

MAINE TURNPIKE AUTHORITY

MAINE TURNPIKE

CONTRACT DOCUMENTS

CONTRACT 2018.23

MAINTENANCE GARAGE EXTENSIONS AND HVAC SYSTEM IMPROVEMENTS
AUBURN, CROSBY, GRAY, KENNEBUNK AND LITCHFIELD
MAINTENANCE FACILITIES

NOTICE TO CONTRACTORS

PROPOSAL

CONTRACT AGREEMENT

CONTRACT BOND

FINAL LIEN AND CLAIM WAIVER AND AFFIDAVIT

SPECIFICATIONS

MAINE TURNPIKE AUTHORITY

SPECIFICATIONS

The Specifications are divided into two parts:
Part I, Supplemental Specifications and Part II, Special
Provisions.

The Maine Turnpike Supplemental Specifications are additions
and alterations to the 2014 Maine Department of
Transportation Standard Specifications. See Subsection 100.1.

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MAINE TURNPIKE AUTHORITY

NOTICE TO CONTRACTORS

Sealed Proposals will be received by the Maine Turnpike Authority for:

CONTRACT 2018.23

MAINTENANCE GARAGE EXTENSIONS AND HVAC SYSTEM IMPROVEMENTS
AUBURN, CROSBY, GRAY, KENNEBUNK AND LITCHFIELD
MAINTENANCE FACILITIES

at the office of the Maine Turnpike Authority, 2360 Congress Street, Portland, ME, until 11:00 a.m., prevailing time as determined by the Authority on December 14, 2018. At which time and place the Proposals will be publicly opened and read. Bids will be accepted from Contractors **prequalified** by the Maine Department of Transportation for Building Construction Projects or submitting qualifications package with bid. All other bids may be rejected. This Project includes a wage determination developed by the State of Maine Department of Labor.

The work consists of extending and rehabilitating one maintenance garage in Auburn, three in South Portland (Crosby), one in Gray, two in Kennebunk and one in Litchfield. The work at each garage includes temporarily supporting the backwall, removing the wall, constructing an extension of the building, replacing the existing siding with metal siding, replacing the existing roofing with metal roofing, installing electrical conduits on the new wall, installing lighting to improve visibility and accommodate the new space, adding unit heaters and transporting existing furnaces to Cumberland Sign Shop, installing ceiling fans, and conducting all other work incidental thereto in accordance with the Plans and Specifications.

Plans and Contract Documents may be examined by prospective Bidders weekdays between 8:00 a.m. and 4:30 p.m. at the office of the Maine Turnpike Authority, 2360 Congress Street, Portland, Maine. **The half size Plans** and Contract Documents may be obtained from the Authority upon payment of Fifty (\$50.00) Dollars for each set, which payment will not be returned. Checks shall be made payable to: Maine Turnpike Authority. The Plans and Contract Documents may also be downloaded from a link online at <http://www.maineturnpike.com/project-and-planning/Construction-Contracts.aspx>.

For general information regarding Bidding and Contracting procedures, contact Nate Carll, Purchasing Manager, at (207) 482-8115. For information regarding Schedule of Items, plan holders list and bid results, visit <http://www.maineturnpike.com/project-and-planning/Construction-Contracts.aspx> . For Project specific information, fax all questions to Nate Carll, Purchasing Manager, at (207) 871-7739 or email ncarll@maineturnpike.com. Responses will not be prepared for questions received by telephone. Bidders shall not contact any other Authority staff or

Consultants for clarification of Contract provisions, and the Authority will not be responsible for any interpretations so obtained.

All work shall be governed by the Specifications entitled "State of Maine, Department of Transportation, Standard Specifications, Revision of November 2014", "Standard Details, Revision of November 2014" and "Best Management Practices for Erosion and Sediment Control", latest issue. Copies and recent updates to these publications can be downloaded at: <http://www.maine.gov/mdot/contractors/publications/> .

Proposals must be accompanied by an original bid bond, certified or cashier's check payable to the Maine Turnpike Authority in an amount not less than Five (5%) Percent of the Total Amount in the Proposal, but not less than \$500.00. The Bidder to whom a Contract is awarded will be required to furnish a Surety Corporation Bond, satisfactory to the Authority, on the standard Contract Bond form of the Authority, for a sum not less than the Total Amount of the Proposal.

Proposals must be made upon the Proposal Forms furnished by the Authority separately with the Contract Documents, and must be enclosed in the sealed special addressed envelope provided that bears the name and address of the Bidder, the name of the Contract, and the date and time of Proposal opening on the outside of the envelope

A pre-bid conference will be held on December 4, 2018 at 10:00 AM at the Maine Turnpike Authority, 2360 Congress Street, Portland, Maine. Because there are no As-built plans available, the Contractor is advised to visit each of the sites (Auburn, Crosby, Gray, Kennebunk, and Litchfield) to verify building geometry, existing grading, construction type, building condition, equipment locations, surroundings and any other information pertinent to providing an accurate bid prior to bidding the project. Site visits are scheduled for the week of December 10, 2018. Maine Turnpike Authority will offer times for scheduled site visits during the pre-bid conference.

The Authority reserves the unqualified right to reject any or all Proposals and to accept that Proposal which in its sole judgment will under all circumstances serve its best interest.

MAINE TURNPIKE AUTHORITY

Nate Carll
Purchasing Manager
Maine Turnpike Authority
Portland, Maine

Maine Turnpike Authority

MAINE TURNPIKE

PROPOSAL

CONTRACT 2018.23

MTA MAINTENANCE GARAGE EXTENSIONS AND HVAC SYSTEM IMPROVEMENTS
AUBURN, CROSBY, GRAY, KENNEBUNK AND LITCHFIELD
MAINTENANCE FACILITIES

MAINE TURNPIKE AUTHORITY

PROPOSAL

CONTRACT 2018.23

MAINTENANCE GARAGE EXTENSIONS AND HVAC SYSTEM IMPROVEMENTS
AUBURN, CROSBY, GRAY, KENNEBUNK AND LITCHFIELD
MAINTENANCE FACILITIES

TO MAINE TURNPIKE AUTHORITY:

The work consists of extending and rehabilitating one maintenance garage in Auburn, three in South Portland (Crosby), one in Gray, two in Kennebunk and one in Litchfield. The work at each garage includes temporarily supporting the backwall, removing the wall, constructing an extension of the building, replacing the existing siding with metal siding, replacing the existing roofing with metal roofing, installing electrical conduits on the new wall, installing lighting to improve visibility and accommodate the new space, adding unit heaters and transporting existing furnaces to Cumberland Sign Shop, installing ceiling fans and all other work incidental thereto in accordance with the Plans and Specifications.

This Work will be done under a Contract known as Contract 2018.23 according to the Plans and Specifications which are on file in the office of the Maine Turnpike Authority, 2360 Congress Street, Portland, Maine.

On the acceptance of this Proposal for said Work, the undersigned will give the required bond with good security conditioned for the faithful performance of said Work. This work will be completed according to said Plans and Specifications, and the doing of all other work required by said Specifications for the consideration herein named and with the further condition that the Maine Turnpike Authority shall be saved harmless from any and all damages that might accrue to any person, persons or property by reason of the carrying out of said Work, or any part thereof, or by reason of negligence of the undersigned, or any person or persons under his employment and engaged in said Work.

The undersigned hereby declares that he/she has carefully examined the Plans, Specifications and other Contract Documents, and that he/she will contract to carry out and complete the said Work as specified and delineated at the price per unit of measure for each scheduled item of Work stated in the Schedule of Prices as follows:

It is understood that the TOTAL AMOUNT stated by the undersigned in the following Schedule of Prices is based on approximate quantities and will be used solely for the comparison of bids, and that the quantities stated in the Schedule of Prices for the various items are estimates only and may be increased or decreased as provided in the Specifications.

