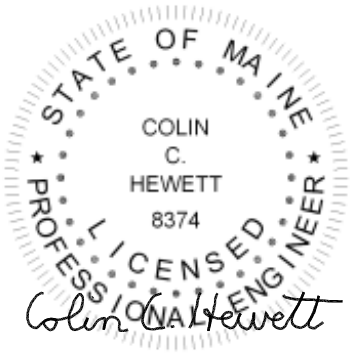
Specifications for

Primary Switchgear Replacement

Prepared by

Hewett & Whitney Engineers
161 Main Street, Suite 2A – PO Box 318
Winthrop, ME 04364

March 12, 2016



C O N T E N T S

Project: Primary Switchgear Replacement

00 11 13
Notice to Contractors

Primary Switchgear Replacement

It is the intent of this document to provide competitive bidding for the work involved to replace the primary switch to the Maine Correctional Center.

The cost of the work is approximately $ 500,000. The work to be performed under this contract shall be completed on or before September 28, 2016.

1. Sealed Contractor bids for the project noted above, in envelopes plainly marked "Bid for *Primary Switchgear Replacement*" and addressed to:
   David Schoenherr
   Bureau of General Services
   4th Floor, Cross State Office Building, 111 Sewall Street
   77 State House Station
   Augusta, Maine 04333-0077
   will be opened and read aloud at *Cross State Office Buiilding, 4th floor* at **2:00 p.m.** on ***March 31, 2016***. Bids submitted after the noted time will not be considered and will be returned unopened.

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.
   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.

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

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

6. An on-site pre-bid conference *will* be conducted for this project.
   The pre-bid conference is *mandatory* for General Contractors and optional for Subcontractors and suppliers. *The pre-bid conference will be on March 22, 2015 at 9:00, commencing at the Maine Correctional Center, 17 Mallison Falls Road, Windham, Maine. Contractors not present at the start or for any portion of the conference will not be permitted to bid on this project.*

7. Bid Documents - full sets only - will be available on or about *March 12, 2016. They will be available electronically at no cost* from:

   Hewett & Whitney Engineers
   Colin Hewett
   admin@hwengineers.com

00 21 13
Instructions to Bidders

1. Bidder Requirements

1.1 A bidder is a Contractor who is 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 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. Refer to section 00 72 13 Insurance Requirements, for specific requirements.

1.7 Contracts developed from this bid shall not be assigned, sublet or transferred without the written consent of the Owner.

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 sum of the lowest acceptable bid plus any Alternate Bids the Owner elects to include.

2.3 The Owner is exempt from the payment of Federal Excise Taxes and Federal Transportation Tax on all shipments, as well as Maine State Sales and Use Taxes on items "…physically incorporated in real property …". The bidder shall not include these taxes in their bid. See Section 00 72 13 for additional information.

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 opening date and time.

3.3 A bid that contains an escalation clause is considered invalid.

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 shall include the cost of Performance and Payment Bonds in the bid amount if the bid amount will result in a construction contract value over $125,000, inclusive of alternate bids that may be awarded in the contract. Pursuant to 14 M.R.S.A., Section 871, Public Works Contractors' Surety Bond Law of 1971, subsection 3, the selected Contractor is required to provide these bonds before a contract can be executed. The form of bonds are shown in section 00 61 13.13 and 00 61 13.16.

3.6 Bidders may modify bids in writing 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 shall acknowledge on the bid form all Addenda issued in a timely manner. The Architect shall not issue Addenda affecting bidders less than 72 hours prior to the bid closing time. 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. After the bid closing time, such written withdrawal requests may be allowed in consideration of the bid bond or, without utilizing a bid bond, if the Contractor provides documented evidence to the satisfaction of the Bureau that factual errors had been made on the bid form.

3.9 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.

3.10 Projects which require compliance with the Davis-Bacon Act are subject to the regulations contained the Code for Federal Regulations and the federal wage determination which is made a part of the Bid Documents. See section 00 73 46, if such rates are required.

00 41 13
Contractor Bid Form

Primary Switchgear Replacement

To: *David Schoenherr*
Bureau of General Services
4th Floor, Cross State Office Building, 111 Sewall Street
77 State House Station
Augusta Maine, 04333-0077

1. The undersigned, or "Bidder", having carefully examined the form of contract, general conditions, specifications and drawings dated *March 12, 2016*, prepared by *Hewett & Whitney Engineers*for *Primary Switchgear Replacement*, as well as 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:

_____ Dollars

$ _____

Allowances *are not included* on this project.

2. Alternate bids *are not included* on this project.

3. The Bidder acknowledges receipt of the following addenda to the specifications and drawings:

Addendum No. ____ Dated: _____
Addendum No. ____ Dated: _____
Addendum No. ____ Dated: _____
Addendum No. ____ Dated: _____
Addendum No. ____ Dated: _____

4. Bid security *is required* on this project.
The Bidder shall include a satisfactory Bid Bond (section 00 43 13) or a certified or cashier's check for 5% of the bid amount with this completed bid form submitted to the Owner.

5. Filed Sub-bids *are not required* on this project.
The bid amount includes the following Filed Sub-bids which were submitted to the Bidder and to the Maine Construction Bid Depository.

6. The Bidder agrees, if this bid is accepted by the Owner, to sign the designated Owner-Contractor contract and deliver it, with any and all bonds and affidavits of insurance specified in the Bid Documents, 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, a Saturday, or a

Sunday, in which case the aforementioned documents must be received before 12:00 noon on the day following the holiday or 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.

7. This bid is hereby submitted by:

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: _____

00 43 13
Contractor Bid Bond

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 day, i.e.: 8th*** day of ***select month***, ***select year***, which is the same date as that of the bid due date.

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.

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 day, i.e.: 8th*** day of ***select month***, ***select year***, which is the same date as that of the bid due date.

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.

AdvantageME:
Appropriation No: ____

STATE OF MAINE
Bureau of General Services
CONSTRUCTION CONTRACT

THIS AGREEMENT made the ***date*** day of ***month*** in the year ***2016*** by and between the State of Maine through the ***Department of Corrections*** hereinafter called the *Owner* and ***Contractor company name*** hereinafter called the *Contractor*.

BGS Project No.: ***2473***
Other Project No.: ***14047***

The *Owner* and the *Contractor* for the consideration hereinafter named agree as follows:

ARTICLE 1 SCOPE OF WORK

§ 1.1 The *Contractor* shall furnish all of the materials and perform all the work described in the specifications and shown on the drawings for the project entitled: ***Primary Switchgear Replacement***.

§ 1.2 The specifications and the drawings have been prepared by ***Hewett & Whitney Engineers***, acting as Designer and named in the documents as the Architect or Engineer. This firm has responsibilities for defining the scope of work governed by their agreement with the *Owner*, the specifications and the drawings, and the General Conditions and Special Provisions of the contract.

ARTICLE 2 COMPLETION DATE

§ 2.1 The work to be performed under this contract shall be completed on or before ***September 28, 2016***. For each calendar day the project remains uncompleted ***$750.00*** shall be charged as liquidated damages.

ARTICLE 3 CONTRACT SUM

§ 3.1 The *Owner* shall pay the *Contractor* for the performance of the contract, subject to additions and deductions provided by approved Change Orders in current funds as follows:
amount in words dollars and ***00***cents,
$0.00

ARTICLE 4 CONTRACT BONDS

§ 4.1 Contract bonds are not required if the contract amount is less than $125,000 unless bonds are specifically mandated by the contract documents.

§ 4.2 On this project, the *Contractor* ***shall*** furnish the *Owner* the appropriate contract bonds in the amount of 100% of the contract amount.

ARTICLE 5 PROGRESS PAYMENTS

§ 5.1 The *Owner* shall make payments on account of the contract as provided therein as follows: Each month 95% of the value, based on contract prices of labor and materials incorporated in the work and of materials suitably stored at the site thereof up to the first day of that month, as certified by the Architect or Engineer.

§ 5.2 The *Owner* may cause the *Contractor* to be paid such portion of the amount retained hereunder as he deems advisable.

ARTICLE 6 FINAL PAYMENT

§ 6.1 Final payment shall be due 30 days after completion and acceptance of the work, provided the *Contractor* has submitted evidence satisfactory to the *Owner* that all payrolls, material bills and other indebtedness connected with the work has been paid.

ARTICLE 7 CONTRACT DOCUMENTS

§ 7.1 The General Conditions of the contract, instructions to bidders, bid form, Special Provisions, the written specifications and the drawings, and any Addenda, together with this agreement, form the contract; they are as fully a part of the contract as if hereto attached or herein repeated.

§ 7.2 Specifications: ***March 12, 2016***

§ 7.3 Drawings: ***March 12, 2016, E0 through E2***

§ 7.4 Addenda: ***each addenda number and date, or "none"***

ARTICLE 8 OTHER PROVISIONS

§ 8.1 ***There are no other provisions***

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

IN WITNESS WHEREOF the parties hereby execute this agreement the day and year first above written.

OWNER	**CONTRACTOR**
(Signature) *(Date)*	*(Signature)* *(Date)*
Mark McCarthy, Manager Correctional Operations	
(Printed name and title)	*(Printed name and title)*
Department of Corrections	
(Department name)	*(Contractor company name)*

BUREAU OF GENERAL SERVICES	
Contract Reviewed by:	Contract Approved by:
(Signature) *(Date)*	*(Signature)* *(Date)*
David Schoenherr	*Joseph Ostwald*
Project Manager/ Contract Administrator	*Director, Planning, Design & Construction*

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 day, i.e.: 8th*** day of ***select month***, ***select year***, which is the same date as that of 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.

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 day, i.e.: 8th*** day of ***select month***, ***select year***, which is the same date as that of 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 day, i.e.: 8th*** day of ***select month***, ***select year***, which is the same date as that of the construction contract, for the construction of ***insert name of project as designated in the contract documents***, and shall fully reimburse the oblige for all outlay and expense with said oblige 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.

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 day, i.e.: 8th*** day of ***select month***, ***select year***, which is the same date as that of the construction contract.

Contractor

(Signature)

insert name and title

insert company name

insert address
insert city state zip code

Surety

(Signature)

insert name and title

insert company name

insert address
insert city state zip code

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

00 71 00
Definitions

1. Definitions

1.1 *Addendum*: A document issued by the Architect 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*: The Architect or Engineer acting as Professional-of-Record for the project. The Architect is responsible for the design of the Project.

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 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.

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 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.

1.12 *Certificate of Substantial Completion*: A document developed by the Architect 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 also include a provisional list of items (a "punch

list") remaining to be corrected by the Contractor, if any, and identifies a 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 Architect and approved by the Bureau.

1.15 *Change Order Proposal (COP)*: Change proposed by the Contractor in the contract amount, requirements, or time, which becomes a Change Order when approved by the Owner.

1.16 *Clerk of the Works*: The authorized representative of the Architect on the job site. Clerk of the Works is also called Architect's representative.

1.17 *Construction Change Directive (CCD)*: A written order prepared by the Architect and signed by the Owner and Architect, 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 Price*: The dollar amount of the construction contract, also called *Contract Sum*.

1.22 *Contract Time*: The designated duration of time to execute the Work of the contract, with a specific date for completion.

1.23 *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.

1.24 *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.

1.25 *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.

1.26 *Final Completion*: Project status indicating when the Work is fully completed in compliance with the Contract Documents. Final Completion is documented by a date on which the Contractor's obligations under the contract are complete and accepted by the Owner and final payment becomes due and payable.

1.27 *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.

1.28 *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 Architect and Contractor.

1.29 *Owner's Representative*: The individual or entity contracted by the Owner to be an advisor and information conduit regarding the Project.

1.30 *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.

1.31 *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.

1.32 *Post-Bid Addendum*: Document issued by the Architect that defines a potential Change Order prior to signing of the construction contract. The Post-Bid Addendum allows the Owner to negotiate 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.

1.33 *Project*: The construction project proposed by the Owner to be constructed according to the Contract Documents. The entire public improvement project may also include separate construction and other activities conducted by the Owner or other contractors. The Owner shall inform all contractors of the scope of the entire public improvement project relative to each individual contract.

1.34 *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. After acceptance by all parties a proposal amends the contract and is implemented by the Contractor.

1.35 *Proposal Request (PR)*: An Owner's written request to the Contractor for a Change Order Proposal.

1.36 *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.

1.37 *Request For Information (RFI)*: A Contractor's written request to the Architect 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 Work.

1.38 *Request For Proposal (RFP)*: An Owner's written request to the Contractor for a Change Order Proposal.

1.39 *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.*

1.40 *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.)

1.41 *Sample*: A physical example provided by the Contractor which illustrates materials, equipment or workmanship and establishes standards by which the Work will be judged.

1.42 *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.

1.43 *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*.

1.44 *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.

1.45 *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.

1.46 *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.

1.47 *Substantial Completion*: Project status indicating 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.

1.48 *Superintendent*: The representative of the Contractor on the job site, authorized by the Contractor to receive and fulfill instructions from the Architect.

1.49 *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.

1.50 *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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General Conditions

Table of Contents of this General Conditions Section

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 Architect. The purpose of this conference is to:

a) introduce all parties who have a significant role in the Project, including:
Owner (State Agency)
Bureau of General Services (BGS)
Architect
Consultants
Clerk-of-the-works
Contractor (GC)
Superintendent
Subcontractors
Other State agencies
Owner's Representative
Construction testing company
Commissioning agent
Special Inspections agent;

b) review the responsibilities of each party;

c) review any previously-identified special provisions of the Project;

d) review the Schedule of the Work calendar submitted by the Contractor to be approved by the Owner and Architect;

e) review the Schedule of Values form submitted by the Contractor to be approved by the Owner and Architect;

f) establish routines for Shop Drawing approval, contract changes, requisitions, et cetera;

g) discuss jobsite issues;

h) discuss Project close-out procedures;

i) provide an opportunity for clarification of Contract Documents before work begins;

j) 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 Architect and authorized in writing by the Architect, 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 Architect in writing of such errors or omissions. The Architect shall make any corrections or clarifications necessary in such a situation to document the true intent of the Contract Documents.

3. Additional Drawings and Specifications

3.1 The Owner shall provide to the Contractor, at no additional expense to the Contractor, a reasonable quantity of additional Drawings and Specifications for the execution of the Work.

3.2 The Architect shall promptly furnish additional revised Drawings and Specifications that are created due to corrections or clarifications made by the Architect. 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. Record of Documents

4.1 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 Architect.

4.2 The Contractor shall maintain, continuously updated, complete records of Requests for Information, Architectural Supplemental Instructions, Information Bulletins, supplemental sketches, Change Order Proposals, Change Orders, Shop Drawings, testing reports, et cetera, for access by the Owner and Architect.

5. Ownership of Contract Documents

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

6. Shop Drawings

6.1 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.

6.2 The Architect 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.

6.3 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.

6.4 The Contractor shall make any corrections required by the Architect, and shall submit a quantity of corrected copies as may be needed. The acceptance of Shop Drawings or schedules by the Architect 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 Architect at the time of submission and secured the Architect’s written approval. The acceptance of Shop Drawings or schedules by the Architect does not relieve the Contractor from responsibility for errors in Shop Drawings or schedules.

7. Samples

7.1 The Contractor shall furnish for approval, with reasonable promptness, all samples as directed by the Architect. The Architect 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.

8. Substitutions

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

8.2 The Contractor may submit detailed information about a proposed substitution to the Architect 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 Architect. The request for substitution shall include a cost comparison and a reason or reasons for the substitution.

8.3 The Architect 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 Architect should briefly state the rationale for the decision. The decision shall be considered final.

8.4 The duration of a substitution review process can not be the basis for a claim for delay in the Schedule of the Work.

9. Patents and Royalties

9.1 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.

9.2 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.

10. Surveys, Layout of Work

10.1 The Owner shall furnish all property surveys unless otherwise specified.

10.2 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.

10.3 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 Architect prior to commencing work.

11. Permits, Laws, and Regulations

11.1 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.

11.2 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.

11.3 The Owner is responsible for obtaining any federal agency project approvals necessary to complete the Work, unless otherwise indicated in the Contract Documents.

11.4 The Owner is responsible for obtaining all easements for permanent structures or permanent changes in existing facilities.

11.5 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.

11.6 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 Architect 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.

11.7 The Contractor shall comply with local, state and federal regulations regarding construction safety and all other aspects of the Work.

12. Taxes

12.1 The Owner is exempt from the payment of Federal Excise Taxes on articles not for resale and from the Federal Transportation Tax on all shipments, as well as Maine State Sales and Use Taxes. Pricing in all Change Order Proposals from the Contractor and Subcontractors shall not include these taxes.

12.2 Maine statute (36 M.R.S.A. §1760) allows "…an exemption from sales and use tax on items which will be physically incorporated in real property of an exempt organization. This exemption only applies to lumber, hardware, doors and windows, nails, insulation and other building materials actually affixed to realty. Tools, wearing apparel, consumable supplies, machinery and equipment used by the Contractor are taxable even if purchased specifically for the exempt job."

12.3 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.A. §1760 and detailed in Rule 302 (18-125 CMR 302).

13. Labor and Wages

13.1 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.

13.2 The Architect 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.

13.3 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.

13.4 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.

13.5 The Contractor shall conform to Maine statute by providing to the Owner a list of all subcontractors and independent contractors on the job site and a record of the entity to whom that subcontractor or independent contractor is directly contracted and by whom that subcontractor or independent contractor is insured for workers' compensation purposes.

13.6 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.

13.7 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 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.

13.8 The Contractor may contact the Maine Department of Labor, 54 State House Station, Augusta, Maine 04333 for guidance on labor issues.

14. Insurance Requirements

14.1 The Contractor shall not commence work under this contract until the Contractor has obtained all insurance required under this article and such insurance has been approved by the Owner. The Contractor shall not allow any Subcontractor to commence work on a subcontract until all similar insurance required of the Subcontractor has been so obtained and approved.

14.2 The Owner does not warrant or represent that the insurance required under this article constitutes an insurance portfolio which adequately addresses all risks faced by the Contractor or its Subcontractors. The Contractor and Subcontractors of every tier shall satisfy themselves as to the existence, extent and adequacy of insurance prior to commencement of work.

14.3 The Contractor and any Subcontractor shall procure and maintain for the duration of the Project insurance of the types and limits set forth under this article and such insurance as will protect themselves from claims which may arise out of or result from the Contractor’s or Subcontractor’s execution of the work, whether such execution be by themselves or by anyone directly or indirectly employed by any of them or by anyone for whose acts any of them may be liable. The insurance coverage provided by the Contractor and any Subcontractor will be primary coverage.

14.4 Workers' Compensation Insurance

Worker's Compensation insurance for all employees on 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

14.5 Liability Insurance

a) General Liability Insurance

General liability insurance 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. It shall include collapse and underground coverage - as well as explosion coverage if explosion hazards exist. Aggregate limits shall apply on a per 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

b) Automobile Liability Insurance

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 $1,000,000

c) Owners Protective Liability Insurance

For Contracts exceeding $50,000 in total Contract amount, Contractor shall secure an Owners Protective Liability policy naming the Owner as the Named Insured.

Minimum acceptable limits are:

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

d) Pollution Liability Insurance

In the event that any disruption, handling, abatement, remediation, encapsulation, removal, transport, or disposal of contaminated or hazardous material is required, the Contractor or its Subcontractor shall secure a pollution liability policy in addition to any other coverages contained in this section. The insurance shall be provided on an occurrence based policy and shall remain in effect for the duration of the Project.

