time. Testing and disinfection times must be coordinated with the Engineer so that samples can be delivered to labs and tested properly. In general, Fridays and weekends are not acceptable times for testing and sampling.

The Owner shall collect all bacteriological samples and deliver them to the lab.

SECTION 01650
PROJECT DRAWINGS

01650.01 GENERAL

The drawings contained in the list on the Title Sheet of the Project Drawings are a part of these contract documents. If a conflict exists between the drawings and the specifications, the specifications shall take precedence. This specification is intended as a guide to interpreting the drawings. Reference made elsewhere in the contract documents to Contract Drawings, Plans or Drawings shall all be taken to mean Project Drawings.

01650.02 LEGENDS

Standard drawing symbols are used where possible on the drawings. The drawings may contain both general and specific legends. A specific legend on a drawing will take precedence over a general or project-wide legend.

01650.03 SCALES

The scale of the drawings will be marked on the individual drawings. Profile drawings are typically drawn with a different horizontal and vertical scale. This will provide for more detail in the profile, however there will also be some distortion and minor direction changes will look much sharper in the profile than they actually are.

01650.04 CONTOUR LINES

Existing contour lines will be shown in the plan view as dashed (or lighter) lines. New or final contour lines will be shown as solid (or darker) lines. The work in the contract includes all cut, fill, and grading required to bring the site grades to the new contour lines.

01650.05 EXISTING UTILITIES/STRUCTURES

The location of all existing structures and utilities shown on the plans are approximate. The structures and utilities were located using reasonable methods such as locating pipes at manholes, catch basins, gate valves and daylights. The location of pipes shown between these points shall be considered approximate and care shall be exercised when working near them or when excavations approach them.

Existing Utilities are covered in detail in Section 02020.

SECTION 01655
AS-BUILT RECORDS

01655.01 GENERAL

Maintain accurate as-built records throughout the construction project. A complete bound copy of these as-built records shall be delivered to the Engineer before final payment is made. The Engineer will supply the Contractor with the needed plans and forms. The Contractor shall complete the drawings and records.

01655.02 AS-BUILT DRAWINGS

The Contractor shall maintain a set of the construction drawings on the site at all times for the purpose of recording the actual configuration of the final work. The drawings shall show in a neat and legible fashion the final configuration of the constructed project, existing utilities, ledge, etc.

01655.03 MANUFACTURER'S LITERATURE

The Contractor shall submit copies of manufacturers' literature to the Engineer for inclusion in the project Operations and Maintenance Manual. The literature shall include installation instructions, warranty certificates, operating instructions, maintenance instructions, maintenance schedules and other relevant data.

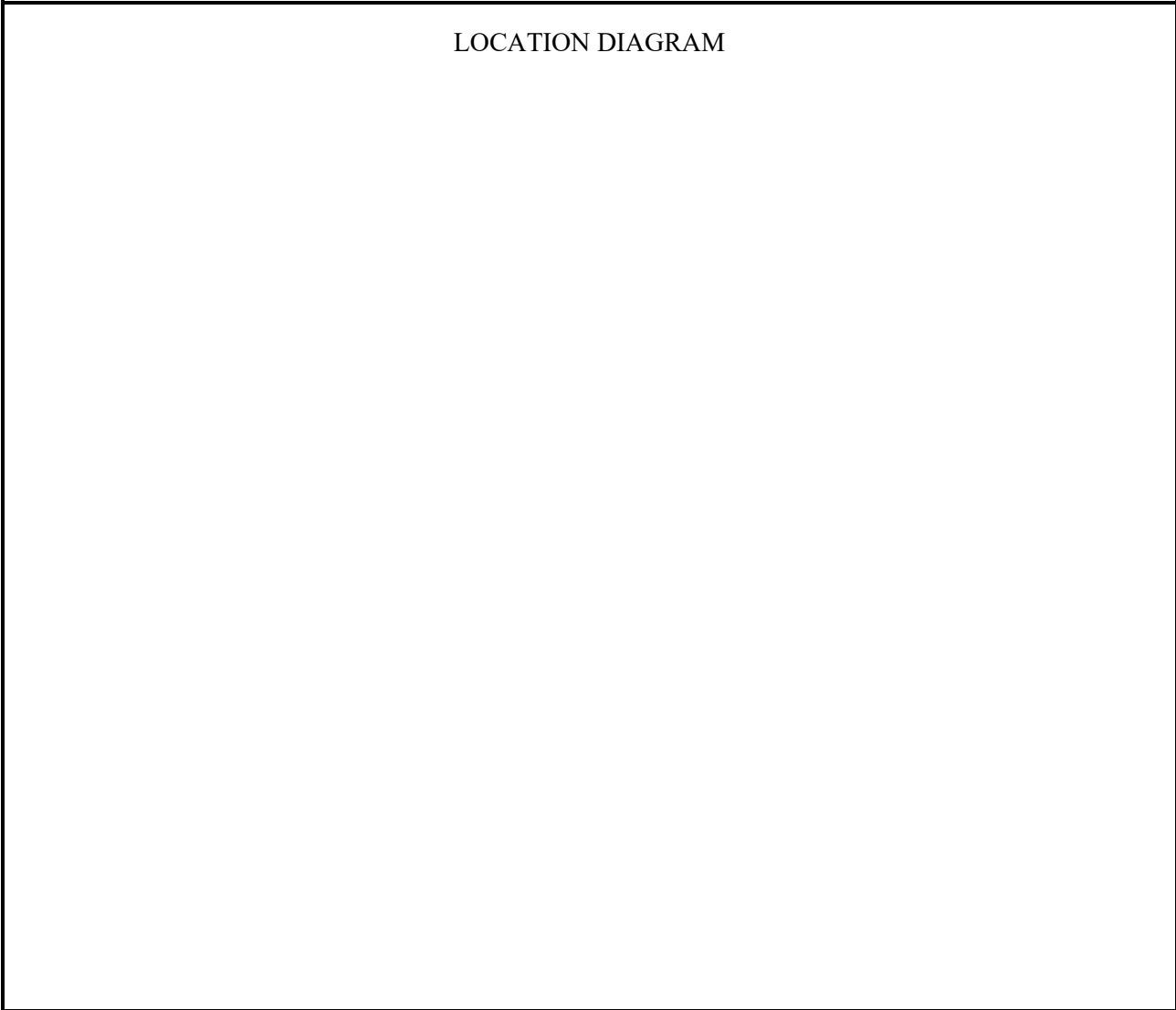
01655.04 UTILITY LOCATIONS

The Contractor shall maintain a neat and accurate bound utility location book on the site at all times for the purpose of recording the location and arrangement of all manholes, catch basins, valves, tees, bends, fittings, service corporations, curb stops, couplings, sewer service tees, ends of sewer services, repairs, etc. The type of pipe and depth shall be noted. Before payment for any work shall be authorized, Utility Location Sheets shall be supplied to the Engineer for any work for which the Contractor is requesting payment.

The Engineer will supply the Contractor with a bound book containing the attached form. The Contractor shall be responsible for all labor to complete the utility locations.

UTILITY LOCATION SHEET

Utility: _____ Street: _____
Project: _____ Dwelling No.: _____
Project Contractor: _____ Occupant: _____
_____ Date: _____
Located By: _____ Station _____



Remarks: Depth of cover: _____ Type & Size: _____

SECTION 01710
TEMPORARY SERVICES AND CONNECTIONS

01710.01 GENERAL

Furnish all labor, materials and equipment required to provide temporary connections, temporary relocations and temporary service required for completion of the project. Temporary services and connections shall be incidental to the overall conduct of the work and shall be included in the individual items at the Contractor's option per Section 01150.02.

All components and materials that will be in contact with the water shall be certified to be in compliance with ANSI / NSF Standard 61. This includes but is not limited to piping, valves, fittings, pumps, tanks, meters, and other appurtenances, etc.