Insert P-Sheets Here:

SCHEDULE OF BID PRICES
CONTRACT NO. 2018.23
Maintenance Garage Extensions and HVAC Improvements
In Auburn, Crosby, Kennebunk, Gray and Litchfield

Item No	Item Description	Units	Approx. Quantities	Unit Prices in Numbers		Bid Amount in Numbers	
				Dollars	Cents	Dollars	Cents
815.01	Buildings - Auburn	Lump Sum	1				
815.02	Buildings - Crosby #1	Lump Sum	1				
815.03	Buildings - Crosby #2	Lump Sum	1				
815.04	Buildings - Crosby #3	Lump Sum	1				
815.05	Buildings - Gray	Lump Sum	1				
815.06	Buildings - Kennebunk #1	Lump Sum	1				
815.07	Buildings - Kennebunk #2	Lump Sum	1				
815.08	Buildings - Litchfield	Lump Sum	1				
815.09	Oil/Water Separator Tank Relocation - Auburn	Lump Sum	1				
815.10	Oil/Water Separator Tank Relocation - Crosby #2	Lump Sum	1				
815.11	Oil/Water Separator Tank Relocation - Gray	Lump Sum	1				

CARRIED FORWARD:

Item No	Item Description	Units	Approx. Quantities	Unit Prices in Numbers		Bid Amount in Numbers	
				Dollars	Cents	Dollars	Cents
BROUGHT FORWARD:							
815.12	Waterline Relocation - Litchfield	Lump Sum	1				
815.13	Wall Sheathing	Square Foot	2,240				
815.14	Roof Sheeting	Square Foot	5,700				
815.15	Windows	Each	28				
815.16	Electrical Conduit	Linear Foot	2,070				
815.17	2" Diameter Copper Waterline	Linear Foot	1,150				
815.171	3/4" Diameter Copper Waterline	Linear Foot	120				
815.18	Electrical Receptacle - Inside	Each	46				
815.19	Electrical Receptacle - Outside	Each	31				
815.20	Air Compressor	Each	3				
TOTAL:							

Acknowledgment is hereby made of the following Addenda received since issuance of the Plans and Specifications: _____

Accompanying this Proposal is an original bid bond, cashiers or certified check on _____ Bank, for _____, payable to the Maine Turnpike Authority. In case this Proposal shall be accepted by the Maine Turnpike Authority and the undersigned should fail to execute a Contract with, and furnish the security required by the Maine Turnpike Authority as set forth in the Specifications, within the time fixed therein, an amount of money equal to Five (5%) Percent of the Total Amount of the Proposal for the Contract awarded to the undersigned, but not less than \$500.00, obtained out of the original bid bond, cashier's or certified check, shall become the property of the Maine Turnpike Authority; otherwise the check will be returned to the undersigned.

The performance of said Work under this Contract will be completed during the time specified in Subsection 107.1.

It is agreed that time is of the essence of this Contract and that I (we) will, in the event of my (our) failure to complete the Work within the time limit named above, pay to Maine Turnpike Authority liquidated damages in the amount or amounts stated in the Specifications.

The undersigned is an Individual/Partnership/Corporation under the laws of the State of _____, having principal office at _____, thereunto duly authorized.

_____ (SEAL)

_____ (SEAL)

*Affix Corporate Seal
or Power of Attorney
Where Applicable*

_____ (SEAL)

By: _____

Its: _____

Information below to be typed or printed where applicable:

INDIVIDUAL:

_____	_____
(Name)	(Address)

PARTNERSHIP - Name and Address of General Partners:

_____	_____
(Name)	(Address)

_____	_____
(Name)	(Address)

_____	_____
(Name)	(Address)

_____	_____
(Name)	(Address)

INCORPORATED COMPANY:

_____	_____
(President)	(Address)

_____	_____
(Vice-President)	(Address)

_____	_____
(Secretary)	(Address)

_____	_____
(Treasurer)	(Address)

MAINE TURNPIKE AUTHORITY

MAINE TURNPIKE

YORK TO AUGUSTA

CONTRACT AGREEMENT

This Agreement made and entered into between the Maine Turnpike Authority, and sometimes termed the "Authority", and _____

_____ herein termed the "Contractor":

WITNESSETH: That the Authority and the Contractor, in consideration of the premises and of the mutual covenants, considerations and agreements herein contained, agree as follows:

FIRST: The parties hereto mutually agree that the documents attached hereto and herein incorporated and made a part hereof collectively evidencing and constituting the entire Contract to the same extent as if herein written in full, are the Notice to Contractors, the Accepted Proposal, the Specifications, the Plans, this Agreement, the Contract Bond and all Addenda to the Contract Documents duly issued and herewith enumerated:

SECOND: The Contractor for and in consideration of certain payments to be made as hereafter specified, hereby covenants and agrees to perform and execute all of the provisions of this Contract and of all documents and parts attached hereto and made a part thereof, and at his own cost and expense to furnish and perform everything necessary and required to construct and complete, ready for its intended purpose, in accordance with the Contract and such instructions as the Engineer may give, acceptable to the Authority, in the times provided, all of the Work covered and included under Contract No. _____ covering _____ as herein described.

THIRD: In consideration of the performance by the Contractor of his covenants and agreements as herein set forth, the Authority hereby covenants and agrees to pay the Contractor according to the Schedule of Prices set forth in the Proposal with additions and deductions as elsewhere herein provided in the times and in the manner stated in the Specifications. This Agreement shall insure to the benefit of, and shall be binding upon the parties hereto, and upon their respective successors and assigns; but neither party hereto shall assign or transfer his interest herein in whole or in part without the consent of the other, except as herein provided.

IN WITNESS WHEREOF the parties to this Agreement have executed the same in quintuplicate.

AUTHORITY -

MAINE TURNPIKE AUTHORITY

By: _____

Title: CHAIRMAN

Date of Signature: _____

ATTEST:

Secretary

CONTRACTOR -

CONTRACTOR

By: _____

Title: _____

Date of Signature: _____

WITNESS:

CONTRACT BOND

KNOW ALL MEN BY THESE PRESENTS that _____
of _____ in the County of _____ and State of _____
as Principal, and _____ a Corporation duly organized under the
laws of the State of _____ and having a usual place of business in _____

As Surety, are held and firmly bound unto the Maine Turnpike Authority in the sum of _____ Dollars (\$_____.____),
to be paid to said Maine Turnpike Authority, or its successors, for which payment, well and truly
to be made, we bind ourselves, our heirs, executors, successors and assigns jointly and severally
by these presents.

The condition of this obligation is such that the Principal, designated as Contractor in the
foregoing Contract No. _____ shall faithfully perform the Contract on his part and
satisfy all claims and demands incurred for the same and shall pay all bills for labor, material,
equipment and all other items contracted for, or used by him, in connection with the Work
contemplated by said Contract, and shall fully reimburse the Obligee for all outlay and expense
which the Obligee may incur in making good any default of said Principal, then this Obligation
shall be null and void; otherwise it shall remain in full force and effect.

Signed and sealed this _____ day of _____, A.D., 201____

Witnesses:

CONTRACTOR

_____ (SEAL)

SURETY

_____ (SEAL)

(Surety must attach copy of Power of Attorney showing authority of Office or Agent to execute bonds)

FINAL LIEN AND CLAIM WAIVER AND AFFIDAVIT

Upon receipt of the sum of _____, which sum represents the total amount paid, including the current payment for work done and materials supplied for Project No. _____, in _____, Maine, under the undersigned's Contract with the Maine Turnpike Authority.

The undersigned, on oath, states that the Final Payment of _____ is the final payment for all work, labor, materials, services and miscellaneous (all of which are hereinafter referred to as "Work Items") supplied to the said Project through _____ and that no additional sum is claimed by the undersigned respecting said Project.

The undersigned, on oath, states that all persons and firms who supplied Work Items to the undersigned in connection with said Project have been fully paid by the undersigned for such Work Items or that such payment will be fully effected immediately upon receipt of this payment.

In consideration of the payment herewith made, the undersigned does fully and finally release and hold harmless the Maine Turnpike Authority, and its Surety, if any, from any and all claims, liens or right to claim or lien, arising out of this Project under any applicable bond, law or statute.

It is understood that this Affidavit is submitted to assure the Owner and others that all liens and claims relating to the Work Items furnished by the undersigned are paid.

(Contractor)

By: _____

Title: _____

State of MAINE

County of _____

I, _____, hereby certify on behalf of _____
(Company Officer) *(Company Name)*

its _____, being first duly sworn and stated that the foregoing representations are
(Title)

are true and correct upon his own knowledge and that the foregoing is his free act and deed in said capacity and the free act and deed of the above-named

(Company Name)

The above-named, _____, personally appeared before me this ____ day of _____ and swears that this is his free act and deed.