Minimum acceptable limit is:

Each occurrence limit $1,000,000

14.6 Property Insurance

a) New Construction Only

The Contractor shall procure and maintain Builder's Risk insurance naming the Owner, Contractor and all Subcontractors as insureds as their interest may appear. The covered cause of loss form shall be Risks of Direct Physical Loss, endorsed to include flood, earthquake, testing and ensuing loss and shall include coverage for materials in transit and materials stored off site. Coverage shall be on a replacement cost and a completed value basis. Unless specifically authorized by the Owner, the limit of insurance shall not be less than the contract amount and coverage shall apply during the entire contract period until the Certificate of Substantial Completion is accepted by the Owner.

b) Renovations within and Additions to Existing Buildings Insured by State of Maine Risk Management Division

Insurance shall be provided by the Owner. The Owner shall provide the following Project information to the State of Maine Risk Management Division prior to commencement of the Work in order to initiate the insurance coverage: building name, street address and municipality, brief project description, project start date and completion date, contract dollar value, and Contractor name and address. Said insurance shall name the Contractor and all Subcontractors as insureds as their interest may appear. The covered causes of loss form shall be Risks of Direct Physical Loss, endorsed to include flood, earthquake, testing and ensuing loss and shall include coverage for materials in transit and materials stored off site. Theft coverage is not included and exclusions common to commercial property policies are applicable. The Contractor shall be responsible for a $500 deductible per occurrence. Unless specifically authorized by the Owner, the limit of insurance shall not be less than the contract amount and coverage shall apply during the entire contract period until the Certificate of Substantial Completion is accepted by the Owner. Verification of insurance will be furnished to the Contractor upon request. The Contractor may independently acquire, at the Contractor's expense, coverage in excess of that maintained by the State of Maine.

14.7 The Contractor shall provide four original copies of all certificates of insurance in a form, and issued by, companies acceptable to the Owner prior to commencement of work. The certificates shall name the Owner as certificate holder and, shall identify the project name and BGS project number. The certificates shall contain a provision that coverage afforded under the insurance policies will not be canceled or materially changed unless at least thirty (30) calendar days prior written notice by registered letter has been given to the Owner.

15. Contract Bonds

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

15.2 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.

16. Allowances

16.1 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.

16.2 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.

17. Assignment of Contract

17.1 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.

18. Separate Contracts

18.1 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.

18.2 The Contractor shall promptly report to the Architect 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.

18.3 Similarly, the Contractor shall promptly report to the Architect and Owner any apparent deficiencies in their own work that would impact the proper execution or results of the Owner's other contractors.

18.4 The Contractor shall report to the Architect 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.

18.5 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.

19. Subcontracts

19.1 The Contractor shall not subcontract any part of this contract without the written permission of the Owner.

19.2 The Contractor shall submit a complete list of named Subcontractors and material suppliers to the Architect 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.

19.3 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.

19.4 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.

19.5 Neither the Contract Documents nor any Contractor-Subcontractor contract shall indicate, infer or create any direct contractual relationship between any Subcontractor and the Owner.

20. Contractor-Subcontractor Relationship

20.1 The Contractor shall be bound to the Subcontractor by all the obligations in the Contract Documents that bind the Contractor to the Owner.

20.2 The Contractor shall pay the Subcontractor, in proportion to the dollar value of the work completed by the Subcontractor, the dollar amount allowed to the Contractor at the time each Contractor's Requisition for Payment is approved by the Owner.

20.3 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.

20.4 The Contractor shall pay the Subcontractor on demand for subcontract work or materials as far as executed and fixed in place, less retainage, at the time the Contractor's Requisition for Payment is approved by the Owner, even if the Architect fails to certify a portion of the Requisition for Payment for a cause not the fault of the Subcontractor.

20.5 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.

20.6 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.

20.7 The Contractor shall give the Subcontractor an opportunity to present and to submit evidence in any progress conference or disputes involving subcontract work.

20.8 The Contractor shall pay the Subcontractor a just share of any fire insurance payment received by the Contractor.

20.9 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.

20.10 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.

20.11 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 Architect's instructions.

21. Supervision of the Work

21.1 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.

21.2 The superintendent represents the Contractor on the jobsite. Directives given by the Architect 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 Architect and Owner are not responsible for the acts or omissions of the superintendent or assistant superintendents.

21.3 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 Architect. 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 Architect that was not revealed by the superintendent in a timely way.

22. Observation of the Work

22.1 The Contractor shall allow the Owner, the Architect 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.

22.2 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.

22.3 The Contractor shall schedule inspections and obtain all required certificates of inspection for inspections by a party other than the Architect.

22.4 The Architect 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 Architect, the Contractor shall notify the Architect of the construction schedule in this regard. Work concealed or buried prior to the Architect's approval may need to be uncovered at the Contractor’s expense.

22.5 The Architect 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.

22.6 The Bureau shall periodically observe the Work during the course of construction and make recommendations to the Contractor or Architect as necessary. Such recommendations shall be considered and implemented through the usual means for changes to the Work.

23. Architect's Status

23.1 The Architect represents the Owner during the construction period, and observes the work in progress on behalf of the Owner. The Architect 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 Architect has authority to stop the work whenever such an action is necessary, in the Architect's reasonable opinion, to ensure the proper execution of the contract.

23.2 The Architect is the interpreter of the conditions of the contract and the judge of its performance. The Architect shall favor neither the Owner nor the Contractor, but shall use the Architect’s powers under the contract to enforce faithful performance by both parties.

23.3 In the event of the termination of the Architect'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 Architect relative to this contract shall be that of the former Architect.

24. Management of the Premises

24.1 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 Architect's directions shall not cause the use of premises to be impeded for the Contractor or Owner.

24.2 The Contractor shall not use the premises for any purpose other that 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.

24.3 The Contractor shall enforce the Architect’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.

24.4 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.

25. Safety and Security of the Premises

25.1 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.

25.2 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.

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

25.4 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.

25.5 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.

25.6 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.

25.7 Damage to the Work, including that which is reasonably protected, shall be repaired or replaced at the expense of the party who caused the damage.

25.8 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 Architect may consult with the Contractor on such means and methods of construction, however, the ultimate responsibility lies with the Contractor.

25.9 The Contractor shall not jeopardize any work in place with subsequent construction activities such as blasting, drilling, excavating, cutting, patching or altering work. The Architect 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.

25.10 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.

25.11 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.

26. Changes in the Work

26.1 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.

26.2 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.

26.3 The Architect shall prepare the Construction Change Directive representing a complete scope of work, with proposed Contract Price and Contract Time revisions, if any, clearly stated.

26.4 The Contractor shall promptly carry out a Construction Change Directive which has been signed by the Owner and the Architect. 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.

26.5 The method of determining the dollar value of extra work shall be by:

a) an estimate of the Contractor accepted by Owner as a lump sum, or
b) unit prices named in the contract or subsequently agreed upon, or
c) cost plus a designated percentage, or
d) cost plus a fixed fee.

26.6 The Contractor shall determine the dollar value of the extra work for both the lump sum and cost plus designated percentage methods using the following rates. The rates include all overhead and profit expenses.

a) Contractor - for any work performed by the Contractor's own forces, 20% of the cost;
b) Subcontractor - for work performed by Subcontractor's own forces, 20% of the cost;
c) Contractor - for work performed by Contractor's Subcontractor, 10% of the amount due the Subcontractor.

26.7 The Contractor shall keep and provide records as needed or directed for the cost plus designated percentage method. The Architect shall review and certify the appropriate amount which includes the Contractor's overhead and profit. The Owner shall make payments based on the Architect's certificate.

26.8 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.

26.9 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.

26.10 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.

26.11 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.

26.12 The Architect may order minor changes in the Work, not involving extra cost, which is consistent with the intent of the design or project.

26.13 The Contractor shall immediately give written notification to the Architect 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 Architect. The Architect shall promptly investigate the conditions and respond to the Contractor's notice with direction that avoids any unnecessary delay of the Work. The Architect shall determine if the discovered conditions warrant a Change Order.

26.14 The Contractor shall, within ten calendar days of receipt of the information, give written notification to the Architect if the Contractor claims that instructions by the Architect will constitute extra cost not accounted for by Change Order or otherwise under the contract. The Architect shall promptly respond to the Contractor's notice with direction that avoids any unnecessary delay of the Work. The Architect shall determine if the Contractor's claim warrants a Change Order.

27. Correction of the Work

27.1 The Contractor shall promptly remove from the premises all work the Architect 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.

27.2 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 Architect. 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.

27.3 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 Architect. The Architect shall determine the status of all claimed defects.

27.4 The Architect 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.

28. Owner's Right to do Work

28.1 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 Architect 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.

28.2 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.

29. Termination of Contract and Stop Work Action

29.1 The Owner may, owing to a certificate of the Architect 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, 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: if the contractor is adjudged bankrupt, or makes a general assignment for the benefit of its creditors, or if a receiver is appointed due to the Contractor's insolvency, or if the Contractor persistently or repeatedly refuses or fails to provide enough properly skilled workers or proper materials, or if the Contractor fails to make prompt payment to Subcontractors or material or labor suppliers, or if the Contractor persistently disregards laws, ordinances or the instructions of the Architect, or is otherwise found guilty of a substantial violation of a provision of the Contract Documents.

29.2 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 Architect shall certify the expense incurred by the Contractor's default. This obligation for payment shall continue to exist after termination of the contract.

29.3 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 Architect, terminate this contract. The Contractor may then recover from the Owner payment for all work executed, any proven loss and reasonable profit and damage.

29.4 The Contractor may, if the Architect 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 Architect, with seven days written notice to the Owner and the Architect, stop the Work or terminate this Contract.

30. Delays and Extension of Time

30.1 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 Architect, 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 Architect shall determine the status of all claimed causes.

30.2 The contract shall not be extended for delay occurring more than seven calendar days before the Contractor's claim made in writing to the Architect. In case of a continuing cause of delay, only one claim is necessary.

30.3 The contract shall not be extended due to failure of the Architect to furnish drawings if no schedule or agreement is made between the Contractor and the Architect indicating the dates which drawings shall be furnished and fourteen calendar days has passed after said date for such drawings.

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

31. Payments to the Contractor

31.1 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 Architect. The Architect 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.

31.2 The Contractor shall submit an application for each payment ("Requisition for Payment") on a form approved by the Owner and Architect. The Architect may require receipts or other documents showing the Contractor's payments for materials and labor, including payments to Subcontractors.

31.3 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.

31.4 The Architect shall verify and certify each Requisition for Payment which appears to be complete and correct prior to payment being made by the Owner. The Architect 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.

31.5 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.

31.6 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 Architect 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.

31.7 Subcontractors may request, and shall receive from the Architect, copies of approved Requisitions for Payment showing the amounts certified in the Schedule of Values.

31.8 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 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.

31.9 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 (M.R.S.A. 5, Section 1746).

32. Payments Withheld

32.1 The Architect 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:

a) defective work not remedied;
b) claims filed or reasonable evidence indicating probable filing of claims;
c) failure to make payments properly to Subcontractors or suppliers;
d) a reasonable doubt that the contract can be completed for the balance then unpaid;
e) liability for damage to another contractor.

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

33. Liens

33.1 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.

33.2 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.

34. Indemnification

34.1 The Contractor shall indemnify and hold harmless the Owner, its officers, agents, and employees from and against any and all claims, liabilities and costs, including reasonable attorney's fees, for any or all injuries to persons, property or claims for money damages arising from the negligent acts or omissions of the Contractor, its employees or agents, officers or subcontractors in the performance of work under this Agreement.

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 Architect's decision on the quality of work shall be final.

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 Architect 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 Architect at the Contractor's expense.

35.4 The Contractor shall request clarification or revision of any design work by the Architect, 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 Architect 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 Architect 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 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 exactly cleaning is specified. The Contractor shall wash 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 Architect, 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, generally called the "punch list", to be corrected by the Contractor. The Architect shall document the successful completion of the Work in a dated Certificate of Substantial Completion, to be signed by Owner, Architect, and Contractor.

36.4 The Contractor shall not call for final inspection of any portion of the Work that is not complete and permanent 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.

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 Architect 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 Architect determines has followed the expected rate of progress.

37.4 The Architect 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:
More than $100,000 and less than $2,000,000	$750
More than $2,000,000 and less than $10,000,000	$1,500
More than $10,000,000	$1,500 plus $250 for each $2,000,000 over $10,000,000

38. Dispute Resolution

38.1 Mediation

a) In the event of a dispute between the parties which arises under this Agreement in which the dispute cannot be resolved through informal negotiation, the dispute shall be submitted to a neutral mediator jointly selected by the parties.

b) 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.

c) In any mediation between the Owner and the Architect, the Owner has the right to consolidate related claims between Owner and Contractor.

38.2 Arbitration

a) 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.

b) 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.

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

d) In any arbitration between the Owner and the Architect, the Owner has the right to consolidate related claims between Owner and Contractor.

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Wage Determination Schedule

PART 1- GENERAL

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

1.2 Summary
A. This Section includes the wage determination requirements for Contractors as issued by the State of Maine Department of Labor Bureau of Labor Standards or the United States Department of Labor.

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

PART 2 - PRODUCTS (not used)

PART 3 - EXECUTION (not used)

THIS DOCUMENT MUST BE CLEARLY POSTED AT THE PERTAINING STATE FUNDED PREVAILING WAGE CONSTRUCTION SITE

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

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

Title of Project -------Maine Correctional Center-Primary Switchgear Replacement

Location of Project --Windham, Cumberland County

2016 Fair Minimum Wage Rates
Building 2 (other than 1 & 2 family homes) Cumberland County

Occupation Title	Minimum Wage	Minimum Benefit	Total	Occupation Title	Minimum Wage	Minimum Benefit	Total
Asbestos/Lead Removal Worker	$13.00	$0.51	$13.51	Insulation Installer	$19.25	$2.33	$21.58
Assembler – Metal Building	$13.63	$3.38	$17.01	Ironworker – Reinforcing	$21.00	$6.80	$27.80
Boom Truck (Truck Crane) Operator	$21.00	$2.85	$23.85	Ironworker – Structural	$23.20	$9.36	$32.56
Bricklayer	$22.00	$2.60	$24.60	Laborers (Incl. Helpers & Tenders)	$14.00	$0.34	$14.34
Bulldozer Operator	$17.63	$3.24	$20.87	Laborer – Skilled	$16.33	$1.67	$18.00
Carpenter	$22.00	$3.84	$25.84	Loader Operator – Front End	$17.21	$2.66	$19.87
Carpenter – Acoustical	$15.00	$2.68	$17.68	Mechanic – Maintenance	$20.13	$3.28	$23.14
Carpenter – Rough	$17.50	$0.75	$18.25	Mechanic – Refrigeration	$20.00	$3.66	$23.66
Cement Mason/Finisher	$17.50	$0.50	$18.00	Millwright	$23.95	$19.19	$43.14
Communication Equipment Installer	$23.99	$7.63	$31.62	Oil/Fuel Burner Servicer & Inst(licensed)	$24.43	$6.13	$30.56
Concrete Pump Operator	$24.25	$5.40	$29.65	Painter	$18.75	$0.00	$18.75
Crane Operator <15 Tons	$21.25	$2.58	$23.83	Paperhanger	$17.00	$3.16	$20.16
Crane Operator =>15 Tons	$24.50	$6.61	$31.11	Pipe/Steam/Sprinkler Fitter	$26.25	$13.84	$40.09
Crusher Plant Operator	$15.80	$3.76	$19.56	Pipe Layer	$19.33	$2.37	$21.70
Dry-Wall Applicator	$22.94	$2.63	$25.57	Plasterer	$43.93	$27.43	$71.36
Dry-Wall Taper & Finisher	$24.00	$2.82	$26.82	Plumber (Licensed)	$26.00	$3.38	$29.38
Electrician – Licensed	$25.00	$5.47	$30.47	Plumber Helper/Trainee (Licensed)	$20.29	$2.54	$22.83
Electrician Helper/Cable Puller (Licensed)	$16.49	$2.73	$19.22	Propane & Natural Gas Service & inst.	$21.00	$3.87	$24.87
Elevator Constructor/Installer	$53.30	$33.36	$86.66	Roofer	$15.00	$1.15	$16.15
Excavator Operator	$19.06	$2.44	$21.50	Sheet Metal Worker	$20.60	$4.69	$25.29
Fence Setter	$15.25	$1.32	$16.57	Sider	$22.75	$4.33	$27.08
Flagger	$16.70	$7.95	$24.65	Stone Mason	$17.80	$0.00	$17.80
Floor Layer	$19.50	$4.51	$24.01	Tile Setter	$21.25	$4.76	$26.01
Furniture Installer/Assembler	$13.75	$0.85	$14.60	Truck Driver – Light	$15.00	$0.99	$15.99
Glazier	$20.82	$2.71	$23.53	Truck Driver – Medium	$15.00	$0.10	$15.10
Grader/Scraper Operator	$17.50	$1.04	$18.54	Truck Driver – Heavy	$14.00	$0.62	$14.62
Heating, Ventilation, Air Conditioning	$25.00	$4.59	$29.59	Truck Driver – Tractor Trailer	$16.24	$3.28	$19.52

The Laborer classifications include a wide range of work duties. Therefore, if any specific occupation to be employed on this project is not listed in this determination, call the Bureau of Labor Standards at the above number for further clarification.

Welders are classified in the trade to which the welding is incidental.

Apprentices - The minimum wage rate for registered apprentices are those set forth in the standards and policies of the Maine State Apprenticeship and Training Council for approved apprenticeship programs.
Posting of Schedule - Posting of this schedule is required in accordance with 26 MRSA §1301 et. seq., by any contractor holding a State contract for construction valued at $50,000 or more and any subcontractors to such a contractor.
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 with the Secretary of State.

Determination No: B2-023-2016
Filing Date: February 4, 2016

Expiration Date: 12-31-2016

A true copy
Attest: Pamela Megathlin
Pamela Megathlin
Director
Bureau of Labor Standards

SECTION 01 10 00 - BASIC REQUIREMENTS

PART 1 - GENERAL

1.1 SUMMARY OF WORK

A. Project Scope: Briefly described, the work includes, but is not limited to, the following:

1. Replace the primary switchgear at Maine Correctional Center.

1.2 CONTRACT CONSIDERATIONS

A. Project Schedule:

EVENT	DATE
Invitation to Bid	March 12, 2016
Prebid Meeting/Site Visit	March 22, 2016 9:00 am
Deadline for questions	March 28, 2016 2:00 pm
Bid Opening	March 31, 2016 2:00 pm
Award Contract	April 7, 2016
Preconstruction Conference	TBD
Substantial Completion	September 21, 2016
Final Completion	September 28, 2016

B. Site Inspection: Visit the site, before submitting bid, to become familiar with the procedural manner, materials, labor, quantities, and expenses involved in completing the work. No allowances for extra work will be granted to accomplish these ends if the need for which could have been foreseen or anticipated by such a visit. Attendance at Prebid Conference is mandatory for all bidders; bids will not be accepted from bidders who did not attend; see project schedule for date and time.

C. Contractor Use of Premises:

1. Limit use of premises to allow Owner occupancy and use.
2. Safeguard Owner's property at all times from injury or loss in connection with this work. Any damage, loss, or injury shall be made good by the Contractor without cost to the Owner.
3. Coordinate all work with Owner to minimize disruptions and comply with all rules regarding site access. Store materials and equipment only in designated areas and in accordance with Owner's instructions. Confine all work and storage of materials to the area(s) designated by the Owner.

D. Deviations and Discrepancies:

1. These specifications are accompanied by drawings indicating the layout to supply all phases of the job as listed in the Scope and elsewhere in the specifications. Large scale drawings take precedence over small scale drawings.
2. The drawings are intended to indicate only diagrammatically the extent, general character, and approximate locations of the work included. Work indicated but having minor details obviously omitted, shown incorrectly, or not shown, shall be furnished complete to perform the functions intended without additional cost to the Owner.
3. If any departure from the contract drawings is deemed necessary, details of such departures and the reasons therefore shall be submitted as soon as practical and within 30 days after award of the contract to the Engineer for approval. No departures shall be made without the prior written approval of the Engineer.
4. The drawings and these specifications are complementary each to the other and what is called for in one shall be as binding as if called for by both. In the event of a conflict within the contract documents, that which is best, better, or more stringent shall apply.
5. In the event of an obvious misapplication of equipment, material, installation practice, or other work, before proceeding, promptly notify the Engineer, verbally and in writing, who shall promptly review the items and respond similarly as to any needed adjustments.
6. Bidders shall study plans and specifications and in the event there any apparent errors, omissions, conflicts, or ambiguities, shall contact Engineer for clarification prior to submitting their bid.