01710.02 TEMPORARY CONNECTIONS

The Contractor shall be responsible for maintaining water service to the Park at all times. If temporary water service is required it shall be installed at the Contractor's expense.

All temporary piping shall be disinfected by the Contractor and approved by the water system operator prior to being put into service. All temporary piping and taps shall be removed once the temporary services are no longer needed.

The Contractor shall make all temporary connections necessary for the proper completion of the project. The temporary connections shall be maintained by the Contractor until no longer needed and then they shall be removed with fittings properly capped and holes properly plugged. All temporary piping shall be disinfected by the Contractor and approved by the water system operator prior to being put into service. All temporary piping and taps shall be removed once the temporary connections are no longer needed.

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DIVISION 2
SITE WORK

General

Potable Water Contact 02001
Existing Utilities 02020

Sitework

Earth Work 02101

Water Systems

Water Line Testing and Disinfection 02720
Water Main Disinfection 02721
Domestic Plumbing Disinfection 02722
Polyethylene Tubing 02735

SECTION 02001
POTABLE WATER CONTACT

02001.01 GENERAL

All components and materials that will be in contact with the finish water when the project is complete shall be certified to be in compliance with ANSI/NSF Standard 61. This includes but is not limited to piping, valves, fittings, pumps, tanks, meters, and other appurtenances, etc.

SECTION 02020
EXISTING UTILITIES

02020.01 DEFINITIONS

“utilities” - is defined in Section 02020 as physical property such as pipes, cables or structures used for water, sewer, storm drain, electrical, telephone, communications, cable TV, etc. This also includes signs, sign posts, light posts, fences, etc.

“Association” - is defined in Section 02020 as public or private organizations which own, maintain or service "utilities."

02020.02 GENERAL

The Contractor is required by law to contact Dig Safe and local water/sewer “Associations” at least 3 business days prior to beginning any excavation work. The Dig Safe telephone number is 1-888-DIG-SAFE.

The Engineer has made a careful attempt to locate all existing "utilities" that are in the area of the project. These are shown on the Contract Drawings. Interferences that are shown on the Contract Drawings shall be corrected at the Contractor's expense. The locations of the existing utilities shown on the plans were compiled from field survey and various other sources. Locations are approximate and not guaranteed to be accurate nor is it guaranteed that all utilities are shown.

02020.03 WATER MAINS, SEWER MAINS AND UNDERGROUND CABLES

Prior to starting work on any portion of the project the Contractor shall give sufficient notice to all applicable "Associations" so that they may mark the location of their “utilities.” The Contractor shall also inspect the area to verify the location of "utilities" shown on the plans and to check for any oversights or discrepancies. If "utilities" are located which are not shown on the plans, the Contractor shall notify the Engineer so that adjustments can be made if necessary to eliminate any conflict with the new work.

The Contractor shall follow responsible excavation practices at all times. When approaching a buried “utility,” manual excavation shall be used to locate them. It is the Contractor's responsibility to provide undisturbed maintenance for all structures that may be affected by the excavation. This includes structures both above and below grade. In instances where excavations are made in close proximity to utility poles or other structures, it shall be the contractor’s responsibility to notify the “Associations” and to provide support for the poles while the excavation is being done. Any costs associated with this shall be borne by the Contractor.

If “utilities” are interrupted, the Contractor shall immediately notify the “Association.” The “Association” shall inspect the damage and make suitable repairs or instruct the Contractor to make suitable repairs. If a “utility” is shown on the drawings, located by an “Association” or could have been located by the Contractor by a simple inspection of the site, then the cost of any needed repairs, including materials and labor shall be borne by the Contractor. If a “utility” not shown on the plans, not located by an “Association” or not able to be located by the Contractor by a simple site inspection is accidentally damaged, the cost of repairs shall be borne by the Owner.

In all cases, satisfactory backfilling and maintenance of the trench is the Contractor's responsibility. The Engineer and the “Association” shall inspect all repairs by the Contractor to broken or damaged “utilities.” Approval of the repairs must be obtained by the Contractor prior to covering the work. The Contractor shall remain responsible for the integrity of broken “utilities” even after the work has been backfilled. The Owner has complete authority to stop work if the Contractor is doing excessive damage to “utilities,” appropriate repairs are not being made, or other precautions are not being taken to minimize damage to existing “utilities.”

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The Contractor shall not make any claims against the Owner for delays in the progress of his work that are less than one day in duration and are caused by an interference not shown on the Contract Drawings. A delay shall exist when the work cannot progress because of an interference and no other work on the project is available for the men and machinery at that time. If the delay lasts more than one day, the Contractor may be compensated, based on hourly payroll and equipment rental rate, by the Owner for the actual costs for each day after the initial day. Compensation will not be based on the amount of work that might have been accomplished.

02020.04 OVERHEAD UTILITIES, UTILITY POLES, SIGNS AND SIGN POSTS

The Contractor shall follow responsible excavation practices at all times. When approaching an overhead “utility”, caution shall be used to avoid damage. It is the Contractor’s responsibility to provide undisturbed maintenance for all structures that may be affected by the excavation. This includes structures both above and below grade. In instances where excavations are made in close proximity to utility poles or other structures, it shall be the Contractor’s responsibility to notify the “Associations” and to provide support for the poles while the excavation is being done. Any costs associated with this shall be borne by the Contractor.

Do not remove structures without receiving approval of party having jurisdiction. Reinstall structures to satisfaction of party having jurisdiction.

02020.06 REPAIRS TO EXISTING UTILITIES

The methods and equipment to complete repairs must be approved by the Association and Engineer. In general, the following methods of connecting and repairing pipes shall apply:

Water Mains:

Fittings made specifically for the pipe materials used.

Water Services:

Brass compression couplings; cast couplings; fittings made specifically for the pipe materials used. Connections to PE tubing shall utilize SS inserts and brass compression couplings.

SECTION 02101
EARTH WORK

02101.01 GENERAL

Supply all labor, materials and equipment necessary to perform all earth work for the project.

The following subsections are included in this specification:

02101.02	Construction Methods
02101.03	Site Preparation
02101.04	Excavation
02101.05	Borrow and Bedding Material
02101.06	Backfilling
02101.07	Cleanup
02101.08	Erosion Control

02101.02 CONSTRUCTION METHODS

The Contractor shall use responsible and safe construction and excavation practices. The Contractor shall verify the condition of the site and neighboring properties and structures prior to beginning work. The Contractor shall use construction methods and equipment of the appropriate size so as to not produce damage, excessive noise, or vibrations on neighboring properties.

Monitoring of vibrations from site work, excavation, and compaction procedures shall be done by the Contractor. It is recommended that the Contractor complete a pre-work survey of the site and neighboring properties to document their condition and determine what construction methods are appropriate.

02101.03 SITE PREPARATION

A.) General

Supply all labor, materials and equipment necessary to prepare the site for excavation and/or construction. Site Preparation includes layout, clearing, grubbing, and stripping. Before removing any structure or vegetation, the Contractor shall obtain approval of the party having jurisdiction. Prior to beginning any excavations in paved areas the pavement shall be cut at the limits of the excavation.

B.) Clearing

Cut and remove all trees, brush, and undergrowth in areas designated for clearing. Protect all vegetation outside the limits of the areas designated and any trees or vegetation so designated within the area. The Engineer shall be contacted prior to removal of any trees within the site boundaries. Any branches which must be removed from standing trees shall be removed in accordance with established arborists' practices. All scars and cuts in standing timber shall be painted with tree paint. Dispose of all removed vegetation in a satisfactory manner.

C.) Grubbing

Remove all material, both natural and man-made, in the areas designated on the plan for excavation and/or construction. This includes roots, stumps, rocks, boulders, pavement, curbing and other structures.

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Material which is amenable to reuse shall be stored. Unsuitable or excess material shall be removed and properly disposed of by the Contractor.