(SEAL)

Notary Public

My Commission Expires: _____

MAINE TURNPIKE AUTHORITY

SPECIFICATIONS

PART I – SUPPLEMENTAL SPECIFICATIONS

(Rev. November 10, 2016)

Supplemental Specifications available on the Maine Turnpike Authority website

MAINE TURNPIKE AUTHORITY

SPECIFICATIONS

PART II – SPECIAL PROVISIONS

PART II - SPECIAL PROVISIONS

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MAINE TURNPIKE AUTHORITY

SPECIFICATIONS

PART II - SPECIAL PROVISIONS

All work shall be governed by the Maine Department of Transportation Standard Specifications, Revision of November 2014, except for that work which applies to sections of the Maine Department of Transportation Standard Specifications which are amended by the Maine Turnpike Supplemental Specifications and the following modifications, additions and deletions.

General Description of Work

The work consists of extending and rehabilitating one maintenance garage in Auburn, three in South Portland (Crosby), one in Gray, two in Kennebunk and one in Litchfield. The work at each garage includes temporarily supporting the backwall, removing the wall, constructing an extension of the building, replacing the existing siding with metal siding, replacing the existing roofing with metal roofing, installing electrical conduits on the new wall, installing lighting to improve visibility and accommodate the new space, adding unit heaters and transporting existing furnaces to Cumberland Sign Shop, installing ceiling fans and all other work incidental thereto in accordance with the Plans and Specifications

Plans

The drawings included in these Contract Documents, and referred to as the Plans, show the general character of the work to be done under this Contract. They bear the general title "Maine Turnpike – Contract 2018.23 – Maintenance Garage Extensions and HVAC System Improvements – In Auburn, Crosby, Gray, Kennebunk and Litchfield . The right is reserved by the Resident to make such minor corrections or alterations in the Plans as he deems necessary without change in the unit prices on the Schedule of Prices of the Proposal.

101.2 Definition

Holidays

The following is added after Memorial Day in the Supplemental Specifications:

Independence Day 2019
(Fourth of July)

12:01 p.m. preceding Tuesday to
6:00 a.m. the following Thursday.

103.4 Notice of Award

The following sentence is added:

The Maine Turnpike Authority Board is scheduled to consider the Contract Award on January 24, 2019.

104.3.8 Wage Rates and Labor Laws

Section 104.3.8 Wage Rates and Labor Laws has been amended as follows:

The fair minimum hourly rates determined by the State of Maine Department of Labor for this Contract are as follows:

Insert Wage Rates

104.4.6 Utility Coordination

This Subsection is amended by the addition of the following:

These Special Provisions outline the arrangements which have been established by the Authority for coordination of the work to be accomplished by the utilities. The scope and schedule of utility relocation work is noted herein. The Contractor shall plan and conduct his work accordingly.

General

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

The Contractor shall plan and conduct his operations in accordance with the following utility schedule. The Contractor must comply with all OSHA regulations pertaining to work adjacent to utility wires. The Contractor shall plan and conduct his work accordingly.

The Contractor shall ensure gas, water and power be shut off before construction. Once water is shut off the Contractor shall drain the water line to avoid water freezing in the pipes.

The following utilities are located within the Project limits. The Contractor shall ascertain the location of the existing utilities and any other necessary information by direct inquiry at the office of the following utility owners:

AERIAL UTILITIES

CENTRAL MAINE POWER (CMP)

No Coordination is needed with CMP

UNDERGROUND UTILITIES

UNITIL – Contractor shall coordinate for natural gas shut off, meter relocation and gas turn on for the Kennebunk Maintenance Garages. Contractor to notify Maine Turnpike Authority 14 days in advance to when gas shut off is required.

MTA Owned LP Gas Lines – Contractor shall be responsible for relocating all LP gas lines as required. Contractor shall be responsible for removing and reinstalling LP gas regulators as required. Maine Turnpike Authority’s LP gas supplier shall be responsible for the hook ups to the proposed building.

107.1 Contract Time and Contract Completion Date

This Subsection is amended by the addition of the following:

All work for the 8-bay garage in Gray and the 10-bay garage in Crosby shall be substantially complete by November 15, 2019, and final completion shall be on or before November 29, 2019. Any other Maintenance Garage work started in calendar year 2019 shall also adhere to these dates.

The construction of all other Maintenance Garage extensions and improvements to be completed under this contract shall be substantially completed by August 27, 2021, and final completion to be on or before September 24, 2021.

No work shall occur during the period from November 30, 2019 to March 27, 2020 and November 27, 2020 to March 26, 2021, as all garages must be made available for winter maintenance operations during this time period.

107.1.1 Substantial Completion

This Subsection is amended by the addition of the following:

Substantially complete for each building shall be defined by the Authority as the following:

- Excavation and tank removal and replacement (if applicable, see plans)
- Slab-on-grade construction
- Building framing and insulation
- Roofing installation
- Siding installation
- Gable end vent fan installation
- Heating unit installation
- LED lighting installation
- Ceiling fan installation
- Plumbing and water line installation
- Electrical work
- Temporary supports installed and removed
- Interior finish carpentry and painting

Supplemental Liquidated damages on a calendar day basis in accordance with Supplemental Specifications Subsection 107.8 shall be assessed for each calendar day that substantial completion is not achieved. The Contractor is responsible to pay the per diem costs listed in Supplemental Specifications Subsection 107.7.2 Schedule of Liquidated Damages for each day that substantial completion is unfinished by the specified date.

107.4.6 Prosecution of Work

The following activities shall not begin until the date specified:

- Building construction shall not begin until March 25, 2019 at the 10-bay garage at Crosby and the 8-bay garage in Gray. Work at other locations may start after March 25, 2019 if the Contractor chooses to begin work in 2019. These start dates are in force, except for any work proposed by the Contractor that does not interfere with the Authority's use of that facility (in the opinion of the Authority) that may be done during winter months. Each Maintenance Garage needed by the

Contractor shall be empty and available to the Contractor by these dates if sufficient notice is given (14 calendar days). Only garages that will be actively under construction will be cleaned out and made available. Once a garage begins construction, the facility must be substantially complete and return to the Authority's use prior to November 13 of that year. The Contractor shall notify Maine Turnpike Authority 14 days prior to the anticipated construction start date so that the Authority can clean out and make Maintenance Garages available to the Contractor.

The Contractor shall submit to the Authority a construction schedule which shall document that the Contractor has the necessary labor and equipment to work immediately and continuously at the project site once the building is decommissioned. The intent of this specification is to minimize the amount of time for building decommissioning, while providing the Contractor sufficient time to complete the work in a diligent manner and reopen the building as prescribed by the project's Substantial Completion date.

SPECIAL PROVISION

SECTION 503

REINFORCING STEEL

Section 503, Reinforcing Steel is deleted and its entirety and replaced with the following:

503.1 Description: This work shall consist of furnishing and placing epoxy-coated reinforcement, in accordance with these specifications and in conformance with the Plans, Supplemental Specifications and Special Provisions.

503.2 Materials: shall meet the requirements of the following Sections of Division 700-Materials:

Reinforcing Steel	709.01
Welded Steel Wire Fabric	709.02

503.3 Schedule of Material: When the Authority does not furnish reinforcing steel schedules, the Contractor shall submit order lists, bending diagrams and bar layout drawings to the Resident for approval. The reinforcing steel shall not be ordered until these lists and drawings are approved. Approval shall not relieve the Contractor of full responsibility for the satisfactory completion of this item. When the Authority allows the use of precast concrete deck panels, or any other significant changes that effect the quantity of reinforcing steel, the Contractor shall be responsible for revising the reinforcing steel schedule; the revised schedule shall be submitted to the Resident for approval.

503.4 Protection of Material: Reinforcement shall be stored on skids or other supports a minimum of 12 inches above the ground surface and protected at all times from damage and surface contamination. The storage supports shall be constructed of wood, or other material that will not damage the surface of the reinforcement or epoxy coating. Bundles of bars shall be stored on supports in a single layer. Each bundle shall be placed on the supports out of contact with adjacent bundles.