E. Schedule of Values: Submit schedule of values to Engineer which indicates the contract cost breakdown of labor and materials for significant items of the contract.

F. Applications for Payment:

1. Submit 4 hard copies of each application on Forms are available at www.maine.gov/bgs/constrpublic/forms.
2. Content and Format: Utilize schedule of values for listing items in application for payment.
3. Payment Period: Monthly.

G. Change Procedures:

1. Change Order Forms: Forms are available at www.maine.gov/bgs/constrpublic/forms.
2. Change order pricing shall be based on contractor's actual cost of labor including taxes and insurance, invoice cost of material plus an allowance for overhead and profit as stated in the Standard General Conditions.
3. No change shall be made from the work, equipment, or materials under this section except as directed in writing by Engineer.
4. All requests for change in contract price and scope shall be accompanied by a breakdown list of materials with unit and extended prices and labor hours with unit and extended price, plus markups that have been applied.

H. Liability Insurance: Maintain such public liability insurance as required by the General Conditions to adequately protect Owner from all liability under the laws of the State of Maine.

1.3 ACCESS TO SITE

A. General: Contractor shall have limited use of Project site for construction operations as indicated on Drawings by the Contract limits and as indicated by requirements of this Section.

B. Use of Site: Limit use of Project site to work in areas indicated. Do not disturb portions of Project site beyond areas in which the Work is indicated.

C. 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.

D. Pre-Bid Touring

1. A minimum 24-hour notice is required and will include number of tour members.
2. Entry is at the main gate only.
3. No weapons, prescription drugs, tobacco products including matches, lighters nor alcohol are allowed beyond the main gate.
4. Any camera equipment needed for the Pre-Bid process will be under the control of Facility staff at all times. Pictures of inmates are prohibited.
5. A driver's license or other picture ID will be required at sign in.
6. Any cell phones and/or car keys will be left with the control officer upon sign-in.
7. A temporary pass will be issued that will be returned upon departure.
8. Any tools and/or equipment needed for the Pre-Bid process (not expected) shall have a written inventory included and will be left with the Control Officer for verification.
9. Vehicles must remain locked while in main lot. Trucks and open vehicles with exposed tools and equipment shall be parked at the satellite lot located on High Street at the Oak Haven Training Center.
10. Do not discuss any portion of the project with the inmate population.

1.4 SECURITY REQUIRMENTS

A. No person convicted of a felony shall be employed on projects at the Maine Correctional Center without the express written permission of the Commissioner of the Department of Corrections or the Warden of the Maine Correctional Center.

B. Through the use of a background check this Facility shall identify the circumstances that may or may not allow a Contractor’s employee entry to this Facilities Secure Area or Institution property: Conviction record, probation, up-coming hearing, summons, court appointment, family or friend incarceration or other situations. All situations are reviewed by the Director of Security or designee and any given circumstance may not alone restrict the employee’s access to the Facility.

C. The approved Contractor’s employees will be provided and carry a photo ID that shall be either worn or carried while working at the Facility. Allow a Contractor’s employee entry to this Facilities Secure Area or Institution property: Conviction record, probation, up-coming hearing, summons, court appointment, family or friend incarceration or other situations. All situations are reviewed by the Director of Security or designee and any given circumstance may not alone restrict the employee’s access to the Facility. The Central Control Officer and/or the Vehicle Entry Officer must verify this photo ID each time the employee enters or exits the Facility.

D. Contractor employees will be required to wear shirts at all times while performing work on all Facility grounds. Shirts and other articles of clothing that are worn on site must not contain offensive graphics, writing, pertain to or be associated with gang, cult or otherwise inappropriate action or gestures. All Contractors’ employees entering the Facility shall give the Control officer his/her vehicle keys and/or proper identification. A Facility Security Chit will be issued that shall be returned whenever exit from the Facility grounds is necessary.

E. Contractor employees must be aware that inmate clothing is often very similar to working clothing worn in the construction industries. It is imperative that Contractor employees maintain and use appropriately their pass or photo ID’s.

F. Additional or replacement employees shall comply with initial entry requirements.

G. Vehicles Entry, Exit And Inspection

1. Vehicle Sally Ports at the Facility have specific requirements concerning entry, exit and mandatory lockdown time frames. The Facility shall identify the morning entry time, end of day exit time (when Contractor must be at the exit location) and all mandatory shutdown time frames that will not allow the Contractor enter or exit the Facility Secure Area.
2. Only necessary Contractor construction vehicles, equipment or rented/leased equipment will be permitted on the Facility grounds. A minimum of 24-hours notice must be given to the Facility Project Coordinator concerning Contractor vehicles, delivery vehicles and equipment intended to enter the Security Perimeter.
3. Equipment or machinery may only be left inside the Facility Secure Perimeter with approval from the Facility Project Coordinator and

H. Phones, Tool, and Key Control the Director of Security. Each Facility construction activity may require individualized security measures.

1. Use of mobile/cell, pagers and portable radios/communication devices within the Facility are not allowed without prior approval from the Director of Security.
2. Tools and equipment used by Contractors that are entering the facility will be checked by the use of the Contractor's prepared inventory list. The Facility must verify use of this equipment.
3. Facility staff shall verify the contractor has the tools and equipment at the time of exiting the facility.
4. The contractor may seek authorization from the Facility Project Coordinator to leave specific tools and equipment at the site.
5. Contractor shall ensure all tools and equipment are accurately accounted for by completing a "Tool Shift Inventory Log" at the beginning and end of each work period.
6. All contractor tools and equipment shall be properly secured when not in use.
7. Facility staff shall be notified immediately if a tool is reported lost or missing.
8. All keys used inside the secure perimeter by the Contractor and/or employees for vehicles, equipment or the securing of tools and tool boxes shall be inventoried and under the overall control of the Facility Project Coordinator. Any locks, chains or other security devices deemed necessary by the Facility Project Coordinator or are needed on a temporary basis will be furnished by the Facility. Under no circumstances will any Facility security keys be issued to the Contractor's employees.
9. The Facility reserves the right to open any lock for security reasons such as verification of tool inventories, contraband movement or possible escape attempts.
10. The Facility Project Coordinator will verify whether or not locked, secured toolboxs will be allowed to be left on the job-site within a Facility Secure Area after working hours, their location and how the Contractor shall secure them.
11. The Facilities Fire Safety Officer must verify whether or not LP gas tanks, welding cylinders, equipment fuel or other volatile fluids are allowed to be stored within the Facility Secure Area or if this equipment shall be removed from the project area at the end of each day. The Fire Safety Officer shall identify the security required for such equipment whether within or outside of a Facility Secure Area.
12. Maintain list of approved screened personnel with Owner's representative.
13. Contractors will supply workers full name and date of birth 7 days in advance.
14. Unapproved workers and/or vendors will have restricted access and only when a security escort is available.

I. All workers shall sign the register each day upon entering the Maine Correctional Center.

J. All workers shall avoid any and all contact with inmates at the Maine Correctional Center and shall remain in their respective work areas.

K. All equipment and materials that could be used in an escape, as determined by the Warden or his designee, shall at all times be under supervision and removed from inside the prison walls at the end of each workday. Prior to the termination of the work day, anything missing or mislaid shall be immediately reported to the escorting officer. No powder actuated devises will be allowed except by the express written permission of the Warden or his designee. Tools, except those in actual use, shall be secured at all times, in locked tool boxes. Attached to each tool box, shall be a list of all tools contained within that tool box. This Inventory shall be checked at the beginning and at the end of each work day. Any lost/missing tools shall be reported immediately to the escorting officer. It shall be understood that the replacement cost of all tools and materials shall be the responsibility of the contractor. At the end of each day, tools such as ladders, ropes, insulating materials, cutting tools, etc., shall always be removed and secured from the inside of the prison. Other building materials considered to be a security risk, which can be moved, shall be removed and stored outside the prison walls at the end of each work day. The bulk of all construction materials shall be stored outside of the prison walls, in predesigned areas. The contractor shall transport materials into the prison only when it is scheduled for immediate incorporation into the work. All scrap, waste materials and debris shall be removed from within the prison walls ant the completion of each day. No vehicles or containers will be allowed to remain within the prison walls overnight, without the express permission of the Warden or his designee. Hoisting may only be done by the use of a rooftop mounted hoist. Aerial lifts may be utilized for material handling; however, the lift must be removed from the Maine Correctional Center grounds when not in actual use. Sheaves, tackle and lines must be removed at the end of each day. Deviation from this may be allowed only by the express consent of the Warden or his designee.

L. No employee of the Contractor will be allowed admittance to the prison if it is known that he has consumed any alcoholic beverages or drugs while outside the prison property during the working day.

M. The Contractor shall enforce a strict discipline and good order among employees.

N. The Contractor shall not allow intoxicating beverages or drugs on the job site. Prescription drugs and paraphernalia must be left at the control area for safe keeping.

O. The Warden of the Maine Correctional Center or his designee reserves the right to have any worker at any time removed from the premises with no notice and no reason has to be given.

P. An indoctrination session will be held at the beginning of construction to inform the workers of Maine Correctional Center rules and regulations.

Q. The Contractor should be aware that because of security problems he might have to vacate the premises without notice and would be expected to remove his work crew expeditiously.

R. Other Guidelines and Information for Contractor Personnel:

1. Refrain from any conversation with inmates.
2. Do not allow any item in your possession to become accessible to the inmates.
3. Do not accept gifts or take out of the institution any items for inmates (this includes letters, notes, or messages).
4. Any vehicle needed inside the institution will enter via the vehicle gate and only after proper clearance has been obtained. Only the driver will be able to accompany the

vehicle inside. The institution will proved an officer escort with the vehicle. If the vehicle is not absolutely needed at the job site, it will be returned to the outside as soon as possible. The same driver must accompany the vehicle upon departure via the vehicle entrance.

5. All workers other than vehicle driver will enter and depart the institution via the front entrance and information area. All workers will be properly identified before entering or leaving the institution. Picture ID's will be provided by the institution, while working, and any worker that fails to provide proper ID (State of Maine driver's license, or other picture ID) will not be allowed into the institution to work on that day.
6. Workers vehicles must be locked at all times, and parking will be in a designated area. Persons working inside the institution must leave the vehicle keys at the control room when entering the institution.
7. No firearms or ammunition will be permitted on prison property or in the immediate area.
8. Report any difficulty with prison personnel or request clarification of any prison rule or regulation to the escorting officer.
9. Work hours will be set in advance of the project. Any deviation from these hours will be made in advance with the approval of the Warden or his designee.
10. Lunch break will typically be between the hours of 11:00am and Noon. The vehicle entrance will not allow any traffic during count, 11:20am-11:50am.
11. Any Fuel operated machinery, including vehicles, and stationary equipment such as welders or air compressors, will have locking fuel caps, unless prior arrangement has been made with the Warden or his designee.

1.5 Contraband Law –Title 17-A MRSA s/s757, effective 05/01/76:

A. A person is guilty of Trafficking in Prison Contraband, if:

1. He intentionally conveys contraband to any person in official custody:
2. Or Being a person in official custody, he intentionally makes, obtains, or possesses contraband.

Contraband for the purpose of this section is defined as "a dangerous weapon, any tool or other thing that may be used to facilitate a violation of Section 755 (Escape), or any other thing which a person confined in official custody is prohibited by statute or regulation from making or possessing." Examples of contraband are: weapons, hacksaw blades, marijuana, drugs, alcohol, files, and cash money.

Punishment shall be a fine of not more than $2000.00 and/or imprisonment for not more than five (5) years.

B. All contractor personnel working in the Prison facility will be required to sign the following certification: "I certify that I do not have a criminal record, any guns, ammunition, knives, medicine, or intoxicants of any kind in my possession and that I will neither give to nor receive from any inmate any items whatsoever. I hereby release the Maine Correctional Center, its employees, and the State of Maine from all responsibilities and/or any claims for injury or death which might be incurred during my visit in the Maine Correctional Center."

C. It shall be the responsibility of the Contractor to ascertain that each individual for whom he is responsible receives and reads a copy of this section prior to entrance to the Maine Correctional Center.

1.6 COORDINATION AND MEETINGS

A. Coordination

1. Coordinate scheduling, submittals, and work of the various sections of specifications to assure efficient and orderly sequence of installation of interdependent construction elements.
2. Verify utility requirement characteristics of operating equipment are compatible with building utilities.
3. Coordinate space requirements and installation of mechanical and electrical work which are indicated diagrammatically on drawings. Follow routing shown for pipes, ducts, and conduit, as closely as practicable.
4. In finished areas, conceal pipes, ducts, and wiring within the construction.

B. Conferences and Progress Meetings:

1. Engineer will schedule a preconstruction conference after Notice of Award for all affected parties.
2. When required in an individual specification section, convene a preinstallation conference at project site prior to commencing work of the section.
3. Attend progress meetings scheduled throughout progress of the work at maximum monthly intervals.

1.7 SUBMITTALS

A. Submittal Procedures:

1. Use submittal form to identify project, contractor, subcontractor or supplier; and pertinent contract document references. Collect submittals in booklet form, organized in order of specification section and paragraph.
2. Apply Contractor's stamp, signed or initialed, certifying that review, verification of products required, field dimensions, adjacent construction work, and coordination of information is in accordance with the requirements of the work and contract documents.
3. Identify variations from contract documents and product or system limitations which may be detrimental to successful performance of the completed work.
4. Revise and resubmit submittals as required; identify all changes made since previous submittal.

B. Shop Drawings:

1. Submit in electronic form as a PDF to the engineer.

C. Product Data and Samples:

1. Submit the number of product data copies which the Contractor requires, plus 3 copies which will be retained by the Engineer.
2. Mark each copy to identify applicable products, models, options, and other data. Supplement manufacturers' standard data to provide information unique to this project.
3. When specified, submit samples to illustrate functional and aesthetic characteristics of the product.
4. Disposition of submittals shall not relieve the Contractor from the responsibility for deviations from drawings or specifications, unless such deviations have been submitted in writing to Engineer itemizing or calling attention to such deviations at time of submission and secured written approval from the Engineer, nor shall such disposition of shop drawings relieve the Contractor from responsibility for errors in such submittals.
5. Note well: Engineer will make a reasonable effort to identify errors contained in submittals, but will not be responsible for Contractor’s errors that Engineer did not correct.

D. Manufacturers' Instructions and Certificates:

1. When specified in individual specification sections, submit manufacturers' printed instructions for delivery, storage, assembly, installation, start-up, adjusting, and finishing, in quantities specified for product data.
2. When specified in individual specification sections, submit manufacturers' certificate to Engineer for review, in quantities specified for product data.

1.8 MATERIAL AND EQUIPMENT

A. Products:

1. Means new material, machinery, components, equipment, fixtures, and systems forming the work, but does not include machinery and equipment used for preparation, fabrication, conveying, and erection of the work. Products may also include existing materials or components specifically identified for reuse.
2. Do not use materials and equipment removed from existing premises, except as specifically identified or allowed by the contract documents.
3. Use interchangeable components of the same manufacture for similar components.

B. Transport, handle, store, and protect products in accordance with manufacturers' instructions.

C. Product Options and Substitutions:

1. Products specified by reference standards or by description only: Any product meeting those standards or description.
2. Products specified by naming one or more manufacturers: Products of manufacturers named and meeting specifications, no options or substitutions allowed.
3. Products Specified by naming one or more manufacturers with a provision for substitutions: Submit a request for substitution for any manufacturer not named.
4. In the event a proposed product substitution has been rejected once, no subsequent substitution is permitted and only products submitted as specified will be reviewed.

1.9 QUALITY CONTROL

A. Quality Assurance/Control of Installation:

1. Monitor quality control over suppliers, manufacturers, products, services, site conditions, and workmanship, to produce work of specified quality.
2. Comply fully with manufacturers' instructions.
3. 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.

B. Cutting and Patching Interior:

1. Employ skilled and experienced installers to perform cutting and patching and new work; restore all work with new products.
2. Submit a written request to Owner and Engineer in advance of cutting or altering structural or building enclosure elements.
3. Fit work tight to adjacent elements. Maintain integrity of wall, ceiling, or floor construction; completely seal voids.
4. Refinish surfaces to match adjacent finishes.

C. Cutting and Patching Exterior:

1. All grassed areas disturbed by trenching or by emplacement of concrete pads for pad-mounted meters, switches, or transformers, shall be restored to initial grade, unless specially sloped to facilitate drainage near pad-mounted devices, fertilized and seeded.
2. Patch paving to match existing.

D. Concrete Pads

1. Provide reinforced concrete pads for equipment as required. Pads shall be 6” in depth for outdoor pads and 4" in depth for indoor pads and be 6” larger than unit being supported.
2. Cement shall be Portland Cement conforming to ASTM C150 with fine and coarse aggregate conforming to ASTM C33. All concrete shall be 3000 psi, 28 day strength, 6% air, slump 3-5, 565 pounds minimum cement, .47 maximum water content.
3. Reinforcing bars shall be 40,000 psi yield strength, intermediate grade conforming to ASTM A615 and A160.

E. References:

1. Conform to reference standard by date of issue current as of date of contract documents.
2. Should a specified reference standard conflict with contract documents, request clarification from Engineer before proceeding.

F. Manufacturers' Field Services and Reports:

1. When specified in individual specification sections, require material or product suppliers or manufacturers to provide qualified staff personnel to observe site conditions and to initiate instructions when necessary.
2. Report observations and site decisions or instructions that are supplemental or contrary to manufacturers' written instructions.

1.10 CONSTRUCTION FACILITIES AND TEMPORARY CONTROLS

A. Temporary Electricity:

1. Provide power from existing generators during cutover to minimize outages. Power consumption shall not disrupt Owner's need for continuous service. Owner to pay for power consumed.

B. Enclosures:

1. Interior: Provide temporary partitions and ceilings as required to separate work areas from Owner occupied areas, to prevent penetration of dust and moisture into Owner occupied areas, and to prevent damage to existing materials and equipment.
2. Exterior: Provide appropriate barricades and safety warning devices, visible both day and night, to both satisfy any OSHA regulations and to protect passersby, both vehicular and pedestrian, from harm.

C. Protection of Installed Work:

1. Protect installed work and provide special protection where specified in individual specification sections.
2. Provide security and facilities to protect work and existing facilities, and Owner's operations from unauthorized entry, vandalism, or theft.

D. Progress Cleaning:

1. Maintain areas free of waste materials, debris, and rubbish. Maintain site in a clean and orderly condition.

E. Removal of Utilities, Facilities, and Controls:

1. Remove temporary above grade or buried utilities, equipment, facilities, materials, prior to final application for payment inspection.
2. Remove underground installations to a minimum depth of 3 feet.
3. Clean and repair damage caused by installation or use of temporary work.
4. Restore existing facilities used during construction to original condition.
5. Offer removed materials to Owner and if refused, dispose of in a legal manner off site.
6. Do not use Owner's dumpsters for disposal of any materials.

1.11 CONTRACT CLOSEOUT

A. Procedures:

1. Submit written certification that contract documents have been reviewed, work has been inspected, and work is complete in accordance with contract documents and ready for Engineer's inspection.
2. Submit final application for payment identifying total adjusted contract sum/price, previous payments, and amount remaining due.

B. Final Cleaning:

1. Execute final cleaning prior to final inspection.
2. Clean interior and exterior surfaces exposed to view. Vacuum carpeted and soft surfaces.
3. Clean debris from site, roofs, gutters, downspouts, and drainage systems.
4. Replace filters of operating equipment.
5. Remove waste and surplus materials, rubbish, and construction facilities from the site.