D.) Stripping

In areas to be stripped, the Contractor shall strip the surface and top soil to a sufficient depth to expose a uniform subgrade of soil.

Top soil which is amenable to reuse shall be stored. Unsuitable or excess top soil shall be removed and properly disposed of by the Contractor.

02101.04 EXCAVATION

A.) General

Furnish all labor, equipment and materials necessary to provide all excavation for trenches, construction, utility installation, foundations and subsurface structures. All excavation shall be classified as either earth excavation or ledge excavation.

Earth excavation shall consist of removal of all grades of soil and rock sufficiently friable to be worked with an excavator. This shall include any other material less than three cubic yards in volume.

Ledge excavation shall consist of blasting, removal, and replacement of all material not classified as earth and greater than three cubic yards in volume.

B.) Excavation Practices

The Contractor is responsible for establishing and practicing safe construction and excavation practices at all times. The Contractor shall keep himself informed of all safety regulations and comply with them at all times. The Contractor shall provide all sheeting, shoring, bracing, and cofferdamming necessary to insure the stability of the sides of the excavation.

Information on underground structures and utilities shown on the plans is not guaranteed for accuracy nor completeness, therefore, when excavation approaches such utilities, manual excavation shall be used to locate them. The Contractor shall be held liable for responsible excavating practices throughout the project. This responsibility shall include the undisturbed maintenance of all structures and utilities, above or below grade, which may be affected by the excavation.

C.) Excavation Methods

Excavate all trenches to the depth required for the installation of the utility and appropriate bedding. All structure excavation shall provide sufficient working area to construct the structure. Excavated material shall not be placed on pavement. The Contractor shall at all times keep the excavation free of water and saturated soil. Water removed from the excavation shall be disposed of in accordance with all applicable environmental regulations and so as not to interfere with adjacent areas. The bottom of the excavations shall be kept dewatered and firm at all times. No excavations shall be continued into fill material which has been on-site less than 12 months without review and approval of a Geotechnical Engineer.

The Contractor shall not have any right of property on any excavated material. The Contractor shall remove and properly dispose of excess excavated material. When requested by the Owner (prior to final disposal), this material shall be delivered to an Owner specified site within a three (3) mile radius of the loading point. Otherwise it shall be the Contractor's responsibility to find and utilize a

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proper disposal site. Removal, transportation and disposal of excess excavated material or unwanted abandoned utilities shall be done at the Contractor's expense.

All trenches shall be closed at the end of each construction day and the surface restored, unless specifically authorized by the Engineer.

D.) Over Excavation

Any excavation beyond the prescribed limits for construction or utility installation shall be filled with crushed or screened stone to the necessary grade at the Contractor's expense. This shall include the removal of overblasted ledge.

E.) Unsuitable Material

The Engineer shall have the right to reject material as unsuitable for backfill. Any such material shall be transported from the site and disposed of properly. Cost of the transportation and disposal of unsuitable earth excavation shall be at the supplemental unit price for Disposal (per Section 02150). Cost of material, installation and compaction of replacement material shall be at the unit price for the borrow specified by the Engineer (per Section 02150). No additional amounts will be paid for excavation of unsuitable material that is in the normal excavation area.

All ledge excavation shall be classified as unsuitable material. Cost of the removal, disposal and replacement of unsuitable ledge excavation shall be incidental to the price for Ledge Excavation.

Excavated old utility materials (pipe, fittings, valves, culverts, wire, conduit, manhole or basin pieces and covers) shall not be utilized in backfill. Such materials shall be removed from the site by the Contractor and disposed of properly (unless specified otherwise on the plans). Cost of removal, disposal and replacement material for these items shall be incidental to the cost of the project.

When so directed by the Engineer, the Contractor shall excavate unsuitable material below the bottom of the trench and backfill to grade with the specified borrow. Cost of excavation, disposal and borrow shall be at the supplemental unit prices (per Section 02150).

F.) Blasting and Ledge Excavation

The Contractor shall remove all overburden from any ledge encountered and shall not remove any ledge until the Engineer has measured its volume. At the Engineer's option, the Contractor may be allowed to predrill trench ledge for measurement and blasting. Ledge that has been previously fractured and broken shall not be classified as ledge excavation.

All blasting shall comply with all federal, state, and local regulations. The blasting contractor shall have a pre-blast survey completed of all structures within 300 feet of the work area prior to beginning work. Prior to blasting a site plan showing all properties surveyed shall be delivered to the Engineer. Vibration monitoring shall be done by the blasting contractor during all blasting. Warning signs shall be posted whenever blasting occurs. No blasting shall be permitted without blasting mats or sufficient soil overburden.

All ledge shall be classified as unsuitable material for backfill. All ledge shall be replaced with borrow (per Section 02101.05) and the cost of this replacement material shall be considered incidental to the ledge removal cost.

G.) Rights-of-Way

The Contractor shall maintain clear passage along all rights-of-way affected by the construction. No permanent rights-of-way shall be closed without prior written approval of the proper civil authorities.

H.) Protection of the Public

Improved streets, roads, driveways and sidewalks shall be kept open over or around all trenches and excavations and the use of these rendered safe for public use, as required by OSHA. All open excavations, if allowed, equipment and materials encroaching on rights-of-way shall be clearly marked by barricades and flashing yellow lanterns from dusk to dawn.

02101.05 BORROW AND BEDDING MATERIAL

A.) General

Furnish all materials, equipment and labor necessary to place and compact all required borrow and bedding. Optimum moisture content shall be as determined by the modified proctor test.

All borrow and bedding shall be free of frozen material, peat, rubbish, and other debris and other material described as unsuitable in Division 2.

B.) Common Borrow

Common borrow shall consist of earth suitable for fill or embankment construction. It shall meet the following criteria:

Moisture content	less than 4% above optimum
Particle size	75 mm - .005 mm
D 10(effective size)	.06 mm - .04 mm
Uniformity coefficient	6 - 10

C.) Sand Borrow

Sand borrow shall be sand of hard durable particles free from vegetable matter, lumps or balls of clay and other deleterious substances. The gradation shall meet the grading requirements of the following table.

Sieve Designation	% by Weight Passing
3/8 inch	85-100
No. 200	0-5

D.) Gravel Borrow

Gravel borrow shall consist of uniformly graded granular material and shall be free from vegetable matter, lumps or balls of clay and other deleterious substances. The maximum stone size is 6". The gradation of the part that passes a 3 inch sieve shall meet the requirements of the following table.

Sieve Designation	% by Weight Passing
1/4"	<70
No. 200	<10

E.) Base Gravel

Base gravel shall be screened or crushed gravel of hard durable particles free from vegetable matter, lumps or balls of clay and other deleterious substances. The maximum stone size is 6". The gradation of the part that passes a 3 inch sieve shall be an even gradation and meet the requirements of the following table.

Sieve Designation	% by Weight Passing
1/4"	25-70
No. 40	0-30
No. 200	0-5

F.) Surface Gravel for Gravel Roads

Surface gravel for gravel roads shall be screened or crushed gravel of hard durable particles free from vegetable matter, lumps or balls of clay and other deleterious substances. The maximum stone size is 3/4". The gradation shall meet the requirements of the following table.

Sieve Designation	% by Weight Passing
3/4"	100
No. 4	50-78
No. 8	37-67
No. 40	13-35
No. 200	4-15
Plasticity Index (PI)	4-12

G.) Surface Gravel for Paved Areas

Surface gravel for paved areas (crushed gravel) shall be gravel that has been screened or crushed. Crushed gravel shall consist of hard durable particles free from vegetable matter, lumps or balls of clay and other deleterious substances. The gradation shall meet the requirements of the following table.

Sieve Designation	% by Weight Passing
3/4"	90-100
No. 4	40- 65
No. 10	10- 45
No. 200	0- 7

H.) Screened Stone

Screened stone shall consist of clean, hard, durable stone particles. It shall be screened and contain uniformly graded stone particles ranging in size from 10 to 20 mm unless otherwise specified. Screened stone shall be free of fine gravel, sand, dirt, vegetation, disintegrated or laminated soils, and other unsuitable material.