If it is expected that epoxy-coated bars will be required to be stored outdoors for a period in excess of two months, then they shall be protected from ultraviolet radiation.

503.5 Fabrication: Bending of reinforcing bars and tolerances for bending of reinforcing bars shall be in conformance with the latest edition of the "Manual of Standard Practice of the Concrete Reinforcing Steel Institute" and the "Detailing Manual of the American Concrete Institute." Unless otherwise specifically authorized, bars shall be bent cold.

503.51 Epoxy Coating: Reinforcing steel, specified on the design drawings to be epoxy coated, shall meet the requirements of AASHTO M284/M284M (ASTM A775/A775M), Epoxy-Coated Reinforcing Steel Bars, and the following requirements:

- a. The Contractor shall furnish a written certification that at the point of application of the coating and at the reinforcing bar shop the coating, the coated bars, and the handling and packaging of the coated bars, meet all the requirements specified in Section 5.2.1 and Section 15.1 of AASHTO M284/M284M (ASTM A775/A775M), and Section 503.053 of these specifications.

- b. Patching material as specified in Section 5.4 of AASHTO M284/M284M (ASTM A775/A775M), shall be supplied for both shop and field patching of the coated reinforcing steel. The patching material shall be supplied as required, but at not less than the following rates:
- #3 to #5 bars: 1 qt/15000 ft of bar, or fraction thereof
 - #6 to #9 bars: 1 qt/8000 ft of bar, or fraction thereof
 - #10 and up: 1 qt/6000 ft of bar, or fraction thereof
- c. All testing shall be as specified in AASHTO M284/M284M (ASTM A775/A775M), except that the frequency of testing for adhesion of the coating shall be two bars of each size out of all bars coated with each individual batch or lot of epoxy resin, or two bars of each size out of all bars coated in an eight hour period, whichever is greater.
- d. If a reinforcing bar fabrication shop uses previously stockpiled bars to supply the requirements of this contract, the fabrication shop shall furnish copies of all certificates required to be furnished by the coating applicator under a., above. The certificates furnished shall be directly traceable to the actual bars used through batch numbers, order numbers or similar information. If such certification is not available, the Authority reserves the right to perform the tests specified under AASHTO M284/M284M (ASTM A775/A775M), at the expense of the fabrication shop. For bars supplied from stock, the fabrication shop shall supply all patching material specified under b., above.
- e. The Contractor shall notify the Resident at least 1 week prior to the start of the coating application, so that the Resident or their designated representative may be present at the beginning of the application of the epoxy coating.

503.52 Patching of Epoxy: Coating Patching required at the point of application of the epoxy coating shall be done in conformance with the requirements of AASHTO M284/M284M (ASTM A775/A775M). All patching related guidelines in ASTM A775, Section X1, Guidelines for Job-Site Practices, shall be considered mandatory.

At the reinforcing steel fabrication shop and at the job site, all nicks, cuts, scratches, cracks, abrasions, sheared ends etc., visible to the naked eye, shall be repaired using patching material supplied as specified under Section 503.51 b. To the greatest extent possible, repairs to each day's production at the fabrication shop and each day's placement at the job site shall be done before the end of each working day. If damaged areas do become rusted or contaminated with foreign matter, then these areas shall be cleaned by sandblasting, or an equally effective method, such that all visible rust and/or foreign matter is removed prior to patching.

503.53 Packaging and Handling of Epoxy-Coated Bars: All handling of epoxy-coated reinforcing bars by mechanical means shall be done by equipment having padded contact areas, or by the use of nylon webbing slings. The use of chains or wire rope slings shall not be allowed, even when used with padding. All bundles of coated bars shall be lifted with a strong back, spreader bar, multiple supports or a platform bridge to prevent bar-to-bar abrasion from sags in the bundles. Support points during lifting or transporting of bundled epoxy-coated bars shall be spaced at a maximum of 15 ft.

Bundled bars shall be strapped together with non-metallic or padded straps in a manner to prevent bar-to-bar abrasion.

Bars loaded for transport shall be loaded and strapped down in a manner that will prevent damage from motion and vibration, to the greatest extent possible. Bundles of bent bars shall be transported strapped to wooden platforms or shall be crated. All individual bundles and layers of bundles shall be separated, and supported by dunnage.

Individual bars shall be handled in a manner that prevents damage to the coating due to abrasion or impact, and at no time shall any bar be moved by dragging over any surface, including other reinforcing bars. Sufficient personnel shall be assigned to assure that bars are handled in a manner consistent with these requirements.

All packaging and handling related guidelines in ASTM A775, Section X1, Guidelines for Job-Site Practices, shall be considered mandatory where not already covered by this specification.

503.6 Placing and Fastening: All steel reinforcement shall be accurately placed in the positions shown on the Plans and shall be firmly held there during the placing and setting of the concrete. Immediately before placing concrete, steel reinforcement shall be free from all foreign material, which could decrease the bond between the steel and concrete. Such foreign material shall include, but not be limited to, dirt, loose mill scale, excessive rust, paint, oil, bitumen and dried concrete mortar.

Bars shall be fastened together at all intersections except where spacing is less than 1 ft in either direction. In which case, fastening at alternate intersections of each bar with other bars will be permitted providing this will hold all the bars securely in position. This fastening may be tightly twisted wire. Welding on epoxy-coated reinforcing steel will not be permitted under any condition.

Proper distances from the forms shall be maintained by means of chairs, stays, blocks, ties, hangers or other approved means. Blocks used for this purpose shall be precast Portland cement mortar blocks of approved shape and dimensions. Chairs used for this purpose shall be plastic, plastic coated, epoxy coated or plastic tipped. Layers of bars may be separated by precast Portland cement mortar blocks or other approved devices. The use of pebbles, pieces of broken stone or brick, metal pipe or wooden blocks shall not be permitted. The placing of reinforcement as concrete placement progresses, without definite and secure means of holding the steel in its correct position, shall not be permitted except in the case of welded steel wire fabric or bar mats.

Epoxy-coated reinforcing bars supported on formwork shall rest on coated wire bar supports, or on bar supports made of dielectric material or other acceptable materials. Wire bar supports shall be coated with dielectric material for a minimum distance of 2 in from the point of contact with the reinforcing bars. Reinforcing bars used as support bars shall be epoxy-coated. In walls, spreader bars shall be epoxy-coated.

Tie wire for epoxy-coated reinforcing steel shall be soft annealed wire that has been nylon, epoxy or plastic coated.

Field bending or cutting of epoxy-coated reinforcing bars will not be allowed, unless otherwise indicated on the plans or permitted by the Resident. When field bending or cutting is allowed, all damaged coating areas shall be repaired in accordance with the patching requirements specified in Section 503.52. All placing and fastening related guidelines in ASTM A775, Section X1, Guidelines for Job-Site Practices, shall be considered mandatory where not already covered by this specification.

Bars in the foundation walls shall be placed so as to clear anchor bolts.

When specified on the contract Plans, reinforcing steel shall be anchored into drilled holes.

The anchoring material shall be one of the products listed on the Maine Department of Transportation's list of Prequalified Epoxy and Adhesive Bonding Systems. Installation shall be in accordance with the manufacturer's published recommendations.

At each anchor location, existing reinforcing will be located to avoid drilling through existing bars. Where interferences are found to exist, location adjustments will be determined by the Resident.

Minimum embedment lengths of reinforcing bars shall comply with the manufacturer's published recommendations for the anchoring material selected. These embedment lengths shall be verified by the Resident before installation of the reinforcing bars. The reinforcing steel lengths indicated on the Plans may be reduced, at the Contractor's option, to the determined minimum embedment lengths.

Reinforcement shall be inspected and approved by the Resident before any concrete is placed.

503.7 Splicing: Reinforcing bars shall be spliced in accordance with the requirements of this section, and in the locations shown on the plans. No modifications of, or additions to, the splice arrangements shown on the Plans shall be made without the Resident's prior approval. Any additional splices authorized shall be staggered as much as possible. All splices shall be made in a manner that will ensure that not less than 75% of the clear concrete cover and not less than 75% of the minimum clear distance to other bars will be maintained, as compared to the cover and clear distance requirements for the unspliced bar. All splices shall also be made in a manner that will ensure that a minimum of 1" clear distance to adjacent bars is maintained.