C. Project Record Documents:

1. Maintain on site, one set of contract documents to be utilized for record documents.
2. Record actual revisions to the work. Record information concurrent with construction progress.
3. Specifications: Legibly mark and record at each product section a description of actual products installed.
4. Record Documents and Shop Drawings: Legibly mark each item to record actual construction.
5. Submit documents to Engineer prior to claim for final application for payment.

D. Warranties:

1. Warrant all work and materials for a period of one year commencing with the acceptance by the Owner of the completed installation in accordance with the Contract Documents. Replace any work, materials, equipment, or system, which develops defects within the warranty period, without cost to the Owner.

PART 2 - PRODUCTS NOT USED

PART 3 - EXECUTION NOT USED

END OF SECTION

SECTION 03300 – CAST-IN-PLACE CONCRETE

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Concrete for electric utility handholes.
2. Concrete for pad-mounted equipment foundations.
3. Electric duct bank encasement.

B. Related Sections:

1. Division 00, including General and Supplementary Conditions, Division 01 Sections, and the Drawings, apply to this Section.

1.2 SUBMITTALS

A. Submit under procedures given in Section 01 33 00.

1. Concrete Mix Design.
2. Test Reports.

PART 2 - PRODUCTS

2.1 CONCRETE MIX MATERIALS

A. Cement: Type I Portland Cement conforming to ASTM C150.

B. Air Entraining: Darex, Ayrtrap, Airecon, or Aerolith.

C. Water: Shall be potable. No calcium chloride shall be added.

D. Aggregate: Fine and coarse aggregate shall conform to ASTM C33. Maximum size of coarse aggregate shall be 1". Fine and coarse aggregates shall be regarded as separate ingredients. All concrete shall be 3000 psi, 28 day strength, 6% air, slump 3-5, 565 pounds minimum cement, 0.47 maximum water content.

2.2 REINFORCEMENT

A. Reinforcing bars shall be of 40,000 psi yield strength, intermediate grade. Bars shall conform to ASTM specifications for:

1. Billet-steel bars A615.
2. Rail-steel bars A160.

Deformations of all except #4 bars shall be in accordance with ASTM A305.

B. Welded wire fabric shall conform to ASTM A185.

1. For all concrete slabs--6 x 6 - 10/10 unless noted otherwise.

2.3 FORM MATERIALS

A. Forms for exposed surfaces shall be moisture resistant plywood Formply or steel.

B. Forms for unexposed areas may be #2 common or better wood boards.

2.4 MIX DESIGN

A. The proportion of ingredients shall be selected to produce proper placing, durability, strength, and other required properties. The mixture shall be proportioned so that it will work readily into corners and angles of the forms and around reinforcement by the methods of placing and consolidating used on the job, but without permitting the materials to segregate or excessive free water to collect on the surface. The determination of the water-cement (W/C) ratio to attain the required strength shall be in accordance with paragraph 2.1.D above.

B. In lieu of proportioning by the above specified method, the concrete supplier may submit a mix design employing the same ingredients proposed for use and used successfully on a previous project under similar conditions to those anticipated on this project. To be accepted, the following data must be submitted and approved.

1. The concrete mix design.
2. Reports for at least 20 consecutive sets of 7 and 28 day concrete strength tests made during the last 6 months.
3. Reports of compliance tests of fine and coarse aggregates made during the last 6 months

PART 3 - EXECUTION

3.1 BATCHING AND MIXING

A. All concrete shall be Ready Mixed concrete and shall be batched and mixed in accordance with "Specifications for Ready Mixed Concrete," ASTM C94.

B. Admixtures specified shall be added to the mixer as a solution and dispensed automatically by a metering device accurate to 1% to 3%. Add different admixtures separately. Manual dispensing of admixtures may be allowed at the discretion of the Engineer.

C. Retempering

1. Water shall be added only to extent that the permissible slump and the maximum W/C ratio is not exceeded.
2. Cement and water to correct wet concrete shall be added only with the express approval of the Engineer, and then only to the extent that the maximum W/C ratio is not exceeded.
3. The concrete supplier may keep bagged cement on the job site for use as in paragraph 2 above if permission is granted by the Engineer.

3.2 FORMWORK

A. Do not use earth cuts as forms for vertical surfaces, except trench walls that are smooth and vertical may be permitted where approved by engineer.

B. Construct forms so that concrete surfaces will conform to dimensions indicated within a tolerance of +/- l/4". Forms shall be sufficient strength to prevent deflection due to force of concrete.

C. Do not remove forms until concrete has cured for 2 days.

D. Do not backfill until concrete has cured for 2 days.

3.3 CONVEYING AND DEPOSITING

A. Convey concrete from mixer to place of deposit as rapidly as practicable without separation and/or loss of ingredients.

B. Deposit concrete continuously, or in layers so that no seams or plane of weakness will be formed within the section. If a section cannot be placed continuously, locate construction joints at points as indicated or as approved. Deposit new concrete while previously placed concrete is still plastic. Discard concrete that has partially hardened or has been contaminated by foreign materials. Remove temporary spreaders in forms when concrete is an elevation where they are unnecessary. Permanent metal or concrete spreaders may be left in forms if approved by the Engineer.

3.4 PROTECTION AND CURING

A. Unless adequate protection is provided and/or approval is obtained, concrete shall not be place during rain, sleet, or snow.

B. Rain water shall not be allowed to increase the mixing water nor to damage the surface finish.

C. Protect freshly deposited concrete from premature drying and excessively hot or cold temperatures. Maintain minimum moisture loss at relatively constant temperature for period of time necessary for hydration of the cement and proper hardening of the concrete.

D. When the mean daily temperature of the atmosphere is less than 40^{o}F, maintain temperature of the concrete between 50^{o} and 70^{o}F for the required curing period. When necessary, make arrangements for heating, covering, insulating, or housing the concrete work in advance of placement. Arrangements shall be adequate to maintain required temperature and moisture conditions without injury due to concentration of heat.

END OF SECTION

SECTION 26 00 10 – BASIC ELECTRICAL REQUIREMENTS

PART 1 - GENERAL

1.1 SUMMARY

A. Summary of Electrical Work: The electrical work includes, but is not limited to, the following:

1. Underground duct bank for primary electric service and concrete foundation for primary switch.
2. Control wiring and related underground wiring.
3. Grounding System.
4. Other work as required to provide a complete and operating system.

B. Related Sections:

1. Drawings, Division 00, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUBMITTALS

A. Submit under procedures given in Section 01 33 00.

B. Submit shop drawings and product data grouped in sets to include complete submittals of related systems, products, and accessories in a single submittal. Clearly mark each submittal with appropriate specification section and paragraph reference.

C. Mark dimensions and values in units to match those specified.

D. Electrical submittals shall be reviewed by, and carry the approval stamp of, the electrical subcontractor and be initialed and dated by the reviewer.

E. Submit certificate of final inspection and approval from authority having jurisdiction, and record electrical drawings.

F. Upon request, provide samples for inspection. Samples will be returned after inspection is completed.

G. Manual: Upon completion of this portion of the Work, and as a condition of its acceptance, deliver to the Engineer for the Owner two copies of a manual describing the system:

1. Provide manuals in durable plastic ring binders, nominal 8½ x 11" size.
2. Identification on, or readable through, the front cover stating general nature of the manual.
3. A copy of all reviewed submittals and shop drawings.
4. Complete instructions regarding operation and maintenance of all equipment involved.
5. Complete name and address of nearest vendor of replaceable parts.
6. Copy of all guarantees and warranties issued.
7. Where contents of manuals include manufacturer's catalog pages, clearly indicate the precise items included in this installation.

1.3 QUALITY ASSURANCE

A. Regulatory Requirements:

1. Electrical: Conform to ANSI/NFPA 70, National Electrical Code.
2. Utility: Conform to the standards of:
   a. Central Maine Power Co. (CMP)
3. Obtain permits and request inspections from local building inspector.

B. Electrical materials, devices, and equipment shall be new. Where standards have been established by the following, they shall conform to those standards as to quality, fabrication, application, and installation and be not less than further required under this specification.

1. Underwriters Laboratories, Inc. (UL).
2. National Electrical Manufacturers Association (NEMA).
3. American National Standards Association (ANSI).
4. National Fire Protection Association (NFPA).
5. Occupational Safety and Health Administration (OSHA).
6. National Electrical Contractors Association (NECA).
7. Central Maine Power Co. (CMP), "utility company."
8. Standards of local Building Codes, Electrical, and Fire Departments, Town of Windham.

1.4 WORK SEQUENCE & COORDINATION

A. Install work under this section so as to conform to the progress of the work of other sections. Complete the electrical work as soon as conditions of the building will permit.

B. Coordinate in advance with other trades the shape, size and position of all necessary openings, sleeves, supports and related and coordinate electrical installation with electrical equipment, piping and ductwork to avoid conflicts and to provide electric service and wiring as required for a complete and operating system.

1.5 WIRING STANDARD

A. Follow wiring coding as indicated on the drawings. Use only the approved wiring methods for circuit applications as indicated in Table 1 (unmarked items are <u>not</u> permitted):

B. Where specifically detailed on drawings, follow wiring method indicated.

C. In the event an application location is encountered that is not listed in the wiring standards, consult Engineer for instructions.

TABLE 1

		Building Wire & Cables in Raceway							Cable	
	Application Location	RSC	EMT	PVC	Cable Tray	Suface Rc'wy	LiqTgt	Flex	MC	NM
1	Underground, 5' away from foundation - Primary, concrete encase - Secondary, no concrete	SFBC		BC SFBC SF						
2	In/under concrete slab to 5' away from foundation	SFBC		SFBC						
3	In slab above grade	BC		BC						
4	Exposed outdoor	SFBC								
5	Wet Interior	SFBC	SFBC							
6	Exposed dry interior Unfinished space	SFBC	BC							

Key: S=Secondary Service, F=Feeders, B=Branch Circuits, C=Control Circuits

1.6 SUBSTITUTIONS

A. Any proposal for a substitution shall be made in writing, including full details for consideration by Engineer. Substitutions will be permitted only by written acceptance of the Engineer.

B. Acceptance of a proposed substitution by the Engineer shall not relieve the Contractor from his responsibility to provide a satisfactory installation of the Work in accordance with the intent of the plans and specifications and shall not affect his guarantee covering all parts of the work.

C. Any material or equipment submitted for acceptance which is arranged differently or of a different physical size from that shown or specified shall be accompanied by shop drawings indicating the different arrangements of size and the method of making the various connections to the equipment. The final results shall be compatible with the system as designed.

D. Electrical materials and equipment have generally been specified by referencing one or more manufacturer's standard product. Materials of similar quality by listed "Acceptable Manufacturers" will generally not be considered a substitute and will be reviewed for conformance with these specifications. Materials not of similar quality, or by manufacturers not listed as acceptable, will be considered a substitute.

E. In the event a proposed substitution for material or equipment has been rejected, Engineer will only review subsequent submittals for that material or equipment that are not substitutes.

1.7 ENGINEER/ARCHITECT

A. The term "Engineer" shall refer to the electrical consulting engineer whose seal appears on the electrical drawings for this project and, for the purposes of contractual matters, shall be synonymous with the term "Architect" or "Architect/Engineer."

1.8 PROJECT/SITE CONDITIONS

A. Install work in locations shown on drawings, unless prevented by project conditions.

B. Prepare drawings showing proposed rearrangement of work to meet project conditions, including changes to Work specified in other sections. Obtain permission of Engineer before proceeding.

1.9 WORKMANSHIP

A. Workmanship shall be by licensed electricians well skilled in the trade. A Master Electrician licensed in the State of Maine shall be on site and supervise all work.

B. Install all work according to the best practices of the trade and in accordance with NECA -1-2000, "Standard Practices for Good Workmanship in Electrical Construction."

C. In the event of a conflict with required codes or an obvious misapplication of equipment, material, wiring practice, or other installation, before proceeding, promptly notify the Engineer. In no event shall any work be installed that is contrary to applicable codes.

1.10 DEVIATIONS AND DISCREPANCIES

A. The drawings are intended to indicate only diagrammatically the extent, general character, and approximate locations of the electrical work. Work indicated, but having minor details obviously omitted, shall be furnished complete to perform the functions intended without additional cost to the Owner. Follow the architectural, structural, and mechanical drawings so that work under this section is properly installed and coordinated with other sections.

B. The drawings and specifications are complementary each to the other and what is called for in one shall be as binding as if called for by both. In the event of conflicting information on the electrical drawings, or between or within drawings and specifications, or between trades, that which is better, best, most stringent, or most expensive will govern, except as may otherwise be permitted by Engineer.

C. Bidders shall study plans and specifications and in the event there are any apparent errors, omissions, conflicts, or ambiguities, shall contact Engineer for clarification prior to submitting their bid.

1.11 CHANGE ORDERS

A. No change shall be made from the work, equipment, or materials under this section except as directed in writing by Engineer.

B. All requests for change in contract price and scope shall be accompanied by a breakdown list of materials with unit and extended prices and labor hours with unit and extended price, plus markups that have been applied.

1.12 RECORD DRAWINGS

A. Keep in good condition at the job, apart from all other prints used in actual construction, one complete set of diazo blueline or white print electrical drawings. Record on these drawings, completely and accurately, any and all differences between the work as actually installed and the design as shown on the drawings. Record all changes within one week of the time that the changes are authorized. Record drawings shall be maintained in site construction office and be available for inspection by Engineer. At the completion of the work, deliver Record Drawings in accordance with requirement for submittals.

1.13 TESTING AND TRAINING

A. Conduct operating test for approval in presence of Engineer. The electrical work shall be demonstrated to operate as specified. Furnish instruments, materials, and personnel required for tests. Notify Engineer at least 10 days in advance of proposed test date.

B. Provide demonstration and training of the owner. Notify owner at least 10 days of proposed training date.

END OF SECTION

SECTION 26 05 00 - BASIC ELECTRICAL MATERIALS AND METHODS

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Existing work
2. Grounding and bonding
3. Connection of utilization equipment
4. Supports
5. Identification
6. Conduit and fittings
7. Surface raceway
8. Wireway
9. Underground electrical
10. Electrical boxes
11. Wire and cable
12. Cords and caps
13. Electrical tape
14. Terminations

B. Related Sections:

1. Drawings, Division 00, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.
2. Section 26 00 10, Basic Electrical Requirements.
3. Section 31 23 00, Earthwork for Utilities.
4. Section 03 30 00, Cast-in-Place Concrete.

1.2 REFERENCES

A. Conform to requirements of National Electrical Code (NEC) ANSI-C1/NFPA 70-2014

B. Conform to requirements of National Electrical Safety Code (NESC) ANSI 2007.

C. Furnish products listed by Underwriters Laboratories, Inc., or other testing firm acceptable to authority having jurisdiction.

1.3 SUBMITTALS

A. Product Data: Provide catalog data for the following:

1. Grounding and bonding devices
2. Supports
3. Anchors
4. Conduit and fittings
5. Surface raceway
6. Wireway
7. Electrical boxes
8. Wire and cable
9. Mounting brackets/ceiling channels

10. Service fittings
11. Handholes and manholes, access frames and covers
12. Concrete transformer foundation

B. Submit product data and shop drawings in booklet form with a separate sheet for each product. Indicate clearly on each sheet product manufacturer, catalog number, product description and other pertinent data.

C. Test reports.

1. Grounding system continuity and resistance test.
2. Conductor continuity and insulation resistance test.
3. Hi pot test.

1.4 PROJECT CONDITIONS

A. Existing project conditions indicated on drawings are based on casual field observation and existing record documents.

B. Verify field measurements and circuiting arrangements are as shown on drawings.

C. Verify removal of existing electric work.

D. Report discrepancies to Engineer before disturbing existing installation.

1.5 COORDINATION

A. Obtain and review shop drawings, product data, and manufacturer's instructions for equipment furnished under other sections to determine connection locations and requirements.

B. Sequence rough-in of electrical connections to coordinate with installation and start up of equipment furnished under other sections.

PART 2 - PRODUCTS

2.1 GROUNDING MATERIALS

A. Ground Rod: Copper clad steel, 3/4" diameter x 10' length. Die-stamp each near the top with the name or trademark of the manufacturer and the length of the rod in feet. The rods shall have a hard, clean, smooth, continuous, surface throughout the length of the rod.

1. Galvanized steel rods are permitted where required by Utility Company.

B. Mechanical Connectors: Bronze.

C. Compression set connectors and components: Burndy “Hyground” compression system, or approved equal.

D. Thermit Welds: Cadweld.

2.2 BASIC MATERIALS

A. Steel Channel: Galvanized or painted steel.

B. Anchors:

1. Masonry Anchors: Rawl-Stud, Lok-Bolt, Saber-Tooth, or equal by Arro, Diamond, or Redhead.
2. Hollow-Wall Anchors: Toggle bolt by Rawl or equal by Arro, Diamond, or Redhead.
3. Anchors shall have sufficient holding power for intended use.
4. Plastic anchors and powder actuated anchors are not permitted.

C. Miscellaneous Hardware: Treat for corrosion resistance.

D. Nameplates: Engraved three layer laminated plastic (lamicoid), white letters on black background. Embossed plastic adhesive tape labels, with 3/16" white letters on black background.

E. Wire and Cable Markers: Cloth markers, split sleeve or tubing type.

2.3 UNDERGROUND STRUCTURES

A. Handholes and Manholes:

1. Cast in place or precast reinforced concrete, suitable for AASHTO H-20 wheel loading, construct in accordance with details on drawings. Precast units shall be the product of a manufacturer regularly engaged in the manufacture of these units.
2. Provide access ladders, cable racks, and pulling-in eyes.
3. Locate duct entrances at corners to facilitate cable routing. Locate pulling-in eyes on wall opposite each duct entrance.
4. Metal Frames and Covers: Provide cast iron frames and covers as indicated, Neenah Foundry Co., R1663 (28") with Type C lid Series heavy duty, or equal. Provide AASHTO H-20 wheel load rating for installation subject to vehicular traffic.
5. The word “ELECTRIC” shall be embossed in all access covers.

B. Concrete Transformer, Switch and Meter Cabinet Foundations:

1. Cast in place or precast reinforced concrete, construct in accordance with details on drawings. Precast units shall be the product of a manufacturer regularly engaged in the manufacture of these units.
2. For precast unit, provide lifting lugs in the slab and base. Assemble slab to the base prior to shipping to the site to ensure proper fit with no rocking of the slab on the base.
3. Locate duct entrances at corners to facilitate cable routing. Locate pulling-in eyes on wall opposite each duct entrance.

C. Concrete:

1. Provide in accordance with Section 03 33 00 for Underground Structures.
2. Provide concrete with 4000 psi, 28 day compressive strength.
3. Maximum size of coarse aggregate shall be 1".

D. Reinforcing Steel:

1. Provide in accordance with Section 03 33 00 for Underground Structures.
2. Reinforcing bars shall be of 60,000 psi yield strength and conform to ASTM A615.

2.4 METAL CONDUIT

A. Acceptable Manufacturers:

1. Allied Tube and Conduit
2. Wheatland Tube Company
3. Jones and Laughlin

4. Republic Steel
5. Triangle PWC

B. Conduit:

1. Metal Conduit and Tubing: Hot dipped galvanized or sheradized steel.
2. Flexible Conduit: Galvanized steel.
3. Liquidtight Flexible Metallic Conduit: Flexible metal conduit with PVC jacket.

2.5 PLASTIC CONDUIT

A. Acceptable Manufacturers:

1. Carlon
2. National
3. American Pipe & Plastics, Inc.

B. Plastic Conduit:

1. Plastic Conduit: NEMA TC 2; PVC. Use Schedule 40 conduit.
2. Liquidtight Flexible Non-Metallic Conduit: Flexible conduit with hard PVC spiral and flexible jacket, Carlon Carflex or approved equal.

2.6 FITTINGS

A. Manufacturers:

1. Appleton
2. Bridgeport
3. O-Z/Gedney
4. Raco
5. Steel City
6. Thomas and Betts
7. Carlon
8. American Pipe & Plastics, Inc.