I.) Crushed Stone

Crushed stone shall consist of clean, hard, durable stone fragments. It shall be crushed and contain uniformly graded stone fragments ranging in size from 20 to 30 mm unless otherwise specified. Crushed stone shall be free of fine gravel, sand, dirt, vegetation, disintegrated or laminated soils, and other unsuitable material.

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J.) Flowable Fill

Flowable fill (controlled low strength material) shall be a cementitious backfill mixture with low strength, flowable characteristics. The late age strength of the flowable fill shall be in the range of 50 to 150 psi to allow it to be excavatable at a future time, if necessary. The flowable fill shall have early setting and strength additives to allow for traffic and construction loads. The flowable fill shall be delivered in ready mixed concrete trucks and placed by chute in a flowable condition into the prepared void or trench.

K.) Concrete Fill

Concrete fill shall have a minimum 28-day compressive strength of 2000 psi.

L.) Placement and Compaction

Crushed or screened stone shall be placed in lifts which will compact to a 6" maximum layer. Gravel and borrow shall be placed in 12" maximum lifts. All placement and compaction of borrow and bedding shall comply with Subsection 02101.06 Backfilling.

02101.06 BACKFILLING

A.) General

Furnish all labor, equipment, and material necessary to completely fill all excavations. Backfilling shall be defined as replacement and compaction of soil in excavation for the purposes of protecting underground construction, maintaining grades, or providing stable foundation material for above ground construction.

B.) Material

Generally the excavated soil shall be suitable as backfill and shall be replaced in the excavation. Exceptions include frozen fill, fill containing large stones, stumps or other rubble, and any material deemed unsuitable by the Engineer. Unless noted otherwise on the plans, all backfill within 3 feet of all foundation/frost walls shall be clean gravel (6" max stone size; 1" minus max. stone within 12" of walls & slabs).

Replacement material for ledge shall be considered incidental to the ledge removal cost.

C.) Backfilling Methods

Backfilling shall proceed as soon as possible after underground construction has been completed. Backfill shall be extended to the grade indicated on the plans, compacted and graded.

Fill material shall be placed in layers not to exceed 12" and compacted to a density equal to at least 95% of the optimum density determined by the modified proctor test. Compacting may be done by vibrating compactor or roller.

The Contractor shall take care not to damage or disturb any structure, including his own, during backfilling and compaction. The Contractor shall be held liable for any such damage.

Excavations in paved areas shall be paved according to specifications as soon as possible. Other areas shall be loamed and seeded or otherwise restored to a condition equal to or better than that of adjacent areas as soon as possible.

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The Contractor shall not withdraw any sheeting without the approval of the Engineer. All voids created by such removal shall be filled and compacted. Any backfilling which does not conform to these specifications, or which settles differentially, shall be excavated to a depth sufficient to correct the problem and refilled as required. Any pavement or structure which is damaged due to settlement of backfill shall be repaired by the Contractor at his expense.

02101.07 CLEANUP / SITE RESTORATION

Maintain all work areas and all haul routes in a neat and orderly condition. Cleanup/site restoration is incidental to the appropriate items of the contract.

Remove all debris and surplus material resulting from the work, and maintain all property, both public and private, in a condition acceptable to the party having jurisdiction.

Cleanup/site restoration includes; removal of all debris and surplus material; replacement and repair of all removed or damaged structures, properties and vegetation to their pre-construction condition; restoration of areas to final grade and contour.

Cleanup of trench areas shall be done concurrently with pipe installation (on a daily basis). When notified by the Owner and/or Engineer that cleanup is not acceptable, pipe installation shall cease and all efforts shall center on cleanup. No compensation shall be paid the Contractor because of the stopping of the pipe installation for cleanup.

02101.08 EROSION CONTROL

A.) General

Furnish all labor, equipment and materials necessary to prevent erosion and sedimentation from occurring on or adjacent to the construction site and areas disturbed by construction. Erosion and sedimentation control measures shall be in conformance with Maine DOT and Maine DEP Best Management Practices.

Develop and submit copies of project work plan and proposed Erosion and Sediment Control Plans.

Provide erosion control measures as required for the construction activity whether or not they are shown on the design plans or Contractors work plans. Any measures shown on the plans shall be considered minimal only. Provide measures to comply with the applicable Best Management Practices.

The Contractor shall be responsible for providing erosion and sediment control during construction and for establishing permanent measures (surface restoration). Erosion control shall be considered incidental to appropriate items of the Contract.

Erosion and sediment control shall be done concurrently with construction (on a continual basis). When notified by the Owner and/or Engineer that erosion and sediment control is not acceptable, construction shall cease and all efforts shall center on erosion and sediment control. No compensation shall be paid the Contractor because of the stopping of construction for erosion and sediment control.

B.) Regulations and Permit Conditions

Comply with all applicable regulations and permit conditions. If additional permits are needed for proposed work or work methods, obtain them and comply with all requirements.

C.) Minimum Material Specifications

Erosion control blankets, when required, shall be as specified in Section 02675. Hay bales shall have minimum dimensions of 18" x 18" x 3'-6" and shall weigh at least 40 lbs. Erosion control fence shall be Envirofence by Mirafi, Inc., Charlotte, NC, or approved equal. The fencing shall have the following properties: grab strength of 120 lbs., grab elongation of 30% (max), water flow rate of 40 gal/min/S.F., and ultraviolet stability of 90%. The fabric width shall be 3 ft. and post length shall be 4.5 ft. The post spacing shall be 7.7 ft. The fence fabric shall be securely stapled to the stakes. Stone for stone check dams shall be as specified by Maine Department of Transportation for trench drain construction. Catch basin inserts shall be Hi-Flow Siltsack by ACF Environmental, or approved equal.

All materials on the project shall be new per Section 01400. The Engineer may accept erosion control fence that has been used on previous projects if it meets this specification and the fence is in good and serviceable condition.

D.) Erosion Control Methods

Install erosion control methods as shown on the design plans and on the Contractors Erosion Control Plan. Install methods according to Best Management Practices and manufactures latest recommendations.

E.) Trench Water

Prevent erosion and sedimentation when discharging trench water. Utilize control structures and Best Management Practices when discharging trench water. Utilize sedimentation control basins, sediment containment devices, filtration socks, filtration bags, or other appropriate control methods. Do not directly discharge to surface water or drainage systems.

F.) Maintenance and Removal

Maintain erosion control measures until final surface restoration has been established. Provide additional measures as project progresses if existing measures are inadequate. Carefully remove materials that are not intended to be permanent (such as erosion control fence) when they are no longer needed.

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SECTION 02720
WATER LINE TESTING & DISINFECTION

02720.01 GENERAL

Furnish all labor, materials and equipment required to test all water lines as specified in the contract documents.

02720.02 WATER PRESSURE TESTING

The testing methods described in this section are specific for water-pressure testing. These procedures should not be applied for air-pressure testing because of the serious safety hazards involved. Air-pressure testing is not allowed.

02720.03 TESTING PROCEDURE

Install and backfill the line leaving all joints and connections secured and exposed. Each valved section of pipe shall be slowly filled with water and all air shall be expelled from the pipe. Flush all water lines prior to testing.

After expelling all air from the main and properly flushing it, the line shall be pressurized to pump shutoff head. All exposed pipe, fittings, valves, and joints shall be examined carefully during the test. Any damaged or defective pipe, fittings, valves or joints that are discovered during the pressure test shall be repaired or replaced with sound material, and the test shall be repeated. Leave all connections exposed until pipe has been pressurized for at least 10 minutes and examine carefully for any signs of leakage. Visible leakage from joints and connections shall not be allowed.