Lapped splices shall be made by placing the bars in contact and wiring them together. Splice laps shall be made in accordance with the following table, unless otherwise noted on the plans.

US CUSTOMARY UNITS

Minimum Lap Splice Length (inches)¹

Lap Splice Length Table							
Bar Size	#3	#4	#5	#6	#7	#8	#9
Min. Lap Splice	17	23	28	42	49	58	74

Lap Splice lengths are based on the following parameters: Minimum center to- center spacing between bars of 6 in; nominal yield strength of the reinforcing steel of 60 ksi; minimum 28-day compressive strength of concrete of 4000 psi. When any of the preceding parameters is altered, appropriate minimum lap splice lengths will be determined by the Resident. When lap splices are placed horizontally in an element where the concrete depth below the splice will be 12 in, or more, the indicated lap splice lengths shall be multiplied by a factor of 1.4.

Mechanical couplers may be used for splicing reinforcing bars, provided they are approved by the Resident and conform to the following requirements:

a. Tension Couplers: Couplers shall be able to develop 1.25 times the theoretical yield strength of the spliced bar in tension. Bolted and wedge-lock type couplers will not be allowed.

b. Compression Couplers: Couplers shall be capable of maintaining the spliced bars in alignment prior to and during concrete placement. For reinforcing bars designed to act in compression, the individual bar ends shall be within 1½ degrees of being "square" to the final 12 in of the bar. Additionally, abutting bar ends shall be in contact, and the angle of the gap between abutting bar ends shall be 3 degrees, or less.

c. Mechanical Couplers: Any mechanical couplers using a threaded splicer and dowel in combination, requiring a lapped splice with the reinforcing bars, shall have a minimum lap splice length as required by this Section.

Welded splices may be made by the "Thermit" process or, with the approval of the Resident, by the shielded metal arc welding process or the self-shielded flux-core arc welding process. The latter two processes shall be used in strict conformance with the requirements of the latest edition of AWS D1.4 "Structural Welding Code - Welding Reinforcing Steel" and any applicable provisions of Section 504, Structural Steel. The Contractor shall submit complete details of their proposed method of making welded splices for the Resident's approval.

503.8 Lapping: Sections of welded steel wire fabric shall be securely fastened to adjoining sections and overlapped. All laps shall be in accordance with Wire Reinforcement Institute Manual of Standard Practice.

Bar mats shall be spliced as required for the individual bars, per table in Section 503.07, splicing.

503.9 Substitution: Substitution of different size bars shall not be permitted except with the written authorization of the Resident.

END OF SECTION

SPECIAL PROVISION

SECTION 815

BUILDINGS

815.01 Description: This work shall consist of the furnishing and construction of the Maintenance Building Addition & Renovation at the Maine Turnpike Authority Maintenance Facilities located in Auburn, South Portland (Crosby), Gray, Kennebunk and Litchfield, Maine as shown on the Plans and described herein. The work shall also include removing existing shingles and underlayment, inspecting and replacing any decayed or rotted roofing boards as approved by the Authority, and furnishing and installing corrugated metal roofing complete with concealed fasteners and accessories for a water tight system. The work shall also include removing existing metal siding and underlayment, inspecting and replacing any decayed or rotted sheathing as approved by the Authority, and furnishing and installing new metal siding. The work shall also include installation of new heating units, electrical outlets, waterline relocation, overhead lights and destratification fans. The work shall also include replacing or relocating buried water and gas lines and replacing oil/water separator tanks where required as shown on the plans. See Appendix A for oil/water separator tank details, heavy duty covers shall be used.

All work shall be completed in accordance with these contract documents.

815.02 Materials: All materials and components shall be as detailed, noted, and specified on the Contract Plans and Special Provisions.

All fill used to support foundations and slabs-on-grade shall meet the requirements of Section 703.12 Aggregate for Crushed Stone Surface.

All backfill, not otherwise specified, shall be Granular Borrow and shall meet the requirements of Section 703.19 Granular Borrow.

815.03 Occupancy: The existing building will be decommissioned throughout the construction. Maine Turnpike Authority will be responsible for removing all equipment and materials prior to the Contractor starting any work. The Contractor will be responsible for signing and coning the area around the entry ways to inform and protect Maine Turnpike Authority employees from Hazards associated with the project. All catch basins and oil separation tanks behind the buildings within the proposed building footprint shall be relocated prior to commencing the construction of the building extension. The Contractor will need to work with the local Supervisor or Transportation Operations Manager for this facility to make arrangements for the storage of the Construction materials and equipment.

The Contractor shall be responsible for removing, storing, and delivering the existing furnaces at the Kennebunk and Auburn maintenance garages prior to the start of construction.

815.04 Services: The Contractor shall be responsible for portable toilets and drinking water for their crews. The Contractor may connect to on site electrical service to conduct their work. On-site non-potable water is available to the Contractor for use during the wet cure phase of the concrete work.

815.05 Construction: The Authority will provide the Contractor with horizontal and vertical control and conceptual slab layout. The Contractor shall provide the additional layout necessary to complete the Work.

All work shall meet the requirements of governmental agencies having jurisdiction and comply with applicable standards and codes. The Contractor shall submit two (2) copies of shop drawings to Authority for review at least fifteen (15) days prior to incorporation into the work. Shop drawings shall be approved prior to incorporation into the work.

Roof, siding and paint colors shall be selected by Authority from manufacturer's standard colors. Some preliminary colors have been selected in the respective specifications.

Excavation shall meet the requirements of Section 203 Excavation and Embankment. All work shall be done in accordance with the Maine Department of Transportation's Best Management Practices for Erosion Control & Sediment Control, February 2008. The Contractor shall be responsible for the Erosion and Sediment Control. When the structure is to rest on an excavated surface other than rock, special care shall be taken not to disturb the bottom of the excavation. If the surface upon which the structure is to rest is disturbed, it shall be regraded and compacted to the extent directed by the Resident.

Placing of gravel borrow used for bedding for the slab-on-grade shall meet the requirements of Standard Specification, Section 206, Structural Excavation. Backfilling shall meet the requirements of Section 203 Excavation and Embankment. Backfilling shall consist of placing suitable material in all spaces not occupied by structures up to the elevation of the existing ground or other elevations shown on the plans or designated. Backfill material shall be granular borrow or other material designated on the plans and shall be at or near optimum moisture content and shall not contain stones larger than 3 in, frozen lumps, chunks of clay, mineral matter or any other objectionable matter.

For reinforced concrete sections, no backfill shall be placed until the masonry has been in place at least 14 days or until concrete cylinders cured with the structure establish that design strength has been reached.

Unless otherwise approved, the material shall be deposited and spread upon compacted material in full width layers not more than 8 inches in depth, loose measure. Sand or gravel soils shall be compacted by vibratory type compaction equipment or by pneumatic tired equipment and, if necessary, by the addition of water. The compacting operations shall be continued until each layer is satisfactorily compacted to its full depth and width. Gravels shall be compacted to 98%.

Unless otherwise indicated on the plans or directed, all sheeting and bracing used during structural excavation shall be removed by the Contractor following the completion of the work, and all voids resulting from use of the sheeting and bracing backfilled where necessary.

Subgrades shall be promptly graded and rolled to minimize absorption of water. When excavating results in a subgrade of unsuitable soil, the Resident may require the Contractor to remove the unsuitable material and backfill the area with approved material.

Placing and compacting of Aggregate Subbase shall meet the requirements of Standard Specification, Section 304 Aggregate Base and Subbase Course.

The Contractor shall install ½” (Size 18 EHD) corrugated stainless steel tubing to each of the LP gas lines running from the relocated LP tanks to the proposed maintenance building. The ½” tubing shall be installed in 1” Schedule 80 PVC conduit. The Contractor shall also install a UL listed gas cock shut off Valve and drip leg at each maintenance building. The LP gas provider is responsible for installing a secondary pressure regulator at the LP tanks to provide 14” w.c. gas pressure to the buildings.

Stainless steel material shall be manufactured by Gastite® (or approved equal) corrugated stainless steel tubing complying with ANSI LC 1 "Fuel Gas Piping Systems Using CSST" and listed with CSA®, ICC and IAPMO. Manufacturing materials to be: ASTM A240 type 300 corrugated stainless steel tubing with a minimum wall thickness of .010", jacketing of UV resistant polyethylene meeting the requirements of ASTM E84 for flame spread and smoke density. All mechanical tube fittings are SAE CA360 brass incorporating double wall flare sealing and Jacket-Lock™ jacket capturing for steel tubing protection.