B. Conduit Fittings:

1. Metal Fittings and Conduit Bodies: NEMA FB 1.
2. Plastic Fittings and Conduit Bodies: NEMA TC 3.
3. Fittings and Conduit Bodies for RSC: Galvanized steel or malleable iron, couplings and fittings threaded.
4. Fittings for EMT: Watertight, concrete tight, compression style with galvanized or zinc-plated steel body and cadmium plated steel or malleable iron nut like O-Z/Gedney #7075S connector and #6075S coupling for 3/4" trade size. Set screw held connectors and fittings of any type are not permitted.
5. Conduit Bodies for EMT: Cast aluminum, galvanized iron or malleable iron bodies.
6. Insulated Bushings: Appleton "BBU".
7. Grounding Bushings: O-Z/Gedney "BLG".
8. Conduit Sealing Bushings: OZ Gedney Type CSB, or approved equal.
9. Fittings for Liquidtight Flexible Metallic Conduit: Galvanized steel or malleable iron, couplings and fittings threaded.
10. Fittings for Liquidtight Flexible Non-Metallic Conduit: High strength, chemical resistant, glass filled thermoplastic compression nut & ferrule assembly, Carlon Carflex or approved equal.

11. Conduit Clamps: Galvanized malleable iron equivalent to O-Z/Gedney 14-G and 15-G Series with clamp back spacer for RSC, and single hole #15-75G malleable or #15-75S galvanized steel clips for EMT.

C. Tray Cable Fittings:

1. Strain Relief Connectors: OZ Gedney Type SR Grip Tight, use on all multiconductor tray cable at box and equipment entrances.
2. Conduit Sealing Bushings: OZ Gedney Type CSB installed in conduit, or in Type GL cabinet adapter.

2.7 ELECTRICAL BOXES

A. Manufacturers:

1. Appleton
2. Crouse Hinds
3. Hoffman
4. Killark
5. Lee Products
6. Raco
7. Square D
8. Steel City

B. Boxes:

1. Sheet Metal: NEMA OS 1; galvanized steel, 4" x 4" x 2" with raised plaster ring and non-gangable 3" H x 3 1/2" D x 2" W per section masonry boxes. Gangable or sectionalizing boxes are not permitted.
2. Cast Metal: Aluminum or cast alloy, deep type "FD", gasket cover, threaded hubs, "Bell" boxes not permitted.

C. Mounting Brackets and Adjustable Ceiling Channels: Galvanized steel of substantial construction to support boxes by bridging between hollow wall studs or ceiling channels, like Caddy #SGB24 screw gun bracket, Caddy #H4 mounting bracket, and B-Line #BA-12 box hanger, or approved equal.

D. Pull Boxes: Code gauge galvanized steel, no prepunched knockouts.

E. Hinged Cover Enclosures: NEMA 250, Type 1, steel enclosure with manufacturer's standard enamel finish and continuous hinge cover, held closed by flush latch operable by screwdriver.

F. Fit exposed pull boxes, in areas accessible to inmates, with 12 gauge steel lockable covers. Lock and latch shall be flush type and incorporate a three point latch mechanism so that corners cannot be lifted. Doors shall be set flush in door frame.

G. Large Cast Metal Boxes:

1. Surface-Mounted Type: NEMA 250; Type 4 and Type 6, flat-flanged, surface mounted junction box; cast aluminum box and cover with ground flange, neoprene gasket, and stainless steel cover screws.

2.8 WIRE AND CABLE

A. Manufacturers:

1. Anaconda

2. Rome Cable
3. General Cable
4. Okonite
5. Phelps Dodge Cable
6. Southwire
7. Triangle PWC

B. Remote Control and Signal Cable:

1. Control Cable for Class 1 Remote Control and Signal Circuits: Copper conductor, 600 volt insulation, rated 60E C, individual conductors twisted together, shielded, and covered with PVC jacket.
2. Control Cable for Class 2 or Class 3 Remote Control and Signal Circuits: Copper conductor, 300 volt insulation, rated 60E C, individual conductors twisted together, shielded, and covered with PVC jacket; UL listed.
3. Plenum Cable for Class 2 or Class 3 Remote Control and Signal Circuits: Copper conductor, 300 volt insulation, rated 60E C, individual conductors twisted together, shielded, and covered with nonmetallic jacket; UL listed for use in air handling ducts, hollow spaces used as ducts, and plenums.

2.9 TAPE AND TERMINATIONS

A. Manufacturers, Tape:

1. 3M Co., Scotch #33 and #88

B. Manufacturers, Terminations:

1. Dossert
2. Ideal
3. 3M Co.
4. Thomas and Betts

C. Wire Connection Devices/Terminations: Compression set or twist-on type with integral molded insulation and internal metallic compression ring or spiral screw-on connecting device. Twist-on type shall be like Ideal "Wing Nut" series. Push-on type wire terminals are not acceptable.

D. Wire Terminals, Butt Splices: Crimp set with integral insulated sleeve, electro tin plated, fully annealed copper.

PART 3 - EXECUTION

3.1 EXISTING ELECTRICAL WORK

A. Verify that abandoned wiring and equipment serve only abandoned facilities.

B. Disconnect existing electrical systems in walls, floors, and ceilings indicated for removal.

C. Coordinate utility service outages and reconnections with Utility Company and Owner.

D. In any area requiring the work of other trades, carefully remove, store and protect any electrical items in the path of the work and re-install and re-connect after the completion of the other trade’s work.

E. In areas where painting is required, remove all electrical items including, but not limited to, lighting fixtures, devices and cover plates, then reinstall after painting has been completed. In the event any electrical items that were not removed become painted, clean the items, or replace if cleaning cannot be suitably cleaned.

F. Provide temporary wiring and connections to maintain existing systems in service during construction until replacement circuits and systems are ready for service, including circuits and systems that serve other areas.

1. Existing electrical feeders and branch circuits.

G. Remove, relocate, and repair existing installations to accommodate new construction.

1. Remove abandoned wiring to source of supply, and/or back to the serving panelboard and turn off breaker and mark as spare in the panelboard directory.
2. Remove exposed abandoned conduit and boxes, including abandoned conduit above accessible ceiling finishes.
3. Disconnect abandoned outlets and remove devices.
4. Provide blank cover for abandoned outlets which are not removed.
5. Disconnect and remove abandoned panelboards and distribution equipment.
6. Disconnect and remove electrical devices and equipment serving utilization equipment that has been removed.
7. Disconnect and remove abandoned luminaires, brackets, stems, hangers, and other accessories.
8. Disconnect and remove underfloor wiring, cut raceways flush with floor and patch and restore floor surfaces.

H. Repair adjacent construction and finishes damaged during removal of existing electrical work.

I. Maintain access to existing, active electrical installations.

J. Existing wiring, the need for which remains, found in good condition, properly located, and conforming to the specified wiring standard, may continue in service.

K. Clean and repair existing materials and equipment within limits of work which remain or are to be reused.

1. Panelboards: Clean and check tightness of electrical connections. Replace damaged circuit breakers and provide closure plates for vacant positions. Revise circuit directory.
2. Luminaires: Clean exterior and interior surfaces. Replace lamps and broken parts.
3. Do not reuse conduit, wire, and other materials except as specifically noted on the drawings.

L. Extend existing installations using materials and methods compatible with existing electrical installations, and as specified.

3.2 EXAMINATION AND PREPARATION

A. Verify that the interior of the building has been physically protected from weather.

B. Verify that supporting surfaces are ready to receive work.

C. Electrical boxes are shown on drawings, locations are approximate unless dimensioned.

1. Obtain verification from Engineer of floor box locations, and locations of outlets in office and work areas, prior to rough-in.

2. Elevator System: Determine location of outlets for lights, cab circuits, machines, and equipment installed in elevator pit, shaft, and machine rooms with elevator system installer prior to rough-in.

D. Make electrical connections to utilization equipment in accordance with equipment manufacturer's instructions.

1. Verify that wiring and outlet rough-in work is complete and that utilization equipment is ready for electrical connection, wiring, and energization.
2. Make wiring connections in control panel or in wiring compartment of prewired equipment. Provide interconnecting wiring where indicated.

3.3 GROUNDING

A. Install grounding electrodes and conductors at locations indicated. Install additional rod electrodes as required to meet Regulatory Requirements.

B. Provide ground bonding as indicated and to meet Regulatory Requirements. Include a separate green [or bare for NM cable] ground wire in each branch and feeder circuit and bond to grounding system.

C. Maintain isolation between neutral and ground conductors in accordance with NEC.

D. Install grounding system so all conductive materials operate at ground potential and there is a low impedance path to ground in the event of a fault.

E. Test grounding system for resistance to earth using fall-to-potential method in accordance with IEEE Std. 81. Maximum ground to earth resistance shall not exceed 25 ohms.

F. Test grounding system continuity resistance (megger); resistance shall not exceed 0.1 ohms.

G. Submit test reports for ground/earth resistance and continuity resistance.

3.4 SUPPORT SYSTEMS

A. Install support systems sized and fastened to accommodate weight of equipment and conduit, including wiring, which they carry.

1. Fasten hanger rods, conduit clamps, and outlet and junction boxes to building structure using expansion anchors, beam clamps, and spring steel clips as appropriate for the application.
2. Use toggle bolts or hollow wall fasteners in hollow masonry, plaster, or gypsum board partitions and walls; expansion anchors or preset inserts in solid masonry walls; self-drilling anchors or expansion anchor on concrete surfaces; sheet metal screws in sheet metal studs; and wood screws in wood construction.
3. Do not fasten supports to piping, ceiling support wires, ductwork, mechanical equipment, or conduit.
4. Do not use powder actuated anchors.
5. Do not drill structural wood or steel members.
6. Fabricate supports from structural steel or steel channel.
7. Install free standing electrical equipment on concrete pads.
8. Install surface mounted cabinets and panelboards with minimum of four anchors.
9. Provide steel channel supports to stand cabinets 1" off wall in wet locations.
10. Bridge studs top and bottom with channels to support flush mounted cabinets and panelboards in stud walls.

3.5 CONDUIT

A. Size raceways for conductor type installed or for type THW conductors, whichever is larger.

1. Minimum Size Conduit: 3/4".

B. Install all conduit concealed in walls or above finished ceilings except where specifically indicated to be surface mounted. Arrange conduit to maintain headroom and to present neat appearance. Install conduit in accordance with the following:

1. Route exposed raceway parallel and perpendicular to walls and adjacent piping.
2. Maintain minimum 6" clearance to piping and 12" clearance from parallel runs of flues, steam pipes, and heating appliances. Install horizontal raceway runs above water and steam piping.
3. Complete raceway installation before installing conductors.
4. Maintain required fire, acoustic, and vapor barrier rating when penetrating walls, floors, and ceilings. Where indicated on drawings, sleeve penetrations through concrete walls, floors, and ceilings.
5. Route conduit through roof openings for piping and ductwork where possible; otherwise, route through roof with pitch pocket.
6. Group in parallel runs where practical and install on steel channel support system. Maintain spacing between raceways or derate circuit ampacities to NFPA 70 requirements.
7. Use conduit hangers and clamps; do not fasten with wire or perforated pipe straps.
8. Use conduit bodies to make sharp changes in direction.
9. Terminate conduit stubs and box connections with insulated bushings.
10. Steel conduit joints shall be threaded; clamp on or set screw fittings are not permitted.
11. Use suitable caps to protect installed raceway against entrance of dirt and moisture.
12. Provide No. 12 AWG insulated conductor or suitable pull string in empty raceways, except sleeves and nipples.
13. Install expansion joints where raceway crosses building expansion joints, and where necessary to compensate for thermal expansion.
14. Install plastic conduit and tubing in accordance with manufacturer's instructions; thermoweld or cement PVC joints..
15. Use flexible or liquidtight conduit, short as possible, maximum 72 inches, for motor and equipment hookup; always include a separate green ground wire.
16. Use liquidtight conduit for flexible connections in damp or wet locations.
17. Install conduit so condensation will drain and not be trapped.
18. Prevent lodgement of dirt, trash, and mortar; swab all raceways prior to installation of wire and cable.

3.6 BOXES

A. General:

1. Install electrical boxes where shown on the drawings, and as required for splices, taps, wire pulling, equipment connections, and regulatory requirements.
2. Locate and install electrical boxes to maintain headroom and to present neat mechanical appearance.
3. Align wall mounted outlet boxes for switches, thermostats, and similar devices.
4. Coordinate mounting heights and locations of outlets above counters, benches, and back splashes.
5. Install lighting outlets to locate luminaires as shown on reflected ceiling plan.

6. Use expansion anchors, shields, or toggle bolts to fasten boxes in place. Do not use explosive powder driven anchors, except where specifically permitted by Engineer. Do not use nails or wire for permanent support.
7. Secure boxes to interior wall and partition studs, accurately positioned to allow for surface finish thickness; select raised cover depth to assure proper fit.
8. Do not install boxes back-to-back in walls; provide 6" minimum separation, except provide 24" separation, in acoustic rated walls.
9. Use hinged cover enclosure for interior pull and junction boxes larger than 12 inches in any dimension. Install in an accessible location that will allow easy access.
10. Field punch openings in pull boxes using punch/dies of appropriate size. Provide knockout closures for unused openings.

B. Surface mounted applications:

1. Use cast "FD" outlet boxes for all surface mounted applications to 10 feet above finished floor, and for exterior and wet locations.
2. Where pull boxes must be installed in finished areas, consult Engineer to select location, style, and finish. The location shall always be as inconspicuous as possible.

3.7 INSTALLATION OF WIRES AND CABLES

A. Verify that interior of building has been physically protected from weather, that mechanical work which is likely to injure conductors has been completed and completely and thoroughly swab raceway system before installing conductors.

B. Use wire not smaller than 12 AWG for power and lighting circuits, and not smaller than 14 AWG for control wiring.

1. Use 10 AWG conductor for 20 ampere, 120 volt branch circuit home runs longer than 75 feet; and for 20 ampere, 277 volt branch circuit home runs longer than 200 feet.

C. Neatly train and secure wiring inside boxes, equipment, and panelboards.

D. Use UL listed wire pulling lubricant for pulling 4 AWG and larger wires.

E. Install wiring according to the Wiring Standard, Section 26 00 10, or in another Division 26 Section, or as directed in applicable section. Protect and support exposed cables (where allowed) above accessible ceilings to keep them from resting on ceiling tiles. Use channel, or running boards as necessary to provide support. Do not support wiring on ceiling support wires, unless ceiling installer has provided certification that ceiling support system is rated to carry the additional load of the cables. Install cables to run parallel and perpendicular to building lines; do not run diagonally, leave ample slack cable at turns.

F. Make splices, taps, and terminations to carry full ampacity of conductors without perceptible temperature rise.

G. Terminate spare conductors with electrical tape.

H. Color code all service, feeder, branch, control, and signalling circuit conductors. Color shall be green for grounding conductors and white for neutrals, except where neutrals of more than one system are installed in same raceway or box, the other neutral shall be white with a colored (not green) stripe. Color code ungrounded conductors operating at 120 volts to ground black, red, and blue for Phases A, B, and C and at 277 volts, brown, orange, and yellow respectively.

I. Terminate all wire joints #10 AWG or smaller with crimp set or twist-on wire terminating device. Use crimp set or bolted "Burndy" or suitable alternate bolted or crimp set device for conductors larger than #10 AWG.

J. Cover all joints made with non-insulated connecting devices with electrical tape; use Type #88 at any time or #33 whenever the temperature of the joint or the room is above 60EF. Triple wrap joints, each wrap having a 50% overlay.

3.8 CORDS AND CAPS

A. Install prefinished cord set where connection with attachment plug is indicated or specified, or use attachment plug with suitable strain relief clamps.

B. Provide suitable strain relief clamps for cord connections to outlet boxes and equipment connection boxes.

C. Make wiring connections in control panel or in wiring compartment of prewired equipment in accordance with manufacturer's instructions. Provide interconnecting wiring where indicated.

D. Install disconnect switches, controllers, control stations, and control devices such as limit switches and temperature switches as indicated. Connect with conduit and wiring as indicated.

3.9 IDENTIFICATION

A. Identify electrical distribution and control equipment, and loads served, to meet regulatory requirements and as scheduled.

1. Degrease and clean surfaces to receive nameplates and tape labels.
2. Secure nameplates to equipment fronts using screws, rivets, or adhesive, with edges parallel to equipment lines. Secure nameplate to inside face of recessed panelboard doors in finished locations.
3. Use embossed tape nameplates with 3/16" lettering to identify individual switches and circuit breakers, wall switches, receptacle circuits, and loads served.
4. Use lamicoid nameplates with minimum 1/4" lettering to identify distribution and control equipment.
5. Nameplate information shall suitably identify the device or circuit. Any nameplate that is not suitably descriptive in the opinion of the Engineer shall be replaced as directed.

B. Install wire markers on each conductor in panelboard gutters, pull boxes, outlet and junction boxes, and at load connections.

1. Use branch circuit or feeder number to identify power and lighting circuits.
2. Use control wire number as indicated on schematic and interconnection diagrams and equipment manufacturer's shop drawings to identify control wiring.

3.10 UNDERGROUND ELECTRICAL

A. Install ducts in trenches furnished under Section 31 23 00, minimum 30" below grade or as indicated and slope 3" minimum per 100 feet away from buildings toward drainage points. Run ducts in straight lines except where change in direction is necessary. Protect ducts and bedding material from damage and displacement until backfilling has been completed.

B. Prior to installing conductors, clean ducts with bristle brush. Pull a test mandrel having a diameter 1/4" less than pipe diameter through duct to verify pipe is clear. Follow with a swab to clean out any remaining dirt or foreign matter.

C. Install yellow plastic warning tape above ducts approximately 12" below finish grade.

D. Cables shall be one piece unspliced between connections, except where distance exceeds available cable length, it may be spliced at accessible locations.

E. Install transformer pad as indicated and set level within 1/4" in 10'-0".

F. Coat metal conduit installed underground with two coats of Bitumastic allowing 24 hours drying time between coats. After installation is complete, coat joints and touch up nicks and scratches.

3.11 FIELD QUALITY CONTROL

A. Perform field inspection and testing of wiring as follows:

1. Inspect wire and cables for physical damage and proper connection.
2. Torque test conductor connections and terminations to manufacturer's recommended values.
3. Perform continuity and insulation resistance (megger) test on all power and equipment feeder and branch circuit conductors. Submit test report tabulating the test performed and the results.
4. Verify proper phasing connections; check rotation of all motors.

B. Perform field inspection and testing of devices as follows:

1. Test for proper polarity and ground continuity.
2. Test GFCI operation according to manufacturer’s written instructions.
3. Replace defective units and retest.
4. Submit test report.

END OF SECTION

SECTION 26 05 13.16 - MEDIUM VOLTAGE UNDERGROUND CABLES

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Underground medium voltage cable.
2. Coordinate underground work with local utility company to obtain a suitable and timely installation to supply power to the project.
3. Other work as needed to complete the installation.

B. Related Documents:

1. Division 00, including General and Supplementary Conditions, Division 01 Sections, and the Drawings, apply to this Section.
2. Section 26 00 10, Basic Electrical Requirements.
3. Section 26 05 00, Basic Electrical Materials and Methods.

1.2 REFERENCES

A. The publications listed below form a part of this specification to the extent referenced. The publications are referred to in the text by the basic designation only. Use latest version of each publication.