02720.04 DISINFECTION

External water lines from the wells to the pump station shall be disinfected per Section 02721. All other piping shall be disinfected per Section 02722.

02720.05 BACTERIOLOGICAL TESTING

After final flushing and before the water main is placed in service, initial samples shall be collected from the water main for bacteriological testing per State of Maine regulations and AWWA specifications. Twenty-four (24) hours after collecting the initial samples, confirmation samples shall be collected. The tests shall be done in accordance with Standard Methods and shall be done by a State Certified Laboratory. If both the initial and confirmation tests show that the samples meet State coliform and bacteria standards then the main shall be placed in service.

If the initial tests fail, the main shall be re-flushed and resampled. If these tests fail, the main shall be re-chlorinated and the process repeated at the Contractor's expense until satisfactory results are obtained. The Engineer will collect the bacteriological samples and provide the testing.

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SECTION 02721 WATER MAIN DISINFECTION

02721.01 GENERAL

Furnish all labor, materials and equipment required to disinfect all water mains as specified in the contract documents. All water mains shall be disinfected prior to acceptance. All work under this Section shall comply with AWWA C-651 except as herein specified. The cost of disinfection is incidental to pipe installation.

02721.02 QUALIFICATIONS AND NOTIFICATIONS

The Testing Contractor and personnel shall be approved by the Owner and Engineer. All disinfection shall be done in the presence of the Engineer. The Contractor shall notify the Engineer at least 48 hours in advance of any disinfection.

02721.03 TAPS AND APPARATUS

All taps and apparatus required for testing and disinfection shall be the responsibility of the Contractor per Sections 02720 and 02721. Provide taps at each high spot for expelling air. Provide taps as close to the beginning and end of the tested section as possible for injecting chlorine solution, flushing, sampling for chlorine residual and bacteriological sampling. Taps to be used for collecting bacteriological samples shall be 0.5" to 1.0", discharges shall be setup to minimize splashing and spray, with smooth clean piping ends and with an accessible ball valve. Hydrants are not acceptable for bacteriological testing.

Chlorine solution for disinfection shall be applied by means of a pump connected to the pipe in a manner satisfactory to the Owner and Engineer. The pump, piping, connections and all necessary apparatus for conducting the test shall be furnished by the Contractor. The Contractor shall furnish and install all necessary caps, plugs, taps, blow-offs, piping and valves needed to flush, test and disinfect the pipe. The Contractor shall remove all tubing and piping from the main once all necessary testing and disinfection has been completed.

02721.04 MAINTENANCE OF SYSTEM PRESSURE AND QUALITY

Coordinate with Owner regarding water system flow and pressure. Utilize approved methods to prevent backflow and cross connections. Pressure Gauges shall be installed on existing pipes that are used to feed water to the new main to allow for pressure monitoring. System pressure shall be maintained at a minimum of 20 psi, or as required by Water Utility.

All valves separating the new main from the existing system shall be kept closed at all times until the main is accepted. Valve operation for flushing, testing, disinfection etc. shall require approval of the Water Utility.

02721.05 PREVENTATIVE MEASURES

Prevent contaminating materials from entering the pipe during installation. Plugs shall be used where necessary during installation of the pipe to prevent the pipe from being contaminated with mud and silt. All gaskets and lubricants shall conform to AWWA standards. In no case shall petroleum based lubricants be used.

02721.06 FLUSHING AND TESTING

The water main shall be flushed and tested prior to disinfection as outlined in Section 02720 WATER MAIN TESTING.

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02721.07 APPLICATION OF CHLORINE

The required method of disinfecting the water main is by uniform continuous injection of a hypochlorite solution into the main while flowing one source. The chlorine shall be fed into the main at a measured rate so that the entire main is chlorinated to a concentration of 50 mg/l. The chlorine shall be retained in the main for at least 24 hours. At the end of 24 hours the chlorine concentration in the main shall be at least 25 mg/l.

The Slug Method and the Tablet Method of disinfection shall not be allowed. Hypochlorite solutions shall utilize sodium hypochlorite (liquid), solutions shall not be mixed from tablets or powdered hypochlorite.

02721.08 FINAL FLUSHING OF MAINS

After the required retention period, the heavily chlorinated water shall be flushed from the main until the chlorine concentration in the main is no higher than water in the system or is acceptable for domestic use. The Contractor shall be responsible for the proper disposal/dechlorination of the highly chlorinated water, per Department of Human Services and DEP regulations.

02721.09 BACTERIOLOGICAL TESTING

After final flushing and before the water main is placed in service, initial samples shall be collected from the water main for bacteriological testing per State of Maine regulations and AWWA specifications. Twenty-four (24) hours after collecting the initial samples, confirmation samples shall be collected. The tests shall be done in accordance with Standard Methods and shall be done by a State Certified Laboratory. If both the initial and confirmation tests show that the samples meet State coliform and bacteria standards then the main shall be placed in service.

If the initial tests fail, the main shall be re-flushed and resampled. If these tests fail, the main shall be re-chlorinated and the process repeated at the Contractor's expense until satisfactory results are obtained.

The Utility District or Engineer will collect the bacteriological samples and provide the testing. A sample is required within 20 feet of each dead-end section and samples are required at 1200 ft. maximum spacing along the piping being tested.

02721.10 FINAL CONNECTIONS

Any pipe section or connection longer than 18 feet shall be capped or plugged and then tested and disinfected per Sections 02720 and 02721.

Final connections shall be as short as possible, but shall not exceed 18 feet in length. Final connections shall be disinfected by spraying or swabbing per AWWA C651-05, 4.6.

SECTION 02722
DOMESTIC PLUMBING DISINFECTION

02721.01 GENERAL

Furnish all labor, materials and equipment required to disinfect all domestic plumbing as specified in the contract documents. All domestic plumbing shall be disinfected prior to acceptance. The cost of disinfection is incidental to pipe installation.

02721.02 QUALIFICATIONS AND NOTIFICATIONS

The Testing Contractor and personnel shall be approved by the Owner and Engineer. All disinfection shall be done in the presence of the Engineer. The Contractor shall notify the Engineer at least 48 hours in advance of any disinfection.

02721.03 CLEANING & DISINFECTION

Clean and disinfect potable domestic water piping as follows (and in accordance with local code and jurisdiction).

1. Purge new piping and parts of existing piping that have been altered, extended, or repaired before using.
2. Use purging and disinfecting procedures prescribed by authorities having jurisdiction; if methods are not prescribed, use procedures described in either AWWA C651 or AWWA C652 or follow procedures described below:
 - a. Flush piping system with clean, potable water until dirty water does not appear at outlets.
 - b. Fill and isolate system according to either of the following:
 - 1) Fill system or part thereof with water/chlorine solution with at least 50 ppm of chlorine. Isolate with valves and allow to stand for 24 hours.
 - 2) Fill system or part thereof with water/chlorine solution with at least 200 ppm of chlorine. Isolate and allow to stand for three hours.
 - 3) Post do-not-use signs at all affected Apartments.
 - c. Flush system with clean, potable water until chlorine is at normal system level.
 - d. Prepare and submit report of purging and disinfecting activities.

02721.04 BACTERIOLOGICAL TESTING

After final flushing and before the plumbing is placed in service, initial samples shall be collected from the water main for bacteriological testing per State of Maine Drinking Water Program requirements.

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f Maine regulations and AWWA specifications. The tests shall be done in accordance with Standard Methods and shall be done by a State Certified Laboratory.

All taps and apparatus required for testing and disinfection shall be the responsibility of the Contractor.

Chlorine solution for disinfection shall be applied by means of a pump connected to the pipe in a manner satisfactory to the Owner and Engineer. The pump, piping, connections and all necessary apparatus for conducting the test shall be furnished by the Contractor.

SECTION 02735
POLYETHYLENE TUBING

02735.01 GENERAL

Furnish and install polyethylene tubing as specified in the contract documents. This specification is applicable for new buried piping. HDPE piping in the well is specified in the well related specifications.