815.06 Variations from Materials Specified: Whenever and wherever items have been identified by describing a proprietary product, such identification is intended to be descriptive, but not restrictive, and is used to indicate the quality and characteristics of products that are satisfactory. Bids shall be considered as offering the item specified in the Invitation for Bid.

The Authority will consider all alternates submitted by the Contractor, but is not bound to accept any which, in its opinion, are not in the Authority’s best interest and are determined by the Authority to be of equal value in all material respects to the proprietary items specified. The evaluation of equality of the product offered shall be the responsibility of the Authority and will be based on information furnished by the Contractor, as well as information reasonably available to the purchasing activity.

815.07 Quality and Standards: Materials and manufactured products incorporated into the work shall be new unless otherwise specified, free from defect, and in conformity with the contract. When material is fabricated or treated with another material or where any combination of materials is assembled to form a finished product, any or all of which are covered by specifications, the Authority may reject the finished product if any of the components do not comply with the specifications. The Authority may reject materials not conforming to the Specifications at any time, and the Contractor shall remove them immediately from the project site unless otherwise instructed by the Authority. The Contractor shall not store or use rejected materials on any Authority project.

If there is no applicable standard set forth in this contract for particular Work, then the Contractor shall perform that Work in accordance with industry standards prevailing at the time of bid. If the Authority determines that Work is non-conforming, the Contractor shall remove, replace, or otherwise correct all unacceptable work as directed by the Authority at the expense of the Contractor, without cost or liability to the Authority.

815.08 Submittals: The Contractor shall submit manufacturers' specifications, product data and installation instructions for all items furnished. The Contractor shall not be relieved of responsibility for any deviation from the requirements of the specifications unless; (1) the Contractor has specifically informed the Authority in writing of such deviation at the time of submission and (2) the Owner has given written approval to the specific deviation. The Contractor shall not be

relieved from responsibility for errors or omissions. No portion of the work shall be commenced until the Authority has approved the submittal.

815.09 Delivery, Storage, and Handling:

- Store materials off the ground and protected from the weather.
- Deliver products in manufacturers' original containers, dry, undamaged, with seals and labels intact.

815.10 Installation:

- Installation, handling and storage of all materials shall comply with manufacturer's instructions and recommendations.
- The contractor shall:
 - Make provisions to allow safe access to the work for the Authority to inspect the work, facilitate ongoing inspection of the work, and to measure the work for payment purposes.
 - Complete installation to provide weathertight service.
 - Complete installation for the building framing, concrete slab placement, roofing and siding shall conform, to all applicable National, State and local codes.
 - Complete installation for the new furnace units, electrical outlets, lights and ceiling fans shall conform, to all applicable National, State and local codes.

If the Authority determines that non-conforming work substantially conforms to the Contract, the Authority may accept the non-conforming work, provided that the Authority may require a credit to the Authority to be deducted from amounts otherwise due the Contractor. If the Authority and Contractor cannot agree to the amount of the credit, the work shall be unacceptable work. The Contractor shall remove, replace, or otherwise correct all unacceptable work as directed by the Authority at the expense of the Contractor, without cost or liability to the Authority.

Responsibility for Existing Structure Removal of existing materials shall be accomplished without damage to the portion of the structure that is to remain. The Contractor shall be responsible for all damage to the existing structure resulting from an act, omission, neglect, or misconduct of the Contractor until Final Acceptance. The Contractor shall, at its sole expense, rebuild, repair, restore, or replace such damage property of otherwise make any good losses that arise from such damage.

The Contractor shall bear all risk of loss, except for damage to Project caused by Uncontrollable Events relating to the Work until Final Acceptance. The Contractor shall bear all risk regardless of cause, including completed Work, temporary structures, and all other Material not yet incorporated into the work.

815.11 Contractor's Safety Program: If a copy of the Contractor's Safety Plan is not on file with the Authority, the Contractor must submit an acceptable Contractor's Safety Plan to the Authority's Bureau of Maintenance & Operations Section prior to Contract award. If copy of the Contractor's Safety Plan is on file with the Authority's Bureau of Maintenance & Operation's, the Contractor must confirm, in writing, that the plan on file is still applicable prior to Contract award. The Contractor shall designate which portions such submissions it considers confidential business information. If such program is revised during the Contract Time, the Contractor shall provide the updated program to the Authority. The Contractor shall comply with its safety program and the

Standard Specifications. The Contractor shall be responsible for all claims or damages arising from failure to so comply and indemnifies and holds harmless the Authority from all claims and damages arising from such non-compliance with Contractor's Safety Program.

The contractor shall be responsible for the safety of all operations in connection with the Contract and shall take all necessary actions to ensure the safety of all persons who may be in, on or adjacent to the Site. The Contractor shall perform Work in a manner that is in compliance with the Contractor's Traffic Control Plan (TCP), all applicable OSHA requirements, and established safety practices.

Failure by the Contractor to comply with the Contractor's TCP, an applicable OSHA requirement or all established safety practices pertaining to the work being performed, will result in the immediate suspension of Work on the entire project until all unsafe practices are corrected and are in compliance with the applicable requirements, standard or practice.

815.12 Environmental Requirements and Waste Materials: All waste materials shall be removed and disposed of in accordance with all federal, state, and local laws and regulations.

Excavation may include deleterious materials such as asphalt pavement. This excavation shall not be reused by the Contractor. The Contractor shall stockpile the excavation material on site as directed by the Authority.

All materials removed from the site shall be the property of the Contractor. The Contractor shall be responsible for any and all materials dropped from his trucks distant from the project. The Contractor shall make his own arrangement for disposal of materials taken from the site, and there will be no burning of materials on or adjacent to the site.

815.13 Hazardous Materials: If the Contractor encounters any condition that indicates the presence of uncontrolled petroleum or hazardous Materials, the Contractor shall immediately stop Work, notify the Authority, treat any such conditions with extreme caution, and secure the area of potential hazard to minimize health risks to Workers and the public, and to prevent additional releases of contaminants into the environment. Such conditions include the presence of barrels, tanks, unexpected odors, discoloration of soil or water, an oily sheen on soil or water, excessively hot earth, smoke, or any other condition indicating uncontrolled petroleum or hazardous Materials. The Contractor shall continue work in other areas of the Project unless otherwise directed by the Authority. The Contractor shall comply with all federal, State, and local laws concerning the handling, storage, treatment, and disposal of uncontrolled petroleum or hazardous Material.

815.14 Permits, Fees, and Notices: The Contractor shall also acquire, at its sole expense, all licenses, Permits and other permissions that are necessary, appropriate and legally required to perform the Work. The Contractor shall give all notices and comply with all laws, ordinances, rules, regulations, and lawful orders of any public authority bearing on the performance of the work (State of Maine permits only; municipal permits not required). If the Contractor performs any work knowing it to be contrary to such laws, ordinances, rules, and regulations, and without such notice to the Authority, he shall assume full responsibility therefore and shall bear all cost attributable thereto.

815.15 Closeout Procedures: The Contractor shall make final changeover of permanent locks and deliver keys to the Authority. The Contractor shall also complete final cleaning requirements, including touchup painting, and other repairs to restore marred exposed finishes to eliminate visual defects.

815.16 Final Cleaning: The Contractor shall clean each surface or unit to condition expected in an average commercial building cleaning and maintenance program. The Contractor shall also comply with manufacturer's written instructions.