1. American National Standards Institute (ANSI) Publications: C2-2002 National Electrical Safety Code.

1.3 SUBMITTALS

A. Submit shop drawings and/or product data for each size and type for the following:

1. Wire and cable
2. Cable terminators and splices
3. Load break elbows

1.4 PRIMARY SERVICE CHARACTERISTICS

A. Local utility company is Central Maine Power Co. (CMP).

B. Medium voltage electrical characteristics for this project are 4,160Y2400V, three phase, 60 hertz.

PART 2 - PRODUCTS

2.1 MEDIUM VOLTAGE URD CABLE

A. Acceptable Manufacturers:

1. General Cable
2. Hendrix
3. Okonite

4. Pirelli
5. Rome

B. General: Type MV-105, #2 aluminum conductor, 5KV shielded power cable like Okonite Okoguard, or approved equal.

C. Construction:

1. Manufactured by the triple extrusion process wherein the three core layers--conductor shield, insulation, and insulation shield--are extruded and cured in one pass through the extruder.
2. The cable shall be wet cured ethylene propylene rubber (EPR).
3. Central Conductor: Aluminum conductors shall be Class B concentric-lay compressed strand in accordance with ASTM B231.

D. Conductor Shield:

1. Ethylene Propylene Rubber insulated cable: Extruded semiconducting thermoset compound that is compatible with the insulation and meetings the requirements in AEIC CS6-87, Section C and ICEA S-68-516, Paragraph 2.7.
2. The thickness of the conductor shield shall meet the requirements of AEIC CS5, Table D-1 or AEIC CS6, Table C1, as appropriate. The shield shall be bonded to the insulation and strip freely from the conductor.
3. The conductor shield for aluminum conductors shall be UCC HFDA 0802 EC, "Super Smooth Strand Shield" or equivalent.
4. The conductor shield for copper conductors shall be UCC HFDA 0800, "Super Smooth Strand Shield" or equivalent.

E. Insulation

1. High quality heat, moisture and ozone resistant chemically crosslinked ethylene propylene based rubber meeting the requirements of ICEA S-68-516.
2. Insulation thickness shall meet the requirements of AEIC CS5-94 Table C-1, or AEIC CS6-87 Table B1 as appropriate.
3. The insulation shall be suitable for use in wet or dry locations at conductor temperatures not to exceed 105^{o}C for continuous operation, 140^{o}C for emergency overload conditions and 250^{o}C for short-circuit conditions in accordance with AEIC CS5, Section A.6, and ICEA S-66-524, Section 3 or AEIC CS6, Section A.3, and ICEA S-68-516, Section 3, as appropriate.
4. The insulation compound shall be certified as extra clean and shall maintain this status throughout the material handling/transfer system prior to use in the extruder.

F. Insulation Shield

1. EPR cable: Extruded black semiconducting thermosetting compound meeting the requirements in Section C.3 of AEIC CS6 and Paragraph 4.1.1 in ICEA S-68-516.
2. The shielding compound shall be compatible with the insulation and identified as semiconducting by surface printing.
3. Thickness of the shield shall meet the requirements of Table D-2 in AEIC CS5-94 or Table C2 in AEIC CS6-87, as appropriate, and the stripping tension shall meet the requirements in Section G of AEIC CS5 or Section D of AEIC CS6 as appropriate.
4. The aged and unaged tensile strength and elongation of the semiconducting shield compound shall be tested according to Paragraph 6.4 of ICEA S-66-524 for XLP or Paragraph 6.5 of ICEA S-68-516 for EPR, as appropriate, and reported.

G. Metallic Shield

1. Helically applied with 12.5% overlap 5 mil copper tape.

H. Overall Jacket:

1. Extruded overall outer PVC jacket shall cover the metallic shield. The minimum average thickness over the metallic shield shall be in accordance with Paragraph 7.1.6 Optional Jackets Applied Over a Concentric Conductor in ICEA S-93-639/NEMA WC74, ICEA S-97-682, and UL 1072 as appropriate.

I. Identification:

1. The outer surface of each individual phase conductor shall be durably marked throughout its length in accordance with Section I of AEIC CS5-94, or Section H or AEIC CS6-87, as appropriate. Phase identification shall be included on three conductor cables. These markings shall not be indented or embossed.
2. The outer surface of each individual phase conductor shall be indented or embossed in accordance with paragraph 350G of ANSI C2-1997, National Electrical Safety Code. The indenting or embossing shall be repeated at an interval of not less than 36 inches nor more than 40 inches.
3. Sequential footage numbers shall be clearly printed throughout the cable length at two foot intervals.
4. The outer jacket shall have three extruded red stripes spaced 120 degrees apart. The stripes shall be flush with the jacket surface.
5. There shall be no ridges or grooves that run longitudinally along the cable.

J. Test Requirements: Each length of cable shall be tested in accordance with AEIC CS5-94, or AEIC CS6-87, as appropriate.

K. Packaging and Marking:

1. There shall be no water or corrosion in the stranded conductor of the completed cable when reel is shipped. Each end of cable shall be capped and sealed watertight to prevent the entrance of moisture into the cable during transit or outdoor storage.
2. The cable ends shall be securely attached to the reel and the cable protected with at least a NEMA Class 2 covering.
3. Reels shall be non-returnable wood and substantially constructed to afford proper protection of the cable during shipment and handling. Reels shall have a minimum outside drum diameter not less than prescribed in ICEA A-9-428, for each cable type.
4. Each reel shall be marked with a weather resistant label, securely attached to a flange of the reel and plainly stating the destination, purchaser's factory production lot identification, date of manufacture, description of cable, length of cable on reel, gross and tare weight of reel, and Contractor’s Purchase Order number.
5. Packaging, marking and shipping shall be in conformance with Section J of AEIC CS5-94 or Section I of AEIC CS6-87, as appropriate.

L. Quality Assurance:

1. Purchaser's quality assurance representatives shall have the right of access to, a) verify that the manufacturer's process controls are documented and, b) verify that the process controls are in use during the production of cable.
2. The manufacturer shall provide access to written information and procedures which demonstrates compliance to the specification requirements.

2.2 HIGH VOLTAGE CONNECTORS AND TERMINATIONS

A. Acceptable Manufacturers:

1. Cooper Power Systems
2. Elastimold
3. 3M Company

B. Medium voltage cable terminations shall be Elastimold 16 THG series single piece termination or approved equal. Select size to match cable and provide accessories as needed.

C. Medium voltage load break connector system, 5kv, 200 amp, Elastimold 160 series and related components and accessories. Provide matching load break junctions, parking bushing as required and/or indicated.

PART 3 - EXECUTION

3.1 CABLE INSTALLATION & TEST

A. Medium voltage cables underground shall be one piece, unspliced, between points of connection to terminations. Bends in cables shall be not less than 12 times the cable diameter. Leave at least 10' of slack below padmounted switchgear.

B. When pulling in cable, follow manufacturer's recommendations. Any cable damaged during handling by Contractor shall be immediately replaced at Contractor's expense. Before pulling cable, swab ducts to remove all foreign material. Pull cables down grade with feed in point at the highest point of the duct run. Use cable lubricants as recommended by the cable manufacturer.

C. Cable terminations shall be installed in accordance with the manufacturer's instructions.

D. After cable is pulled in and termination have been installed, high pot the assembly to a test voltage of 50 kv. Record leakage current at 15, 30, 45, and 60 seconds after application of test voltage and at one minute intervals thereafter. Results of this test shall be delivered to the Engineer within one week after test is done. In the event of excessive or increasing leakage current, Contract shall make such repairs or replacements as necessary to achieve satisfactory results.

END OF SECTION

SECTION 26 10 00 – MEDIUM VOLTAGE METAL-CLAD VACUUM SWITCHGEAR

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Coordinate overhead line work with local utility company to obtain a suitable and timely installation to minimize power outages to the project.
2. Setting, framing, guying of utility poles as indicated.
3. Other work as needed to complete the installation.

B. Related Documents:

1. Division 00, including General and Supplementary Conditions, Division 01 Sections, and the Drawings, apply to this Section.
2. Section 26 00 10, Basic Electrical Requirements.
3. Section 26 05 00, Basic Electrical Materials and Methods.

1.2 REFERENCES

A. The publications listed below form a part of this specification to the extent referenced. The publications are referred to in the text by the basic designation only. Use latest version of each publication.

1. ANSI/IEEE C37.20.2 - Standard for Metal-Clad Switchgear.
2. ANSI/IEEE C37.04 & .06 - Standard for Indoor AC Medium-Voltage Circuit Breakers used in Metal-Clad Switchgear.
3. ANSI/IEEE C37.11 - Requirements for electrical control for AC High- Voltage Circuit Breakers rated on a symmetrical current basis or a total current basis.
4. ANSI/IEEE 48 - Standard Test Procedures and Requirements for High-Voltage Alternating-Current Cable Terminations.
5. ANSI Z55.1 - Gray Finishes for Industrial Apparatus and Equipment.
6. ANSI/IEEE C57.13 - Requirements for Instrument Transformers.
7. NEMA SG4 - Alternating Current High Voltage Circuit Breakers.
8. NEMA SG5 - Power Switchgear Assemblies.

1.3 SUBMITTALS

A. Submit shop drawings and/or product data for each size and type for the following:

1. Metal clad switchgear

1.4 PRIMARY SERVICE CHARACTERISTICS

A. Local utility company is Central Maine Power Co.

B. High voltage electrical characteristics for this project shall be 4160 V, three phase, four wire, 60 hertz, wye connected and secondary voltage and phase as indicated.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Acceptable Manufacturers:

1. Square D
2. S&C Electric Co.

2.2 METAL CLAD SWITCHGEAR ASSEMBLY

A. The metal clad switchgear shall consist of an indoor enclosure containing circuit breakers and the necessary accessory components, all factory assembled for extension of existing Square D switchgear, and operationally checked. Refer to drawings for one-line diagram and physical layout and dimensions. The assembly shall be self-supporting and designed for floor mounting on a level concrete pad. The integrated switchgear assembly shall withstand the effects of closing, carrying and interrupting currents up to the assigned maximum short circuit rating.

B. System Voltage: 4,160 volts nominal, three phase grounded, 60 Hz.

C. Maximum Design Voltage: 5 kV.

D. Impulse Withstand (Basic Impulse Level): 95 kV.

E. Power Frequency Withstand: 36 kV, 1 minute test.

F. Main Bus Ampacity: 1200 amperes, continuous.

G. Momentary Current Ratings: Equal to the circuit breaker close and latch rating.

2.3 COMPONENTS

A. Stationary Structure

1. The switchgear shall be arranged as indicated on the drawings, assembled to form a rigid self-supporting completely enclosed structure providing steel barriers between sections. The sections are divided by metal barriers into the following separate compartments: circuit breaker, instrument, main bus, auxiliary device and cable. Each section may have up to two breaker compartments.

B. Circuit Breaker Compartment

1. Each circuit breaker compartment shall be designed to house a horizontal drawout metal-clad vacuum circuit breaker. The stationary primary disconnecting contacts are to be silver-plated copper and mounted within glass polyester support bushings. The movable contacts and springs shall be mounted on the circuit breaker element for ease of inspection/maintenance.
2. Entrance to the stationary primary disconnecting contacts shall be automatically covered by metal shutters when the circuit breaker is withdrawn from the connected position to the test or disconnected position or removed from the circuit breaker compartment. Extend a ground bus into the circuit breaker compartment to automatically ground the breaker frame with high-current spring type grounding contacts located on the breaker chassis when in the test and connected positions. Guide rails for positioning the circuit breaker and all other necessary hardware are to be an integral part of the circuit breaker compartment. Blocking devices shall interlock breaker frame sizes to prevent installation of a lower ampere rating or interrupting capacity element into a compartment designed for one of a higher rating. It shall be possible with indoor or outdoor walk-in switchgear

to install a circuit breaker into a bottom compartment without use of a transport truck or lift device.

C. Cable Compartment/Ground Bus

1. Clamp type cable lugs shall be furnished as shown on plans. The ground bus shall extend through this compartment for the full length of the switchgear.

D. Main Bus Compartment

1. The main bus is to be rated 1200 amperes and be fully insulated for its entire length with an epoxy coating by the fluidized bed process. The conductors are to be silver-plated copper and be of a bolted design. Access to this compartment is gained from the front or rear of the structure by removing a steel barrier. Bus supports and pass-thru barriers shall be glass polyester.

E. Doors and Panels

1. Relays, meters, control switches, etc., shall be mounted on a formed front-hinged panel for each circuit breaker compartment.

F. Circuit Breakers

1. The circuit breakers shall be rated 4,160 nominal volts, 5000 maximum volts, 60 Hz, with a continuous current rating of 1200 amperes and a maximum symmetrical interrupting rating of 36kA/750MVA - 5kV system. Furnish Type VAD-3/VAD-2 circuit breakers with one vacuum interrupter per phase. Breakers of same type and rating shall be completely interchangeable. The circuit breaker shall be operated by means of a stored energy mechanism which is normally charged by a universal motor but can also be charged by a manual handle for manual emergency closing or testing. The closing speed of the moving contacts is to be independent of both the control voltage and the operator. Provide a full front shield on the breaker. Secondary control circuits shall be connected automatically with a self-aligning, self-engaging plug and receptacle arrangement when the circuit breaker is racked into the connected position. Provision shall be made for secondary control plug to be manually connected in test position. A minimum of 3 auxiliary contacts (1a 2b), shall be provided for external use. Provisions shall be made for 6 additional cell-mounted auxiliary contacts both MOC and TOC type for external use. The racking mechanism to move the breaker between positions shall be an integral part of the circuit breaker element.
2. An interlocking system shall be provided to make it impossible to rack a closed circuit breaker to or from any position. An additional interlock shall automatically discharge the stored-energy operating mechanism springs upon removal of the breaker out of the compartment.
3. The circuit breaker control voltage shall be: 48 volts DC, - provide one capacitor trip unit for each circuit breaker.

G. Instrument Transformers

1. Current transformers - each breaker compartment shall have provision for front-accessible mounting of up to four current transformers per phase, ANSI standard relay accuracy, two on bus side and two on cable side of circuit breaker. The current transformer assembly shall be insulated for the full voltage rating of the switchgear. Relaying and metering accuracy shall conform to ANSI Standards. Voltage transformers are drawout mounted with primary current-limiting fuses and shall have ratio as

indicated. The transformers shall have mechanical rating equal to the momentary rating of the circuit breakers and shall have metering accuracy per ANSI Standards.

H. Control Wiring

1. The switchgear shall be wired with type SIS #14 AWG, except where larger size wire is specified. The switchgear shall be provided with terminal blocks for outgoing control connections. Wire markers shall be provided for each end of all control wires.

I. Protective Relays: Provide relaying instruments as indicated on drawings for each circuit breaker.

J. Ammeters: ANSI C39.1; indicating ammeter with 4.5 inch square recessed case and 250° scale, white dial with black figures and pointer, 5 ampere, 60 Hz movement, 1 percent accuracy.

K. Voltmeters: ANSI C39.1; indicating voltmeter with 4.5 inch square recessed case and 250° scale, white dial with black figures and pointer, 120 volt, 60 Hz movement, 1 percent accuracy.

L. Ammeter Transfer Switch: Rotary multistage detent type with 600 volt AC-DC silver plated contacts, engraved escutcheon plate, pistol-grip handle and four positions including OFF.

M. Voltmeter Transfer Switch: Rotary multistage detent type with 600 volt AC-DC Silver plated contacts, engraved escutcheon plate, pistol-grip handle, and seven positions including OFF.

2.4 FABRICATION

A. Construction: Each equipment bay shall be a separately constructed cubicle assembled to form a rigid free standing unit. Minimum sheet metal thickness shall be 11 gauge steel on all exterior surfaces. Adjacent bays shall be securely bolted together to form an integrated rigid structure. To assist installation and maintenance of bus and cables, the rear covers shall be removable. Each individual unit shall be braced to prevent distortion.

B. Dimensions: Standard dimensions per indoor section are: 36"W x 95"H x 92"D, except for 350MVA/1000MVA vacuum and all SF6 metal-clad, indoor section depth is 100".

C. Main bus shall be silver-plated copper, rated 1200 amps, and is to be supported on NEMA class A-20 glass reinforced polyester standoff insulators. Provide standard provisions for future extension, as applicable.

D. The metal-clad switchgear shall be fully assembled, inspected and tested at the factory prior to shipment. Large line-ups shall be split to permit normal shipping and handling as well as for ease of rejoining at the job site.

2.5 FACTORY FINISHING

A. All steel parts, except galvanized (if used), shall be cleaned and a zinc-phosphate pre-treatment applied prior to paint application.

B. Paint color shall be ANSI-61; TGIC polyester powder, applied electrostatically through air. Following paint application, parts shall be baked to produce a hard durable finish. The average thickness of the paint film shall be 2.0 mils. Paint film shall be uniform in color and free from blisters, sags, flaking and peeling.

C. Adequacy of paint finish to inhibit the buildup of rust on ferrous metal materials shall be tested and evaluated per paragraphs 5.2.8.1-7 of ANSI C37.20.2-1987. Salt spray withstand tests in accordance with paragraph 5.2.8.4 shall be performed on a periodic basis to provide conformance with the corrosion resistance standard of at least 1000 hours minimum.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Visually inspect switchgear for evidence of damage and verify that surfaces are ready to receive work.

B. Visually inspect to confirm that all items and accessories are in accordance with specifications and drawings.

C. Verify field measurements are as shown on design drawings, shop drawings, and as instructed by manufacturer.

D. Verify that required utilities are available, in proper location, and ready for use.

E. Beginning of installation means installer accepts existing surface conditions.

3.2 INSTALLATION

A. Install in accordance with manufacturer's instructions, applicable requirements of the NEC and in accordance with recognized industry practices.

B. Use jumper cables, as provided by the switchgear manufacturer, to connect the primary surge arresters.

C. Bending of high-voltage cables should be avoided or minimized. All necessary bends should meet at least the minimum radii specified by the cable manufacturer.

3.3 FIELD QUALITY CONTROL

A. Field inspection and testing will be performed by the installing contractor.

B. Perform mechanical operator tests in accordance with manufacturer's instructions.

C. Check torque of all bolted bus connections, including cable terminations.

D. Touch-up paint all chips and scratches with manufacturer-supplied paint and leave remaining paint with owner.

E. Verify key interlock operation.

F. Perform insulation resistance tests per manufacturer's published instructions.

G. Perform low-frequency withstand tests according to ANSI/IEEE C37.20.2, paragraph 5.5.

END OF SECTION

SECTION 26 13 00 – MEDIUM VOLTAGE PADMOUNTED SWITCHGEAR

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes: Medium voltage, padmounted, metal enclosed, fused switchgear assembly in accordance with accompanying plans and one-line drawings.

B. Related Documents:

1. Division 0, including General and Supplementary Conditions, Division 1 Sections, and the Drawings, apply to this Section.
2. Section 26 00 10, Basic Electrical Requirements.
3. Section 26 05 00, Basic Electrical Materials and Methods.

1.2 REFERENCES

A. The equipment shall comply with the following standards; use issue current at the time the contract is awarded:

B. American National Standards Institute (ANSI):

1. C2.2002 National Electrical Safety Code
2. C37.20.3 Metal-Enclosed Interrupter Switchgear

C. National Fire Protection Association (NFPA):

1. NFPA 70 National Electrical Code

D. The switchgear shall be listed by Underwriters Laboratories, Inc. and be in compliance with the Category A enclosure test requirements of ANSI Standard C37.57 to provide a degree of protection against contact with energized equipment in ground level installations subject to deliberate unauthorized acts by members of the unsupervised general public.

1.3 SUBMITTALS

A. Submittals for review shall include the following:

1. Outline drawing showing conduit entry areas and anchoring information and estimated weights.
2. Schematic wiring diagram drawings.
3. Sequence of operation.
4. Complete bill of material showing items to be supplied with manufacturer's name and part number and with reference numbers as shown on the drawings.