02735.02 MATERIAL

Polyethylene tubing shall be copper tube size butt-fused polyethylene pipe. Pipe size shall be as shown on the drawings. Tubing shall have a working pressure rating of 200 psi. Tubing shall be PE 4710 resin and conform to AWWA C-901-17, and ASTM D-2737.

Insert stiffeners shall be stainless steel and shall be used at all compression connections. Compression connections shall only be used where approved by Engineer. All joints shall be thermal butt-fused.

02735.03 DETECTABLE WARNING TAPE

Install Detectable Warning Tape in trench approximately 2 feet above new water line. Install per manufacturer's recommendation.

Detectable Warning Tape shall have a minimum thickness of 4 mils with a solid aluminum core to ensure continuity. Tape shall be supplied in coils with a minimum width of 2". Tape shall be marked "Water" and shall conform to the APWA color code specifications for underground tape systems. Detectable Warning Tape shall be EJP #91700, or approved equal.

02735.04 INSTALLATION

Installation shall follow the general AWWA Standards and manufacturer's latest recommendations. Polyethylene tubing shall be installed with 8" of clean sand bedding (with 3" minimum of sand below the tubing). Polyethylene tubing shall be installed with 3 feet of cover unless noted otherwise on the plans.

Tubing shall be installed as one length of butt-fused pipe. All connections shall be made with brass (copper pipe packed joint) fittings and insert stiffeners shall be used at all connections.

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DIVISION 11
EQUIPMENT

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SECTION 11001
EQUIPMENT - GENERAL

11001.01 GENERAL

Furnish, install and test all equipment specified in the contract documents.

11001.02 QUALITY ASSURANCE

Provide only new equipment of proven reliability and performance. Acceptable manufacturers are listed for each piece of equipment specified. Certificates, patents, licenses, and other required legalities are specified where applicable for each piece of equipment.

11001.03 SUBMITTALS TO THE ENGINEER

Attention is called to the Shop Drawings and Submittals sections of the General Conditions and of Division 1. Manufacturers' literature and illustrations shall be submitted on all equipment to be installed. Installation instructions, operating data, operating manuals, and maintenance data shall also be submitted.

11001.04 GUARANTEE

Submit the equipment manufacturers' warranty to the Engineer for approval. All materials and workmanship shall also be warranted as specified in the General Conditions.

11001.05 MATERIALS

All standard recommended spare parts, as indicated in the manufacturers' instruction manuals shall be provided for each piece of equipment.

11001.06 DELIVERY, STORAGE AND HANDLING

Deliver equipment according to manufacturers' detailed instructions and/or as specified within the appropriate applicable sections of the specifications.

11001.07 INSPECTION

All equipment will be inspected by the Engineer, the Contractor, and the manufacturers' representative to determine the condition. See the appropriate section for the details of inspection for the various pieces of equipment.

11001.08 INSTALLATION AND ADJUSTMENTS

Install all equipment in accordance with the manufacturers' requirements. Install equipment under the direct supervision of a manufacturer's representative when specified. All equipment shall be checked and adjusted for proper operation and alignment.

Install equipment for controls are visible and reachable by operator when standing on the floor.

11001.09 POTABLE WATER CONTACT

All components and materials that will be in contact with the finish water when the project is complete shall be certified to be in compliance with ANSI / NSF Standard 61. This includes but is not limited to piping, valves, fittings, pumps, tanks, meters, and other appurtenances, etc.

11001.10 ITEMS SPECIFIED ON PLANS

Some items are specified on the plans by make and model number. A dedicated specification section may not be included for that item. Comply with all codes and follow manufacturers recommendations for installation. Item include but may not be limited to:

- Square D Pressure Switches
- Amtrol WX-350 Hydropneumatic Tanks
- Flomatic Submersible Pump Check Valve
- Submersible Pump Wire
- Pressure Relief Valve

SECTION 11110
BOOSTER PUMPS

11110.01 GENERAL

Furnish and install the booster pumps and accessories as specified in the contract documents. The two pumps shall be identical and shall be configured for lead/lag operation with alternating lead pump.

Submit a copy of the pump manufacturer’s warranty to the Engineer. The pump and motor shall carry a minimum 1-year warranty.

11110.02 EQUIPMENT

The booster pumps shall be Franklin, VR Vertical Multi-Stage or approved equal. Pumps shall be vertical, multi-stage, close-coupled and all water contact parts shall be stainless steel. Provide with mechanical seal according to EN 12756 and ISO 3069. Pump shall require no special tools for assembly or disassembly. Motors shall be Nema standard design TC frame.

Pumps	Pump 1	Pump 2
Model No.	10VR-04	10VR-04
Stages	4	4
HP	3	3
RPM	3600	3600
V, Phase, Hz	230/1/60	230/1/60
Design Conditions	50 gpm, 120 ft.	50 gpm, 120 ft.

Pump motors shall be 230V, 1Ø, 60Hz (3500 rpm). Pump motors shall be ODP/TEFC and shall have the maximum energy efficiency available. The motors provided shall have a minimum service factor of 1.15. Motors shall be non-overloading for the entire published pump operating range without utilizing the motor service factor.

11110.03 INSTALLATION

Install the pumps as shown on the plans and according to the manufacturer’s latest recommendations. The pumps shall be mounted on a concrete pad, grouted and securely bolted to the pad with anchor bolts. Start the pumps and confirm their proper operation. Supply the services of the manufacturer’s representative during pump startup.

SECTION 11310
WELL & PUMPING EQUIPMENT DISINFECTION

11310.01 GENERAL

Furnish all labor, materials and equipment required to disinfect all wells, pitless adaptors, well casings, drop pipes, check valves and associated equipment as specified in the contract documents. Wells and pumping equipment shall be disinfected prior to acceptance. **The Testing Contractor and personnel shall be approved by the Owner and Engineer.** All disinfection shall be done in the presence of the Engineer. The Contractor shall notify the Engineer at least 48 hours in advance of any disinfection. All work under this Section shall comply with AWWA C654-03. All apparatus required for testing and disinfection shall be the responsibility of the Contractor. Disinfection is incidental to pump work.

Wells and pumping equipment shall be disinfected after construction, servicing or maintenance operations. Wells include groundwater wells and vertical pipes/cans containing well pumps.

11310.02 PREVENTATIVE MEASURES

Prevent contaminating materials and runoff from entering the well during construction. Keep drop pipes, pumps and accessories off the ground and on blocking or supports. Clean and remove all mud, grease and contamination prior to installing pump assembly into well.

11310.03 MATERIALS

Utilize sodium hypochlorite only. All chemicals shall comply with NSF60.

11310.04 PROCEDURE

- Comply fully with AWWA C654-03.
- Chlorinate all permanent equipment prior to installation per AWWA C654-03 (4.4).
- Chlorinate well after installation of permanent equipment per AWWA C654-03 (4.5).

11310.05 FINAL FLUSHING

After the required retention period, the heavily chlorinated water shall be flushed from the well until the chlorine concentration has been zero for at least 15 minutes. The Contractor shall be responsible for the proper disposal/dechlorination of the highly chlorinated water, per Department of Health and Human Services and DEP regulations.

11310.06 BACTERIOLOGICAL TESTING

After final flushing and before the well and water line is placed in service, initial samples shall be collected from the system for bacteriological testing per State of Maine regulations and AWWA specifications. Twenty-four (24) hours after collecting the initial samples, confirmation samples shall be collected. The tests shall be done in accordance with Standard Methods and shall be done by a State Certified Laboratory. If both the initial and confirmation tests show that the samples meet State coliform and bacteria standards then the system shall be placed in service.

If any tests fail, the procedure in AWWA C654-03 (5.1) shall be followed.

The Owners Representative will collect the bacteriological samples and provide the testing.