The Contractor shall:

1. Clean Project site, yard, and grounds, in areas disturbed by construction activities, including landscape development areas, of rubbish, waste material, litter, and other foreign substances.
2. Sweep paved areas broom clean. Remove petrochemical spills, stains, and other foreign deposits.
3. Remove tools, construction equipment, machinery, and surplus material from the Project site.
4. Remove snow and ice to provide safe access to building.
5. Clean exposed exterior and interior hard-surfaced finishes to a condition free of dirt, stains, films, and similar foreign substances. Avoid disturbing natural weathering of exterior surfaces. Restore reflective surfaces to their original condition.
6. Remove debris and surface dust from limited access spaces, including roofs, plenums, shafts, trenches, equipment vaults, manholes, attics, and similar spaces.
7. Sweep concrete floors broom clean in unoccupied spaces.
8. Remove labels that are not permanent.
9. Touch up and otherwise repair and restore marred, exposed finishes and surfaces.
10. Replace finishes and surfaces that cannot be satisfactorily repaired or restored, or that already show evidence of repair or restoration.
11. Not paint over "UL" and similar labels, including mechanical and electrical nameplates.
12. Wipe surfaces of mechanical and electrical equipment, and similar equipment.
13. Remove excess lubrication, paint and mortar droppings, and other foreign substances.
14. Replace parts subject to unusual operating conditions.

815.17 Closeout Documentation: The following documents shall be added to the required list of closeout documentation:

- Project Record Drawings
- Warranties

The Contractor shall prepare and submit Project Record Documents, operation and maintenance manuals, similar final record information, and As-built drawings showing locations of buried or enclosed pipes, conduits, wires, building outline, etc.

815.18 Warranty: The Contractor shall guarantee work for one (1) year from date of Final Acceptance by the Authority. The Physical Work must be Complete and in Conformity with the Contract and the Closeout Documentation, exclusive of the All Bills Paid and Request for Final

Payment Letters, in order for the Authority to finally “accept” the Project. All defects, including leaks occurring during guarantee period, shall be corrected without cost to the Authority. The Contractor unconditionally warrants and guarantees to the Authority that all work will be of good quality, free from faults and defects, and in conformance with the specification. All work not conforming to these requirements, including substitutions not properly approved and authorized, may be considered defective. If required by the Authority, the Contractor shall furnish satisfactory evidence as to the kind and quality of materials and equipment. If the Authority discovers any warranty defects during the warranty period, the Contractor agrees to perform all remedial work, at no additional cost or liability to the Authority. Remedial Work will be completed within two weeks unless a more immediate response is required for safety or convenience, as determined by the Authority.

The Contractor agrees that the warranty obligations provided by this Contract shall be reported as an outstanding obligation in the event of bankruptcy, dissolution, or the sale, merger, or cessation of operations of the Contractor.

815.19 Method of Measurement: The Maintenance Building Addition & Renovation for each Maintenance Building shall be measured for payment at the contract lump sum, complete in place and accepted.

815.20 Basis of Payment: The Maintenance Building Addition & Renovation will be paid for at the contract lump sum price, which shall be full compensation for the work indicated on the plans and as called for in the contract. Work indicated on the plans and as called for in this contract includes but is not limited to demolition, temporary support, excavation, borrow, gravel, foundation, stone, geotextile, backfill, framing, roofing, siding, windows, furnace unit heaters, overhead lights, ceiling fans, electrical outlets, waterline relocation, labor, equipment and materials for building construction and other contract related incidentals necessary to complete the work.

It will be the responsibility of the Contractor to verify the dimensions prior to submitting bid documents. The satisfactory disposal of all removed materials shall be considered incidental to related contract items. Payment for any staging, platforms or lifts required by the Contractor to perform the work, or to provide access to the Authority in order to inspect or measure the work, shall be considered incidental to related contract items.

Payment will be made under:

<u>Pay Item</u>	<u>Pay Unit</u>
815.01 Buildings – Auburn	Lump Sum
815.02 Buildings – Crosby #1	Lump Sum
815.03 Buildings – Crosby #2	Lump Sum
815.04 Buildings – Crosby #3	Lump Sum
815.05 Buildings – Gray	Lump Sum
815.06 Buildings – Kennebunk #1	Lump Sum
815.07 Buildings – Kennebunk #2	Lump Sum
815.08 Buildings – Litchfield	Lump Sum
815.09 Oil/Water Separator Tank Relocation – Auburn	Lump Sum
815.10 Oil/Water Separator Tank Relocation – Crosby #2	Lump Sum
815.11 Oil/Water Separator Tank Relocation – Gray	Lump Sum
815.12 Waterline Relocation – Litchfield	Lump Sum
815.13 Wall Sheeting	Square Foot

815.14 Roof Sheathing	Square Foot
815.15 Window	Each
815.16 Electrical Conduit	Linear Foot
815.16 Electrical Conduit	Linear Foot
815.17 2" Diameter Copper Waterline	Linear Foot
815.17 1/4" Diameter Copper Waterline	Linear Foot
815.18 Electrical Receptacle – Inside	Each
815.19 Electrical Receptacle – Outside	Each
815.20 Air Compressor	Each

SPECIAL PROVISION

SECTION 033000

CAST-IN-PLACE CONCRETE

PART 1 – GENERAL

1.1 Summary

- A. This work shall consist of furnishing and constructing all cast-in-place Portland Cement Concrete as shown on the contract drawings and as required to complete the work. This work includes all steel reinforcement, synthetic fiber reinforcement, form work, anchor bolts, sleeves and any other accessories necessary to complete the work.

1.2 References

- A. All work shall comply with the applicable provisions of the following codes:
1. American Concrete Institute ACI-318-08 “Building Code Requirements for Structural Concrete and Commentary”.
 2. American Concrete Institute ACI-301-10 “Specifications for Structural Concrete”.
 3. Concrete-Reinforcing Steel Institute CRSI Handbook, 10th Edition.
 4. ASTM C94 Standard Specification for Ready-Mixed Concrete.

1.3 Submittals

- A. At least 15 days prior to the first placement, a concrete mix design shall be submitted by the contractor to the Authority for approval. No concrete shall be placed on the project until the concrete mix design has been approved by the Authority. The mix design submitted by the Contractor to the Authority shall include the following information:
1. Description of individual coarse aggregate stockpiles, original source, bulk specific gravity, absorption and gradation. A combined coarse aggregate blended gradation shall be provided.
 2. Description of fine aggregate, original source, bulk specific gravity, absorption, colorimetric, gradation, and Fineness Modulus (F.M.).
 3. Description and amount of cement.
 4. Target water-cement ratio.
 5. Target water content by volume.
 6. Target strength.
 7. Target air content, slump and concrete temperature.
 8. Target concrete unit weight.
 9. Type and dosages of air entraining and chemical admixtures.

- B. Approval by the Authority will be contingent upon the ability of the mix design proportions to produce the concrete strength requirement and other factors that may affect durability.
- C. The Contractor shall provide the Authority with at least two copies of shop drawings for all reinforcing steel and other accessories to be cast-in-place. Shop drawings shall be submitted at least 15 days in advance of concrete placement and shall be reviewed by the Authority prior to placement.

1.4 Testing

- A. Concrete acceptance testing will be performed by the Authority. The Authority will determine the acceptability of the concrete through a quality assurance program. Quality assurance tests will include compressive strength and air content. Concrete sampling for quality assurance tests will be taken at discharge point, with pumped concrete sampling taken at the discharge end of the pump line.
- B. Compressive strength tests will be completed by the Authority in accordance with AASHTO T22 at 28 days, except no slump will be taken. The test average of two concrete cylinders will determine the compressive strength.
- C. Testing for entrained air in concrete, at the rate of one test per subplot, shall be in accordance with AASHTO T152.
- D. Concrete not meeting the standards in these specifications or as indicated on the Drawings shall be removed and replaced by the Contractor at no cost to the Authority.