B. Submit one complete set of as-built drawings and material summary with the equipment.

C. Supply five copies of operation and maintenance manuals when the equipment is shipped. The manuals shall contain:

1. Sequence of Operation
2. Installation Instructions
3. Maintenance Instructions
4. Material Summary

5. Complete Drawings
6. Component Instructions
7. Spare Parts Information

1.4 QUALITY ASSURANCE

A. The padmounted switchgear shall conform to or exceed the applicable requirements of the following standards and codes:

1. All portions of ANSI C57.12.28, covering enclosure integrity for padmounted equipment.
2. Article 710-21(e) in the National Electrical Code, which specifies that the interrupter switches in combination with power fuses shall safely withstand the effects of closing, carrying, and interrupting all possible currents up to the assigned maximum short-circuit rating.
3. All portions of ANSI, IEEE, and NEMA standards applicable to the basic switch and fuse components.

B. Manufacturer's Requirements:

1. Electrical materials, equipment, and devices shall provide the highest reliability and ease of maintenance and operation.
2. The manufacturer shall have at least 15 years experience in the design, fabrication, testing, and service of this type of equipment and be able to document their qualifications.

C. Factory Testing:

1. The switchgear and controls shall be factory tested together to simulate a complete and integrated system. Submit copies of the test reports to the engineer.
2. The following separate tests (as applicable) shall be performed on the switchgear:

    a. Dielectric Test (Per ANSI C37.20.2, 5.3.1)
    b. Mechanical Test (Per ANSI C37.20.2, 5.3.2)
    c. Grounding of Instrument Transformer Case Test (Per ANSI C37.20.2, 5.3.3)
    d. Electrical Operation and Control Wiring Test (Per ANSI C37.20.2, 5.3.4.1)
    e. Polarity Test (Per ANSI C37.20.2, 5.3.4.3)
    f. Sequence Test (Per ANSI C37.20.2, 5.3.4.4)

3. The manufacturer of the padmounted switchgear shall be completely and solely responsible for the performance of the basic switch and fuse components as well as the complete integrated assembly as rated.
4. The manufacturer shall furnish, upon request, certification of ratings of the basic switch and fuse components and/or the integrated padmounted switchgear assembly consisting of the switch and fuse components in combination with the enclosure.

1.5 WARRANTY

A. The manufacturer shall warrant the equipment to be free from defects in material and workmanship for three (3) years from the date of start-up. The warranty shall include all parts and labor.

PART 2 - PRODUCTS

2.1 GENERAL

A. Manufacturers

1. S&C Electric Co.

B. The metal-enclosed switchgear shall conform to the following specification.

C. Drawings

1. The metal-enclosed switchgear assembly shall be in accordance with the plans and drawings.
2. The manufacturer shall furnish, with each metal-enclosed switchgear assembly, a set of drawings complete with a bill of material and showing: typical front views and open side views for each bay as well as typical components, their positions, and available space for cable termination; an anchor bolt plan with dimensions; a one-line diagram; and appropriate wiring diagrams.
3. The manufacturer shall furnish a comprehensive instruction manual covering installation of the switchgear assembly and operation of the various components.

D. The metal-enclosed switchgear shall consist of one or more indoor self-supporting bays, containing interrupter switches and (power fuses, electronic fuses, or both) with the necessary accessory components, all completely factory-assembled and operationally checked.

E. Ratings

1. The distribution system will be grounded.
2. The ratings for the integrated switchgear assembly shall be as designated below.

kV, Nominal…….4.16
kV, Maximum……..4.8
kV, BIL…….60
Main Bus Continuous, Amperes ……600

Short-Circuit Ratings
Amperes, RMS Symmetrical……..25,000
MVA Three-Phase Symmetrical
at Rated Nominal Voltage……..180
Duty-Cycle Fault-Closing
Amperes, RMS Asymmetrical……40,000

The momentary and duty-cycle fault-closing ratings of switches, momentary rating of bus, and interrupting ratings of fuses shall equal or exceed the short-circuit ratings of the metal-enclosed switchgear.

F. Certification of Ratings

1. The manufacturer of the metal-enclosed switchgear shall be completely and solely responsible for the performance of the basic switch and fuse components as well as the complete integrated assembly as rated.
2. The manufacturer shall furnish, upon request, certification of ratings of the basic switch and fuse components and/or the integrated metal-enclosed switchgear

assembly consisting of the switch and fuse components in combination with the enclosure(s).

3. The integrated switchgear assembly shall have a BIL rating established by test on switchgear of the type and kind to be furnished under this specification. Certified test abstracts establishing such ratings shall be furnished upon request.

G. Compliance with Standards & Codes

The metal-enclosed switchgear shall conform to or exceed the applicable requirements of the following standards and codes:

1. ANSI C37.20.3 (Metal-Enclosed Interrupter Switchgear).
2. The applicable portions of Article 710 in the National Electrical Code, including Article 710-21(e), which specifies that the interrupter switches in combination with power fuses shall safely withstand the effects of closing, carrying, and interrupting all possible currents up to the assigned maximum short-circuit rating.
3. The switchgear manufacturer shall furnish equipment that is listed by Underwriters Laboratories, Inc.

2.2 CONSTRUCTION

A. To ensure a completely coordinated design, the metal-enclosed switchgear shall be constructed in accordance with the minimum construction specifications of the fuse and/or switch manufacturer to provide adequate electrical clearances and adequate space for fuse handling.

B. Enclosure Construction

1. In establishing the requirements for the enclosure design, consideration shall be given to all relevant factors such as controlled access; tamper resistance; corrosion resistance; protection from ingress of rodents, insects, and weeds; and the possibility of arcing faults within the enclosure.
2. The enclosure of each bay shall be unitized monocoque construction to maximize strength, minimize weight, and inhibit corrosion.
3. The material for all external sides of the enclosure and the roof shall be 11-gauge hot-rolled, pickled and oiled steel sheet.
4. Each bay containing high-voltage components shall be a complete unit in itself, with full side sheets resulting in double-wall construction between bays. To guard against unauthorized or inadvertent entry, side and rear sheets and the top shall not be externally bolted.
5. The base shall be a continuous steel channel of a thicker gauge material than used for the enclosure and shall extend completely around all four sides of each bay.
6. Access to the interior of the enclosure shall be from the front only, allowing placement of the metal-enclosed switchgear assembly tight against a wall or back-to-back to minimize floor-space requirements.
7. To guard against unauthorized or inadvertent entry, there shall be no access to high voltage through side or rear sheets of the metal-enclosed switchgear assembly; and no access to high voltage by means of externally removable panels.
8. To guard against corrosion, all hardware (including door fittings, fasteners, etc.), all operating-mechanism parts, and other parts subject to abrasive action from mechanical motion shall be of either nonferrous materials, or galvanized or zinc-nickel-plated materials. Cadmium-plated ferrous parts shall not be used.
9. Externally accessible hardware shall not be used for support of high-voltage components or switch-operating mechanisms within the switchgear.

C. Door Construction

1. Doors shall be constructed of 11-gauge hot-rolled, pickled, and oiled steel sheet.
2. Doors shall have 90-degree flanges and shall overlap with the door openings. For strength and rigidity, and to minimize exposure, the door flanges shall be welded at the corners and shall be formed (at the top and both sides as a minimum) with a double bend so that the sheared-edge flanges at the top and both sides fold back parallel to the inside of the door. The double bend is not required on arc-resistant switchgear.
3. Doors over 40 inches in height shall have a minimum of three concealed galvanized steel or non-ferrous hinges with stainless-steel hinge pins. Doors 40 inches in height or less shall have a minimum of two such hinges.
4. Each door shall be equipped with a door handle. The door handle shall be padlockable and, on outdoor gear, shall incorporate a hood to protect the padlock shackle from tampering.
5. In consideration of controlled access, tamper resistance, and arcing faults, each door over 40 inches in height shall have a minimum of three concealed, interlocking, high-strength latches. Doors 40 inches in height or less shall have a minimum of two sure latches.
6. Doors providing access to interrupter switches or interrupter switches with power fuses shall be provided with a wide-view window, constructed of an impact-resistant material, to facilitate checking of switch position without opening the door.
7. Doors providing access to fuses or fused voltage transformers shall have provisions to store spare fuse units, refill units, or interrupting modules.
8. All doors providing access to high-voltage components shall be provided with a sturdy, self-latching door holder, which shall be zinc-nickel plated and chromate dipped.

D. Access Control

Access control shall be provided as follows:

1. Doors providing access to interrupter switches with fuses shall be mechanically or key interlocked to guard against:

   a. Opening the door if the interrupter switch on the source side of the fuse is closed, and
   b. Closing the interrupter switch if the door is open.

2. Doors providing access to interrupter switches only, which are operated by stored-energy type switch operators, shall be mechanically interlocked to guard against operating the interrupter switch if the door is open.
3. Doors and hinged-bolted panels providing access to high-voltage components shall be provided with flush-mounted key-operated snaplocks and shall have provisions for pad-locking.

E. Internal Protective Screens

1. In addition to the enclosure door, each bay or compartment thereof containing high-voltage components shall be provided with an internal protective screen, bolted closed, to guard against inadvertent entry to bays containing these components when the enclosure door is open.
2. Each bay containing a control-power transformer capable of 5 kVA or greater output shall be provided with an internal protective screen, bolted closed, to guard against inadvertent contact with the primary fuse when the enclosure door is open. In such cases, the screen shall also be interlocked to ensure that the secondary load has been disconnected prior to removal of these fuses.

F. Insulators

The interrupter-switch and fuse-mounting insulators, main-bus support insulators, insulated operating shafts, and (if applicable) push rods shall be of a cycloaliphatic epoxy resin system with characteristics and restrictions as follows:

1. Operating experience of at least 15 years under similar conditions.
2. Adequate leakage distance established by test per IEC publication 507, First Edition, 1975.
3. Adequate strength for short-circuit stress established by test.
4. Conformance with applicable ANSI standards.
5. Homogeneity of the cycloaliphatic epoxy resin throughout each insulator to provide maximum resistance to power arcs. Ablation due to high temperatures from power arcs shall continuously expose more material of the same composition and properties so that no change in mechanical or electrical characteristics takes place because of arc-induced ablation. Furthermore, any surface damage to insulators during installation or maintenance of switchgear shall expose material of the same composition and properties so that insulators with minor surface damage need not be replaced.
6. Isolating through-bushings for the 4.16-kV switchgear assembly shall be provided between all bays to guard against the propagation of a fault from one bay into the adjacent bay. The isolating through-bushings shall have features and capabilities as follows:

    a. The bushings shall be of a nontracking, self-scouring, nonweathering cycloaliphatic epoxy resin. Such bushings shall be the only dielectric insulating material between the energized bus conductor and the ground plane. A single semiconducting material is permissible as an interface between the energized conductors and bushings. Isolating systems that incorporate multiple insulating materials in series shall not be acceptable, thus avoiding generation of corona that can break down the weakest insulation material.
    b. The bushings shall be designed for adequate BIL and certified tests shall be provided upon request.
    c. The bushings shall provide a minimum of 12-1/2 inches of leakage distance between the energized bus conductor and the ground plane.
    d. To avoid thermally induced stresses that are likely to cause interface separation and failure, the bus conductor shall not be molded or cemented into the bushing.
    e. To avoid multiple insulating materials in series that are likely to cause voltage stresses that may lead to failure, the bus conductors shall not be covered with any insulating material in an effort to achieve BIL or increased leakage distance at locations where the bus passes through the bays.
    f. The openings between the bushings and bus conductors shall be closed with a semiconducting grommet and, to avoid multiple insulating materials in series, insulating materials such as fiberglass or porcelain shall not be used for such purpose.
    g. Bushing bus conductors and main bus conductors shall be designated for direct connection and shall not require laminated or flexible bus connections.
    h. The manufacturer of the switchgear assembly shall furnish, upon request, certified tests that establish the capability of the isolating through-bushing, bus conductor, and connections to meet the short-circuit rating of the switchgear assembly. Certified tests shall be furnished, upon request, that establish the capability of the bus connections to meet applicable temperature-rise requirements.
    i. To minimize space requirements, the overall length of the bushing shall be a maximum of 9-1/2 inches from end to end.

j. To avoid mechanical stresses that are likely to cause interface separation and failure, the isolating through-bushing shall include a flange at the ground-plane interface that shall be a formed homogeneous section of the bushing and not a separate part of dissimilar material that is molded or cemented to the bushing.
k. Bushings shall be secured to the ground plane by clamps that overlap the bushing flanges and press the flanges securely against the ground plane to seal the openings and restrict the propagation of ionized gases between bays.
l. For outdoor or dripproof applications, a drain channel shall be installed above the isolating through-bushings as a backup for the bay-to-bay gasketing so that any moisture entering between bays will not fall on the bushing or the bus.

G. Bus

1. High-Voltage Main Bus

a. Bus and interconnections shall consist of aluminum bar of a minimum 56% IACS conductivity.
b. The bus supports, bus, and interconnections shall withstand the stresses associated with short-circuit currents up through the maximum rating of the switchgear.
c. Bolted aluminum-to-aluminum connections shall be made with ½"—13 galvanized-steel bolts with two Belleville spring washers per bolt, one under the bolt head and one under the nut. These bolts shall be tightened to 50 foot-pounds torque.
d. Bus to which cable will be terminated shall be equipped with grounding provisions. Grounding provisions shall also be provided on the ground bus in such bays.

2. Ground Bus

a. A ground bus of short-circuit rating equal to that of the integrated assembly (or a ground connection, in the case of single-bay switchgear) shall be provided, maintaining electrical continuity throughout the metal-enclosed switchgear.
b. The ground bus shall consist of aluminum bar of a minimum 56% IACS conductivity.
c. In each bay, the ground bus (or connector) shall be bolted to a nickel-plated steel bracket, which shall be welded in place.
d. Nickel-plated steel brackets (at least one per bay) shall have a short-time current-carrying capability consistent with the short-circuit rating of the metal-enclosed switchgear.
e. Bolted connections shall be as specified for the main bus, except that only one Belleville spring washer shall be required per bolt for attachment of ground bus to the nickel-plated steel bracket.
f. For multi-bay metal-enclosed switchgear assemblies, two ground cable connectors accommodating No. 2 through 500 kc mil conductors shall be provided for connection of ground bus to station ground.

H. Low-Voltage Components

1. All low-voltage components, switch operators (except those integrally mounted in the switchgear stile), source-transfer controls, meters, instruments, and relays, shall be located in grounded, metal-enclosed compartments separate from high voltage to provide isolation and shall be arranged to allow complete accessibility for operation without exposure to high voltage.
2. Space heaters, where used, shall have a grounded, perforated, galvanized steel guard.

3. To provide isolation from high voltage, low-voltage wiring, except for short lengths such as at terminal blocks or at secondaries of sensing devices, shall be in grounded conduit, cable trays, or raceways.

I. Cable-Termination Space

To facilitate cable pulling and installation of cable terminators, provisions shall be made for:

1. Full front access for positioning and removal of cable pulling sheaves.
2. Free access without interference from nonremovable structural members or from mechanical linkages between the interrupter-switch blades and operating mechanism.

2.3 FINISH AND FEATURES

A. Outdoor Switchgear

1. Outdoor Finish

a. The enclosure finish shall conform to or exceed the applicable requirements of ANSI C57.12.28.

b. During fabrication, the areas of structural parts which may later become inaccessible, such as folded edges and overlapping members, shall be given an iron-oxide zinc-chromate anticorrosion primer to ensure that all surfaces are protected.

c. Full coverage at joints and blind areas shall be achieved by processing enclosures independently of components such as doors and roofs before assembly into the unitized structures.

d. To remove oils and dirt, to form a chemically and anodically neutral conversion coating to improve the finish-to-metal bond, and to retard underfilm propagation of corrosion, all surfaces shall undergo a thorough pretreatment process comprised of a fully automated system of cleaning, rinsing, phosphatizing, sealing, drying, and cooling before any protective coatings are applied. By utilizing an automated pretreatment process, the enclosure will receive a highly consistent thorough treatment, eliminating fluctuations in reaction time, reaction temperature, and chemical concentrations.

e. After pretreatment, protective coatings shall be applied that shall help resist corrosion and protect the steel enclosure. To establish the capability to resist corrosion and protect the enclosure, representative test specimens coated by the enclosure manufacturer’s finishing system shall satisfactorily pass the following tests:

1) 4000 hours of exposure to salt-spray testing per ASTM B 117 with:
   a) Underfilm corrosion not to extend more than 1/32” from the scribe as evaluated per ASTM D 1654, Procedure A, Method 2 (scraping); and
   b) Loss of adhesion from bare metal not to extend more than 1/8” from the scribe.

2) 1000 hours of humidity testing per ASTM D 4585 with no blistering as evaluated per ASTM D 714.

3) 500 hours of ultraviolet accelerated weathering testing per ASTM G 53 using lamp UVB-313 with no chalking as evaluated per ASTM D 659, and no more than a 10% reduction of paint gloss as evaluated per ASTM D 523.

4) Crosshatch adhesion testing per ASTM D 3359 Method B with no loss of paint.

5) 160-inch-pound impact adhesion testing per ASTM D 2794 with no paint chipping or cracking.

6) Oil resistance testing consisting of a 72-hour immersion bath in mineral oil with no shift in color, no streaking, no blistering, and no loss of hardness.
7) 3000 cycles of abrasion testing per ASTM 4060 with no penetration to the substrate.

f. Certified test abstracts substantiating the above capabilities shall be furnished upon request.
g. A heavy coat of insulating "no-drip" compound shall be applied to the inside surface of the roof structure to prevent condensation of moisture thereon.
h. After the enclosures are completely assembled and the components (switches, fuses, bus, etc.) are installed, the finish shall be inspected for scuffs and scratches. Blemishes shall be touched up to restore the protective integrity of the finish.
i. Touch-up materials—with complete instructions—shall be included with each shipment of metal-enclosed switchgear for touch-up in the field.
j. The finish shall be light gray, satisfying the requirements of ANSI Standard Z55.1 for No. 61 or No. 70; or shall be olive green, Munsell 7GY3.29/1.5.

B. Outdoor Features

1. Enclosure Ventilation

a. Ventilation openings shall be provided at the top and bottom on the front and rear of each bay. Ventilation openings on the front of arc-resistant switchgear shall be provided at the top only.
b. Vents shall be rain-resistant and corrosion-resistant.
c. Each vent shall have an inside screen and baffle to exclude insects and to protect against insertion of foreign objects.

2. Lifting eyes shall be removable. Sockets for lifting eyes shall be blind-tapped.
3. Gasketing and Sealing

a. Door openings and openings for hinged bolted panels (and bolted panels providing access to low-voltage components) shall have resilient compression gasketing to prevent water from entering the enclosure.
b. Gasket seals shall be provided at the top and side edges of adjoining bays to prevent water entry between the double walls.
c. The top and both sides of bus openings between bays shall be covered with channel gaskets as an additional protection against entrance of water or external labyrinthine metal rainshields shall be provided over enclosure roof flanges between adjacent bays.
d. Roofs shall be weather-sealed in place with a suitable sealant.

4. Space Heaters

a. Space heaters with sheaths of high-temperature chrome steel shall be provided to maintain air circulation inside the enclosure.
b. There shall be a space heater in each bay.
c. Space heaters shall be wired.
d. Space heaters shall be prewired, controlled by a thermostat, and operated at 120 VAC, supplied by power from the internal VT's.

5. Four sets of (3) VT's connected phase to ground will be supplied for control power to the heaters, lights, metering, and for the sensing for the two source transfer Micro AT controls.
6. 3 kV MCOV distribution class surge arresters shall be provided in the entrance bays.

7. Three 600:5 window CT's shall be provided in each of the utility entrance bays to be used for metering.
8. An Ion 6200 digital meter shall be provided on the door of each of the utility entrance bays.
9. A light and door activated light switch shall be provided in each of the bays.
10. Three sets of Infra-Red viewing windows shall be provided for each bay for viewing of fuses, bus connections, switch connections, etc.