SECTION 11385
SUBMERSIBLE WELL PUMP AND ACCESSORIES

11385.01 GENERAL

Furnish and install the submersible well pump and accessories as specified in the contract documents. Note: Well has not been drilled yet. Specification is for bidding purposes only. Actual equipment installed will be determined after well is completed and adjustments made by change order.

Submit a copy of the pump manufacturer's warranty to the Engineer.

11385.02 EQUIPMENT

The submersible well pump shall be Franklin 10FS2S4 4" submersible pump or approved equal rated at 10 GPM at 490' TDH. In order to be considered equal a pump must meet or exceed the performance, construction and NSF-61 approval of the 10FS2S4. The dynamic head in the pump curve shall not vary more than 5% at a given flow from the 10FS2S4 curve.

Pump motor shall be 2-HP, 230-V, 1-phase, 3-wire Franklin submersible motor. Pump shall have a 1.25" NPT discharge. The pump motor shall be certified by the pump supplier to be non-overloading throughout the entire range of the published pump curve.

Accessories to be supplied and installed include the following as shown in detail on the drawings:

250 psi SIDR PE well pipe, torque arrestors, pitless adapter, Baker Premium Watertight Cap with screened air vent, wire, splice kits, pipe clamps, fittings, check valve, any other miscellaneous fittings or parts required for a complete installation

11385.03 INSTALLATION

Install the pump and accessories as shown on the plans and according to the manufacturer's latest recommendations. Start the pump and confirm its proper operation. Installation shall be by a licensed well pump installer.

Disinfect per specification 11310.

SECTION 11710
CHEMICAL FEED SYSTEMS

11710.01 GENERAL

The chemical feed systems include the pumps and accessories specified for the feeding of sodium hypochlorite solution. Furnish and install the chemical feed systems as specified herein.

11710.02 MATERIALS

Pumps - Chemical feed pump shall be Model No. AD241-A20HI as manufactured by Liquid Metronics Incorporated. Sixteen feet of suction line and a foot valve shall be supplied with the pump. Discharge tubing from pumps to injection nozzle shall be supplied and installed.

Accessories - as manufactured by Liquid Metronics Incorporated.

- 1.) Flooded Suction Polyethylene Solution Tank - 35 gallon capacity tank with cover assembly, Model No. 27400. One solution tank with cover shall be supplied and installed.
- 2.) Wall Mounting Bracket Assembly - Polyurethane coated metal bracket and hardware, Model No. 28272. Two bracket assemblies shall be supplied and installed.
- 3.) Injection quill - with injection check valve mounted on threaded tee
- 4.) Four Function Valve - Anti-syphon/pressure release valves. One 4-function valve shall be supplied and installed.
- 5.) Suction Tube Shield - Model No. 10458. One suction tube shield shall be supplied.
- 6.) Splash Guard - Model No. 10583. One splash guard shall be supplied and installed.
- 8.) Spare Parts Kit - A complete spare parts kit shall be supplied.

11710.03 INSTALLATION

Install as shown on the plans and according to the manufacturer's latest recommendations. A representative of the manufacturer shall be present during installation and start-up.

SECTION 11714
WATER STORAGE TANK

11713.01 GENERAL

Furnish and install two (2) water storage tanks as specified herein and as shown on the drawings. Tanks shall be NSF-61 approved for potable water. Fittings and gaskets shall be NSF-61 approved for potable water.

11713.02 MATERIALS

A.) Tanks shall be Ace Rotomold item VT1650-86 by Den Hartog Industries, or approved equal. Tanks shall meet the following:

- NSF-61 approved for potable water
- 1650 gallons capacity each
- Gallon indicators on side
- 86" diameter
- 16" PE threaded top lid
- Install tank fittings and connections as shown on the plans
 - Tank Vent Connection, 2" (top)
 - Tank Fill/Pump Connection, 2" (base)
 - Tank Drain Connection, 2" (base)
 - Float Switch Connection (top)

B.) Furnish one tank with floats for interconnection with station controls as shown on the plans.

11713.03 INSTALLATION

Install as shown on the plans and according to the manufacturer's latest recommendations.

SECTION 11815
FLOW METERS

11815.01 GENERAL

Furnish and install the flow meters and accessories as shown on the plans and as specified herein.

11815.02 MATERIAL

Furnish two 3/4" positive displacement well water meters and one 2" positive displacement system water meter.

Water meters shall be Badger Recordall RCDL positive displacement nutating disc meters by Badger Meter, Inc. or equal. Meter display and totalizer shall read in gallons.

11815.03 INSTALLATION

Install the meters and accessories as shown on the drawings and according to the manufacturer's latest recommendations. Coordinate with electrical subcontractor for analog connection to control panel.

SECTION 11817
LEVEL MONITORING DEVICES

11817.01 GENERAL

Furnish and install all level monitoring devices and accessories as shown on the plans and as specified herein.

11817.02 MATERIALS

- A.) Float Switches – Float switches shown on the drawings shall be mechanical tilt float level switches designed for level control in potable water. Float switches shall be non-mercury, have factory sealed cables, be impact and corrosion resistant with ABS shell, have 16 AWG or larger conductors, and have 13-amp minimum contact rating at 120/240 VAC. Float switches shall be U.L. recognized. Unless shown otherwise on the drawings float switches shall be wide angle (5” to 18” range). Unless shown otherwise on the drawings float switches shall be SPST, normally open (open when down). Float switches shall be SJE Pumpmaster WPS pump switches by SJE, Inc. or approved equal.

11817.03 INSTALLATION

Install floats as shown on the drawings and according to the manufacturer’s latest recommendations. All conduits and connections shall utilize waterproof flexible conduit and waterproof heat shrink connections. Test all devices and confirm proper interaction with controls.

COBSCOOK BAY STATE PARK – SHOWER BUILDING & UTILITY IMPROVEMENTS

DIVISION 15
MECHANICAL

Potable Water Contact	15001
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COBSCOOK BAY STATE PARK – SHOWER BUILDING & UTILITY IMPROVEMENTS

SECTION 15001
POTABLE WATER CONTACT

15001.01 GENERAL

All components and materials that will be in contact with the finish water when the project is complete shall be certified to be in compliance with ANSI / NSF Standard 61. This includes but is not limited to piping, valves, fittings, pumps, tanks, meters, and other appurtenances, etc.

SECTION 15124
CHECK VALVES

15124.01 GENERAL

Furnish and install all check valves as specified in the contract documents. Valves used in potable water service shall be certified to NSF/ANSI 61 Drinking Water System Components - Health Effects.

15124.02 MATERIALS

Check valves shall be Tru-Union Schedule 80 PVC, ball check with spring, sized as indicated on plans. Equal to Asahi/America of Lawrence, MA.

15124.03 INSTALLATION

Install the check valves as shown on the plans and according to the manufacturer's latest recommendations.

SECTION 15170
SCHEDULE 80 PVC PIPING

15170.01 GENERAL

Furnish, install and test all Schedule 80 PVC and CPVC piping, fittings and valves as shown on the drawings and as specified in the contract documents. Submit layout plan showing proposed pipe layout, proposed location of unions and pipe supports and braces.

15170.02 MATERIALS

The piping and fittings shall be Sch 80 PVC per ASTM D-1785 and of the sizes shown on the drawing. When specified, pipe and fittings shall be Sch 80 CPVC. PVC shall be Type I Grade I per ASTM D-1784. Pipe shall be marked with manufacturer's name, material code, pipe size, schedule, pressure rating, manufacturing date and MSF seal for potable water.

All PVC pipe and fittings shall utilize solvent welded joints. Install, joint, and test the PVC pipe and fittings in accordance with the manufacturer's latest recommendation. All PVC check valves and ball valves shall be Sch 80 rated and shall have union ends.

15170.03 VALVES

Valves shall be brass ball valves with stainless steel balls.

15170.04 UNIONS AND PIPE SUPPORTS

Provide unions where shown and as necessary for removal and replacement of all equipment, pumps and tanks. Securely support all pipe at 48" c/c maximum using UniStrut or equivalent supports.

15170.05 TESTING

All PVC piping shall be tested for leaks by a hydrostatic (water) test. The pump, piping, connections and all necessary apparatus for conducting the test shall be furnished by the Contractor. The Owner may supply the gauges for the test. After the piping and fittings have been completely installed, the pipe shall slowly be filled with water and all air expelled. Pressure shall be applied by means of a pump connected to the pipe in a manner satisfactory to the Owner and Engineer. Once the test pressure has been reached, the pump shall be shut off. The Contractor shall remove all test piping and apparatus from the line once all necessary testing has been completed.

Any exposed pipe, fittings, valves and joints shall be examined carefully during the test. Any damaged or defective pipe, fittings, valves or joints that are discovered following the pressure test shall be repaired or replaced with sound material, and the test shall be repeated.

The test pressure shall be 150 psi. The test pressure shall be held for 8 hours with no pressure drop.

DIVISION 16
ELECTRICAL

Electrical - General

16010

SECTION 16010
ELECTRICAL - GENERAL

PART 1 - GENERAL

1.01 DESCRIPTION

- A. Furnish all labor, materials and equipment necessary for providing electrical services, installations, and connections for all structures and equipment. Electrical work required for this Contract includes: power conductors, control conductors, wiring of pumps, including sensors, outlets, control panels, pressure switches, float switches, etc.
- B. Related work specified elsewhere includes:
Motors, Pumps, Equipment, Controls, etc.
Review Divisions 11, 15 and 16 in details
Review all drawings including site plan for electrical work
- C. Definitions:
NEC means National Electrical Code, latest edition.
GFI means ground fault interrupter or protected.
- D. All work shown on the drawings is intended to be approximately correct to the scale of the drawings but figured dimensions and detailed drawings are in all cases to assume precedence over them. The electrical drawings are diagrammatic and are not intended to show every detail of construction or the exact location of equipment. Where construction makes it advisable or necessary to change the location of equipment, the Subcontractor shall perform such work without cost to the Owner on written request of the Engineer. Any doubt as to the intended location of equipment shall be resolved by the Engineer before proceeding with the installation.
- E. The intent is to obtain an electrical installation of all systems, complete in every detail within and about the project, and with all facilities properly interconnected with power. The Electrical Subcontractor shall furnish and install all such parts as may be necessary to complete the systems in accordance with the best trade practice and to the satisfaction of the Engineer. Upon completion, the electrical systems and all equipment throughout the structures shall operate properly and adequately and function as intended.
- F. Provide all contact and coordination with the local power company when required. Meet with the local power company as needed to coordinate the work and to make sure their specifications and requirements are met. If there is any charge for the local power company to upgrade its infrastructure or to complete the new service drops the OWNER will pay those charges. All electrical permits shall be obtained and paid for by the electrical contractor.

1.02 QUALITY ASSURANCE

- A. All electrical work shall be performed by a duly licensed electrician who is thoroughly trained and experienced in the type of work covered by this Section. The electrician shall be thoroughly knowledgeable and familiar with all electrical standards, codes, ordinances and laws.
- B. In addition to complying with all pertinent standards, codes and regulations, comply with:
 - 1. Requirements of the Electrical Utility Company
 - 2. National Electrical Code and National Electrical Safety Code.
 - 3. Federal, State and Local ordinances, codes, regulations and laws.
 - 4. Requirements of Underwriters' Laboratories, Inc. for all items installed for which UL Standards have been established.
- C. Secure and pay for all permits and inspections required by any required authorities. The electrical inspection shall be made and approved by the Board of Fire Underwriters or other State and/or Local authority having jurisdiction. All certificates shall be in duplicate and shall be delivered to Engineer and become the property of Owner.
- D. Before commencing work, review the Project with the Local and State inspectors and the Electrical Utility Company. Conform, in every respect, with their separate recommendations unless the recommendations are inferior to, or in direct conflict with, the contract documents; then Engineer's approval will be required before proceeding with the work.
- E. Nothing in the specifications, or shown on the drawings, shall be construed as requiring a violation of any law, code, or regulation. Any work or device which fails to receive the approval of any agency shall be promptly changed so as to fully comply.

1.03 JOB CONDITIONS

Power characteristics for the project vary. The drawings indicate the power characteristics at each location and the extent and general arrangement of the electrical work. If any departures are deemed necessary for any reason or to secure code or Electric Utility Company approval, notify Engineer and secure his concurrence prior to ordering or installing any materials or equipment. The power characteristics are generally summarized as follows:

Location	
Bathhouse	240/120 Single Phase
Ex. Well House	240/120 Single Phase

1.04 SCHEDULING/SEQUENCING

Before ordering or installing electrical work, review this project and verify compliance with all applicable laws, codes and regulations. Notify Engineer at least 48 hours in advance of all testing so that he may witness the tests and the testing procedures.

1.05 GROUNDING

Ground all work in accordance with the requirements of NEC. Confirm adequacy of existing grounds and upgrade where necessary.

PART 2 - ELECTRICAL WORK

2.01 TEMPORARY POWER, DEMOLITION, RELOCATIONS, ETC.

Provide temporary wiring as required to maintain the facilities in operation during work. Remove old equipment and deliver to Owner. Relocate existing equipment designated on the plans. Relocate equipment, conduit and conductors as required to facilitate installation of new equipment and panels including temporary relocations necessary to keep station operational during construction.

2.02 WIRE AND CABLE

All wire and cable shall comply with the latest requirements and specifications of the NFPA and/or the Insulated Power Cable Engineers Association (IPCEA), and shall be manufactured by Triangle, General Cable, General Electric, Carol, American or approved equal, unless otherwise specified or indicated. All conductors used in the wiring system shall be soft-drawn copper wire having a conductivity of not less than 98 percent of that of pure copper, unless otherwise indicated or specified. Wire No. 10 AWG and smaller may be solid, and wire No. 8 AWG and larger shall be stranded.

All wire and cable shall be stamped approximately every two (2) feet to indicate voltage, type, temperature rating, UL listing, manufacturer's name, size, etc. All cable and wire shall be 600-volt, installed in approved raceways or conduit, not less than No. 12 AWG (except that No. 14 AWG may be used for control wiring). Insulation for cable and wire shall be type XHHW unless indicated otherwise.

2.03 CONDUITS

Conduits shall be as shown on the drawings. All exposed exterior conduits shall be rigid galvanized steel (RGS). RGS conduit shall be galvanized and be threaded (NPT). Rigid galvanized conduit shall be manufactured by Youngstown Sheet & Tube Company, Republic Steel, or equivalent. Aluminum conduit shall NOT be used on this project. PVC conduit is acceptable where buried as well as inside the building.

2.04 EXAMINATION AND APPROVAL OF WORK

No work shall be covered before examination and approval by the Engineer and by all inspectors and authorities having jurisdiction. Replace any imperfect or condemned work with work conforming to requirements and satisfactory to the Engineer without extra cost to the Owner. If work is covered before due inspection and approval, the Subcontractor shall pay all costs of uncovering and reinstating work.

2.05 NAMEPLATES

Provide nameplates for all items of equipment on all switch gear, motor starters, panelboards, controllers, selector switches, safety switches, push-button stations, feeder switches and relay and equipment enclosures. Nameplates shall be black laminated plastic or Bakelite, approximately 3/4" x 2-1/2" x 1/16", with four edges neatly beveled. Lettering shall be engraved, white, with a height of approximately 2/16" to 1/4". Provide two holes in nameplate and secure to equipment with non-ferrous screws. If adequate space is not available on item to which nameplate is to be affixed, nameplate may be installed adjacent to and as close to the item as possible, and in a position where it is readily visible. Notations on nameplates shall be exactly the same as the corresponding notations that appear on the Drawings, or as directed by the Engineer.