2.4 BASIC COMPONENTS

A. Interrupter Switches

1. Interrupter switches shall have a one-time or two-time duty-cycle fault-closing rating equal to or exceeding the short-circuit rating of the switchgear. These ratings define the ability to close the interrupter switch either alone (unfused) or in combination with the appropriate fuse, once or twice (as applicable) against a three-phase fault with asymmetrical current in at least one phase equal to the rated value, with the switch remaining operable and able to carry and interrupt rated current. Tests substantiating these ratings shall be performed at maximum voltage. Certified test abstracts establishing such ratings shall be furnished upon request.
2. Interrupter switches intended for manual operation shall be operated by means of an externally operable, nonremovable handle. The handle shall have provisions for padlocking in both the open and a closed positions. Interrupter switches intended for power operation shall be operated by means of a switch operator expressly designed to be compatible with the interrupter switch.
3. Interrupter switches shall utilize a quick-make quick-break mechanism installed by the switch manufacturer, which shall swiftly and positively open and close the interrupter switch independent of the switch-handle or switch operator operating speed.
    a. For manually operated interrupter switches, and for interrupter switches operated by direct motor drive switch operators, the quick-make quick-break mechanism shall be integrally mounted to the switch frame.
    b. For interrupter switches operated by stored-energy switch operators, the quick-make quick-break mechanism shall be an integral part of the switch operator.
4. Interrupter switches shall be completely assembled and adjusted by the switch manufacturer on a single rigid mounting frame. The frame shall be of welded steel construction such that the frame intercepts the leakage path which parallels the open gap of the interrupter switch, to positively isolate the load circuit when the interrupter switch is in the open position.
5. Interrupter switches shall be provided with a single blade per phase for circuit closing including fault closing, continuous current carrying, and circuit interrupting. Spring-loaded auxiliary blades shall not be permitted.
6. Circuit interruption shall be accomplished by use of an interrupter which is positively and inherently sequenced with the blade position. Circuit interruption shall take place completely within the interrupter, with no external arc or flame. Any exhaust shall be vented in a controlled manner through a labyrinthine muffler or a deionizing vent.
7. Interrupter switches shall have a readily visible open gap when in the open position to allow positive verification of switch position.
8. Terminals on interrupter switches to which cable will be terminated shall be equipped with grounding provisions. Grounding provisions shall also be provided on the ground bus in such bays.
9. Terminals for entrance-bay applications only shall be equipped with provisions for two cables per phase.
10. Bus tie switches if required will be in-line with the bus and mounted to the roof of the switchgear.

2.5 FUSES

A. Solid-Material Power Fuses

1. Solid-material power fuses shall be of the solid-material type and shall utilize refill-unit-and-holder or fuse-unit-and-end-fitting construction. The refill unit or fuse unit shall be readily replaceable.
2. For switchgear rated up through 270 MVA at 4.16 kV mountings for solid-material power fuses shall be disconnect style. Non-disconnect style mountings for power fuses shall be used only where higher ratings are required.
3. Fusible elements shall be nonaging and nondamageable so that it is unnecessary to replace unblown companion fuses following a fuse operation.
4. Fusible elements for refill units or fuse units, rated 10 amperes or larger, shall be helically coiled to avoid mechanical damage due to stresses from current surges.
5. Fusible elements that carry continuous current shall be supported in air to help prevent damage from current surges.
6. Solid-material power fuses shall have melting time-current characteristics that are permanently accurate with a maximum total tolerance of 10% in terms of current. Time-current characteristics shall be available which permit coordination with protective relays, automatic circuit reclosers, and other fuses.
7. Solid-material power fuses shall be capable of detecting and interrupting all faults whether large, medium, or small (down to minimum melting current), under all realistic conditions of circuitry, with line-to-line or line-to-ground voltage across the power fuses, and shall be capable of handling the full range of transient recovery voltage severity associated with these faults.
8. All arcing accompanying power fuse operation shall be contained within the fuse, and any arc products and gases evolved during fuse operation shall be vented through exhaust control devices that shall effectively control fuse exhaust.
9. Solid-material power fuses shall be equipped with a blown-fuse indicator that shall provide visible evidence of fuse operation while installed in the fuse mounting.
10. Solid-material power fuses in feeder bays shall be equipped with grounding provisions on the load side of each fuse and on the enclosure ground bus.

2.6 SWITCH OPERATORS

A. The following requirements apply to switch operators that incorporate an integral quick-make quick-break mechanism for solenoid trip-open and solenoid trip-closed operation with motor recharge—for use with interrupter switches rated 13.8 kV nominal, 600 amperes load interrupting or less.

1. Switch operators shall be of the stored-energy type. They shall be equipped with an integral quick-make quick-break mechanism installed by the switch operator manufacturer, which shall store sufficient mechanical energy to either open or close the interrupter switch. The quick-make quick-break mechanism shall swiftly and positively open and close the associated interrupter switch independent of the speed of the charging motor or manual handle.
2. Switch operators shall be equipped with a tripping solenoid to release the stored energy to open or close the associated interrupter switch in response to a control signal. Total operating time for opening or closing shall not exceed 4 cycles from the time the solenoid is energized.
3. Switch operators shall be equipped with a charging motor that shall charge the quick-make quick-break mechanism within 1Z\x seconds after each switch operation.
4. Switch operators shall be equipped with a torque limiter to absorb deceleration forces when travel limits are reached during charging to allow the motor to positively and completely charge the quick-make quick-break mechanism without transmitting excessive torque to the mechanism.

5. Pushbuttons shall be provided to permit local electrical trip-open and trip-closed operation. Local electrical operation shall be prevented when the source-transfer control is in the automatic mode.
6. Switch operators shall be provided with a manual charging access port and a removable manual-charging handle to allow manual charging of the quick-make quick-break mechanism in the absence of control power. While the manual charging access port is open, the motor-charging circuit shall be disconnected to prevent inadvertent electrical charging of the quick-make quick-break mechanism.
7. Switch operators shall be equipped to permit local mechanical trip-open and trip-closed operation in the event control power is lost.
8. Switch operators shall be located within a grounded, metal-enclosed low-voltage compartment in the switchgear stile, and shall be mounted on a drawout carriage. The metal-enclosed compartment shall provide isolation from high voltage to help protect operating personnel. The drawout carriage shall permit decoupling of the switch operator from the associated interrupter switch for testing and exercising of the switch operator without opening or closing the interrupter switch and without exposure to high voltage. When the switch operator is decoupled, the associated interrupter switch shall be locked open or closed, depending upon switch position at the time of decoupling. It shall not be possible to recouple the switch operator to the interrupter switch unless the switch operator is in the same position (open or closed) as the interrupter switch.
9. Switch operators shall be equipped with targets to show whether the quick-make quick-break mechanism is charged or discharged; whether the switch operator is in the switch-open or switch-closed position; whether the associated interrupter switch is in the open or closed position; and whether the switch operator is in the coupled or decoupled position.
10. Switch operators shall be equipped with an operation counter.
11. Switch operators shall be equipped with key interlocks and auxillary switches to prevent anti-paralleling.
12. Switch operators shall be provided with a hinged padlockable steel cover or door to protect the switch operators and to guard against tampering. The cover or door shall be equipped with windows (unless Category A enclosures are required) to allow observation of the switch operator targets. Gasketing shall be installed between the cover or door and the mounting surfaces.

2.7 SOURCE-TRANSFER CONTROLS

A. Operating Description

1. Common-Bus Primary-Selective System

a. Transfer on Loss and Return of Source Voltage

1) The source-transfer control shall utilize the common-bus primary-selective system. The normal condition shall be with one source interrupter switch (for the preferred source, as field programmed) closed to energize the high-voltage bus, and with the other source interrupter switch (for the alternate source) open with its associated circuit available as a standby. The control shall monitor the conditions of both power sources and shall initiate automatic switching when the preferred-source voltage has been lost (or reduced to a predetermined level) for a period of time sufficient to confirm that the loss is not transient. The automatic switching shall open the preferred-source interrupter switch and then close the alternate-source interrupter switch to restore power to the high-voltage bus.

2) When normal voltage returns to the preferred source for a preset time, the control shall initiate retransfer to the preferred source if in the automatic return mode, or await manual retransfer if in the hold return mode. In the hold return mode, if the alternate source fails and if the preferred source has been restored, the control shall initiate automatic retransfer to the preferred source.

3) In the automatic return mode, the control shall provide either open transition (nonparalleling) or closed transition (paralleling) on retransfer, as field programmed.

2. Transfer on Unbalance Condition

1) A field programmable unbalance detection feature shall initiate automatic switching on detection of source-side open-phase conditions at the same voltage level as the metal-enclosed switchgear, whether caused by utility-line burndown, broken conductors, single-phase switching, equipment malfunctions, or single-phasing resulting from blown source-side fuses. The control shall continuously develop and monitor the negative-sequence voltage to detect any unbalance present as a result of an open-phase condition. Automatic switching shall occur when the system unbalance exceeds a predetermined unbalance-detect voltage for a period of time sufficient to confirm that the condition is not transient.

2) When normal phase voltages return to the preferred source, the control shall initiate retransfer to the preferred source as described in 4.4.1.1(1) (a) and (b).

3. Control Features

a. The operating characteristics of the source-transfer control and its voltage-, current-, and time-related operating parameters shall be field programmable and entered into the control by means of a keypad. To simplify entry of this information, a menu arrangement shall be utilized including keys dedicated to the operating characteristics and to each of the operating parameters. Entry of an access code shall be necessary before any operating characteristic or operating parameter can be changed.

b. All operating characteristics and operating parameters shall be available for review on a liquid-crystal display with backlighting.

c. Light-emitting diode lamps shall be furnished for indicating the presence of acceptable voltage on each high-voltage source.

d. A light-emitting diode lamp shall be furnished for indicating that all switch operators are coupled to their respective interrupter switches and in the correct positions, the control is in the automatic mode, that all doors providing access to interrupter switches powered by stored-energy switch operators are closed and latched, and all control circuitry is properly connected for automatic transfer. The display specified in 4.4.2 (2), when not being used to show menu information, shall show messages explaining why this lamp is not lighted.

e. A selector switch shall be furnished for choosing manual or automatic operating mode. In the manual mode, local electrical trip-open and trip-closed operation by means of pushbuttons shall be enabled while automatic switching shall be inhibited.

f. Test keys shall be furnished for simulating loss of voltage on each of the two sources, as well as for checking the functioning of the lamps, display, and keypad.

g. The control shall include built-in diagnostics for analyzing system events. The device shall automatically record system status and source-transfer control status every time a control operation occurs. All such operations shall be indicated by the illumination of a light-emitting diode lamp and shall be available for display by means of a dedicated event key.

h. The present source voltage and current inputs, and the present status of discrete inputs to and outputs from the control shall be available for display by means of a dedicated examine key.

i. The control shall have the capability to automatically calibrate to a known voltage on each source. This capability shall be keypad selectable.

4. Construction Features

a. Source-transfer controls shall employ an advanced microprocessor to provide the superior reliability and serviceability required for use in power equipment. All components shall be soldered on printed-circuit boards to minimize the number of interconnections for increased reliability.

b. All interconnecting-cable connector pins and receptacle contacts shall be gold-over-nickel plated to minimize contact pressure.

c. The surge withstand capability of the control shall be verified by subjecting the device to both the ANSI Surge Withstand Capability Test (ANSI/IEEE Standard C37.90.1) and to a 5-kV, 3.75-joule capacitive-discharge test. For the capacitive-discharge test, a suitable capacitor shall be charged to 5 kV, and shall then be used to discharge 3.75 joules into each input circuit and each output circuit of the device.

d. To identify and eliminate components that might be prone to early failure, the control shall be subjected to a dielectric test, a functional check, and a 72-hour screening test followed by a second functional check. For the screening test, the control shall be energized at rated control voltage while subjected to a maximum-design operating temperature of +70ºC for 24 hours, followed by 48 hours during which the temperature is cycled repeatedly between –40ºC and +70ºC.

e. The control shall be located in a grounded, metal-enclosed low-voltage compartment in the switchgear stile, and shall be mounted on a drawout carriage. The metal-enclosed compartment shall provide isolation from high voltage.

f. For source-transfer control connections not soldered directly to the printed-circuit board, all interconnecting-cable connector pins and receptacle contacts shall be gold-over-nickel plated to minimize contact resistance.

g. Source-transfer controls shall be provided with a hinged padlockable steel cover or door to protect the control and to guard against tampering. The cover or door shall be equipped with a window (unless Category A enclosures are required) to allow observation of the status indicator on the control. Gasketing shall be installed between the cover or door and the mounting surfaces.

2.8 LABELING

A. Warning Signs

1. All external doors and hinged bolted panels providing access to high voltage shall be provided with “Caution—High Voltage—Keep Out” signs.

2. All internal protective screens providing access to high voltage shall be provided with “Danger—High Voltage—Keep Out—Qualified Persons Only” signs.

3. All internal protective screens providing access to interrupter switches shall be provided with warning signs indicating that “Switch Blades May Be Energized in Any Position.”

4. All internal protective screens providing access to fuses shall be provided with warning signs indicating that “Fuses May Be Energized in Any Position.”

B. Rating Nameplates

1. The integrated switchgear assembly shall be provided with an external nameplate indicating the manufacturer’s drawing number and the following: voltage ratings (kV, nominal; kV, maximum; kV, BIL); main bus continuous rating (amperes); short-circuit ratings (amperes, RMS symmetrical and MVA three-phase symmetrical at rated nominal voltage); and the momentary and fault-closing ratings (amperes, RMS asymmetrical). When the assembly is UL listed, the external nameplate shall include the UL classification markings comprised of “UL” in a circle; the word “Listed”; the assigned control number; and the product identity.
2. Each individual bay shall bear a nameplate indicating the ratings of the interrupter switch (amperes, continuous and interrupting); the maximum rating of the fuse in amperes; and the catalog number of the fuse units, refill units, interrupting module, or control module. When the individual bay is to be UL listed, this nameplate shall include the UL classification markings comprised of “UL” in a circle; the word “Listed”; the assigned control number; and the product identity. In addition, the enclosure category shall be specified.

C. Accessories

1. Fuse units, refill units, voltage-transformer fuses, as required, for original installation and for spares.

D. Coordination Study

1. The switchgear manufacturer shall perform an overcurrent coordination study to determine the fuse sizes in the feeder bay on the primary side of the transformer.
2. The scope of the study shall be bounded by the protection device upstream from the transformer primary fuse and the downstream device from the transformer secondary.
3. A oneline and existing protection settings shall be provided at the time of the study or before.

E. Arc Flash Study

1. The switchgeaer manufacturer shall perform an arc flash study and provide labels for the switchgear.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Install equipment in accordance with manufacturer's instructions.

B. Install proper fuses in each fused switch.

C. Clean equipment finishes to remove paint and concrete splatters.

3.2 GROUNDING

A. Provide grounding and bonding to NFPA 70 and ANSI C2. Bond all ground conductors together at the equipment ground and bond conduits and metal enclosures.

B. Inspect grounding and bonding system conductors and connections for tightness and proper installation.

END OF SECTION

SECTION 31 23 33 – Trenching and Backfilling

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. This Section covers earthwork including excavation, fill, and backfill for electrical systems.

B. Related Sections:

1. Division 00, including General and Supplementary Conditions, Division 01 Sections, and the Drawings, apply to this Section.

1.2 DEFINITIONS

A. Unsuitable Materials

1. Fill: Topsoil; frozen materials; construction materials and materials subject to decomposition; stones larger than 2"; organic materials, including silts, which are unstable; and inorganic materials, including silts, too wet to be stable.
2. Existing Subgrade (Except Footings): Same materials as Paragraph 1 that are not capable of direct support of slabs, pavement, and similar items, with the possible exception of improvement by compaction, proof rolling, and similar methods of improvement.

B. Earthwork includes all earthwork operations required by the drawings and specifications within the construction area.

C. Degree of Compaction is expressed as a percentage of maximum density obtained by the test procedure presented in AASHTO T180, Method A.

D. Whenever the term "fill" is used herein, it shall mean fill or backfill as appropriate.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Granular Fill

1. Under concrete slab--crushed stone or gravel graded from one inch to No. 4.
2. Bedding for duct lines--sand or 1/4" screened gravel.

B. Fertilizer: (5-10-5) and shall be delivered to site in unopened containers that clearly display the manufacturer's label indicating the analysis of the contents.

C. Seed: Grass mixture comparable to existing turf and shall be delivered to site in unopened containers that clearly display the manufacturer's label indicating the analysis of the contents.

PART 3 - EXECUTION

3.1 EXCAVATION

A. Trench Earthwork:

1. All pavement cuts shall be saw cut.
2. Excavate trenches to a width as necessary for sheeting and bracing and proper performance of the work.
3. Grade the bottom of trenches to provide a uniform bearing.
4. Support piping on clean sand bed per detail, unless a mechanical support is shown.

B. Site Earthwork: Excavation shall be accomplished as required by drawings and specifications. Remove subgrade materials that are unsuitable and replace with acceptable material.

C. Finished elevation of subgrade shall be as follows:

1. Pavement Areas--bottom of the pavement or base as applicable.
2. Planting and Lawn Areas--4" below the finished grade.

3.2 FILLING AND BACKFILLING

A. Filling or backfilling shall not begin until all foreign materials have been removed from the excavations. Fill and backfill shall be accomplished using excavated materials and/or borrow, as applicable. Unsuitable excavated materials shall not be used.

B. Materials shall be placed in horizontal layers not exceeding 12" in loose depth and then compacted. No material shall be placed on surfaces that are muddy, frozen, or contain frost.

C. Compaction shall be performed by rolling with approved equipment (hand or mechanized) well suited to the soil being compacted. Mechanized vibratory compaction equipment shall not be operated within 10' of new or existing building walls without the prior approval of the Owner. Material shall be moistened or aerated as necessary to provide the moisture content that will readily facilitate the specified compaction with the equipment used. Each layer shall be compacted until further settlement is not possible.

D. Reinstall or restore landscaping to its original condition including planting, mulching, seeding, and watering for 90 days after restoration. Provide follow-up reseeding and replanting as needed to complete the restoration.

3.3 GRADING

A. Crushed stone or gravel fill to be placed under concrete slabs on grade shall be graded from one inch to No. 4, tamped and leveled. The thickness of the fill shall be six inches unless otherwise indicated.

B. Subgrade shall be finished in a condition acceptable to the Engineer at least one day in advance of the paving operations. Finished subgrade shall be maintained in a smooth and compacted condition until the succeeding operation has been accomplished. When approved compacted subgrades are disturbed by Contractor's subsequent operations or adverse weather, the subgrades shall be scarified and compacted as specified hereinbefore to the required density prior to further construction thereon.

3.4 GRASS AREAS

A. General: All new or existing grassed areas to remain, which are disturbed during construction, shall be harrowed and tilled to a depth of 4". Reestablish existing and/or design grades by dragging or similar operations. Grassed areas earthwork shall not be carried out when the soil is wet so that the tilth of the soil will be destroyed. Plant bed must be approved by Engineer before seeding or sodding operation begins.

B. Finished Grading: Begin finish grading after rough grading has had sufficient time for settlement. Scarify subgrade surface in grassed areas to a depth of 4". Apply topsoil so that after normal compaction, dragging, and raking operations (to bring surface to indicated finish grades) there will be a minimum of 4" of topsoil over all grassed areas; make smooth, even surface and true grades, which will not allow water to stand at any point. Shape top and bottom of banks to form reverse curves in section; make junctions with undisturbed areas to conform to existing topography. Solid lines within grading limits indicate finished contours.

C. Fertilizing: Fertilizer shall be incorporated into the soil to a depth of 4" at a rate of 25 pounds per 1000 square feet.

D. Seeding: Seeding shall be at a rate of 4 pounds per 1000 square feet and accomplished only during periods when uniform distribution may be assured. Rake dry seed lightly into bed immediately after seeding and roll with a roller not to exceed 150 pounds for each foot of roller width. After seeding and rolling, apply hay mulch at a rate of 500 square feet per 50-pound bale. Hydro seeing in accordance with Maine DOT standards is permitted in lieu of dry seeding.

END OF SECTION