1.5 Quality Assurance

- A. Manufacturer Qualifications: A firm experienced in manufacturing ready-mixed concrete products and that comply with ASTM C 94/C 94M requirements for production facilities and equipment. Measuring and batching of materials shall be performed at an Authority approved batching plant.
- B. Determination of the concrete cover over reinforcing steel for structural concrete shall be made prior to concrete being placed in the forms. Bar supports, chairs, slab bolsters, and side form spacers shall meet the requirements of CRSI Chapter 3, Section 2.5 Class 1, Section 2.6 Class 1A or Section 4. All supports shall meet the requirements for type and spacing as stated in the CRSI Manual of Standard Practice, Chapter 3. Concrete will not be placed until the placing of the reinforcing steel and supports have been approved by the Authority. If the Contractor fails to secure Authority approval prior to placement, the Contractor's failure shall be cause for removal and replacement at the Contractor's expense. The Contractor shall notify the Authority at least 48 hours prior to the placement, when reinforcing steel will be ready for checking. Sufficient time must be allowed for the checking process and any needed modifications

PART 2 – PRODUCTS

2.1 Concrete

- A. Materials shall meet the requirements specified in the following sections of Division 700 Materials of the “State of Maine, Department of Transportation, Standard Specifications, November 2014 Edition”
- | | |
|---|----------|
| 1. Portland Cement and Portland Pozzolan Cement | 701.01 |
| 2. Water | 701.02 |
| 3. Air Entraining Chemical Admixtures | 701.03 |
| 4. Water Reducing Chemical Admixtures | 701.04 |
| 5. High Range, Water Reducing, Chemical Admixture | 701.0401 |
| 6. Set Retarding Admixtures | 701.05 |
| 7. Curing Materials | 701.06 |
| 8. Waterstops | 701.07 |
| 9. Smooth Surface Asphalt Roll Roofing (Formerly Heavy Roofing Felt). | 701.08 |
| 10. Fly Ash | 701.10 |
| 11. Calcium Nitrate Solution, Chemical Admixture | 701.11 |
| 12. Silica Fume | 701.12 |
| 13. Ground Granulated Blast Furnace Slag | 701.13 |
| 14. Fine Aggregate for Concrete | 703.01 |
| 15. Coarse Aggregate for Concrete | 703.02 |
| 16. Alkali Silica Reactive Aggregates | 703.0201 |
| 17. Preformed Expansion Joint Filler | 705.01 |
- B. Cement
1. Cement shall be Portland Cement conforming to ASTM C-150 for Type I, II or III as specified.
- C. Aggregates
1. Concrete aggregate shall conform to ASTM Specification C-33. All aggregates shall be free from frozen materials and other impurities.
 2. Fine aggregates shall be clean sand free from clay, loam and other deleterious substances.
 3. Coarse aggregate shall be durable, clean, crushed stone or gravel, free from clay, loam and other deleterious substances.
- D. Water
1. Water shall be clean and potable containing no deleterious impurities which may be harmful to concrete or accessories.
- E. Admixtures
1. Prohibited admixture: Calcium chloride, thiocyanates or admixture containing more than 0.05% chloride ions are not permitted.
 2. All admixtures products shall be listed on the Maine DOT Qualified Products List. <http://www.maine.gov/mdot/tr/qpl/>
 3. Certification: The Authority will require written conformance to the above mentioned requirements and the chloride ion content of the admixture from the admixture manufacturer prior to review.

2.2 Reinforcing Steel

- A. Reinforcing steel shall conform to ASTM A-615 and be of an approved manufacturer. All bars shall be new, Grade 60 and shall be at the sizes shown on the drawings.
- B. All reinforcing steel shall meet the requirements of Reinforcing Steel, Section 709.01 of the “State of Maine, Department of Transportation, Standard Specifications, November 2014 Edition”.
- C. Steel accessories shall be at the sizes and types as shown on the drawings unless otherwise specified and shall include all spaces, chairs, ties and other devices for properly spacing, supporting and fastening reinforcement in place. Anchor bolts shall be F1554, Grade 36 or better and of the sizes and types shown on the Drawings.
- D. All reinforcing steel shall be epoxy coated.

2.3 Synthetic Fiber Reinforcing

- A. Synthetic fibers shall be STRUX 90/40 as manufactured by W.R. Grace & Co. or an approved equal.
- B. The dosage rate for the synthetic fibers shall be three lbs. per cubic yard of concrete.
- C. Synthetic fiber reinforcement will be incidental to the lump sum building items; it will not be paid for separately.

2.4 Accessories

- A. Non-shrink Grout selected by Contractor shall be listed on the Maine DOT Qualified Products List
<http://www.maine.gov/mdot/tr/qpl/>

2.5 Joint Sealants

- A. Joint filler selected by Contractor shall be listed on the Maine DOT Qualified Products List
<http://www.maine.gov/mdot/tr/qpl/>

PART 3 – EXECUTION

3.1 Concrete Proportioning

A. Concrete shall conform to the following requirements

Use	Min. Strength 28 Day psi	Max. Size Coarse	% Air	Min Max Slump	Min Cem. Fac.	Max W/C
Slab	4000	3/4"	5-7.5*	2-4"***	611 #/CY	0.45

*Target Air is 6% with -1% to +1.5% range

**Min-Max slump is before the addition of water reducing admixtures.

3.2 Formwork

- A. All construction form work shall be of sufficient strength and construction to safely withstand the loads imposed, conforming to ACI 347. Forms shall be suitably tied and/or bolted together to maintain the specified dimensions. 3/4-inch chamfer strips shall be placed at all exposed corners unless otherwise specified.
- B. Materials – Forms shall be smooth, treated plywood or steel. Plywood forms shall be coated with form oil and steel forms shall be coated with water or other approved substances to facilitate removal. Only non-staining substances shall be used.
- C. All foreign matter within the forms shall be removed before depositing concrete in them.
- D. All forms shall be inspected and approved by the Authority prior to any concrete being placed within them.
- E. Build into the forms all collars or sleeves required for piping and wiring, and any anchors and inserts as shown on the Drawings.
- F. Forms shall be left in place until the concrete has developed 80 percent of the design strength, and proven by a break of two cylinders. The formwork may be removed 48 hours after the completion of the concrete placement with the approval of the Authority and when the following conditions are met:
 1. Immediately after the forms are removed, defects in the concrete surface shall be repaired in accordance with section 502.12 of the “State of Maine, Department of Transportation, Standard Specifications, November 2014 Edition” and the repaired area is thoroughly dampened with water. The surfaces of exposed concrete shall be cured for the remainder of the 7-day curing period by the application of a product listed on the Maine Department of Transportation Prequalified list of curing compounds. The curing compound shall be applied continuously by an approved pressure spraying or distributing

equipment at a rate necessary to obtain an even, continuous membrane, meeting the manufacturer's recommendation but at a rate of not less than 0.2L/m² [1 gal/200ft²] of surface. Other methods of curing concrete may be used with the prior approval of the Authority.

2. Forms and false work, including blocks and bracing, shall not be removed without the consent of the Authority. The Authority's consent shall not relieve the Contractor of responsibility for the safety of the work. In no case shall any portion of the wood forms be left in the concrete. As the forms are removed, all projecting metal devices that have been used for holding the forms in place shall be removed in accordance with Section 502.09 and the holes shall be filled as required in Section 502.12 of the "State of Maine, Department of Transportation, Standard Specifications, November 2014 Edition". Forms shall be removed so as not to damage the concrete.

3.3 Reinforcing Steel

- A. Placing of all Reinforcing Steel shall be done in accordance with Section 503 - Reinforcing Steel of the "State of Maine, Department of Transportation, Standard Specifications, November 2014 Edition"

3.3 Placing Concrete

- A. Placing of all concrete shall be done in accordance with Section 502.10 of the "State of Maine, Department of Transportation, Standard Specifications, November 2014 Edition"
- B. All concrete shall be placed before it has taken its initial set, as specified in Section 502.10. Concrete shall be placed in horizontal layers in such a manner as to avoid separation and segregation. A sufficient number of workers for the proper handling, tamping and operation of vibrators shall be provided to compact each layer before the succeeding layer is placed and to prevent the formation of cold joints between layers. Care shall be taken to prevent mortar from spattering on structural steel, reinforcing steel and forms. Any concrete or mortar that becomes dried on structural steel, reinforcing steel or forms shall be thoroughly cleaned off before the final covering with concrete. Following the placing of the concrete, all exposed surfaces shall be thoroughly cleaned as required, with care not to injure any surfaces.
- C. Concrete in any section of a structure shall be placed in approximately horizontal layers of such thickness that the entire surface shall be covered by a succeeding layer before the underlying layer has taken its initial set. Layers shall not exceed 18 inches in thickness and shall be consolidated to become an integral part of the layer below. Should the placement be unavoidably delayed long enough to allow the underlying layer to take initial set or produce a so-called "cold joint", the following steps shall be taken:
 1. An incomplete horizontal layer shall be bulk-headed off to produce a vertical joint.
 2. Horizontal joints shall be treated as required in Section 502.10(f) of the "State of Maine, Department of Transportation, Standard Specifications, November 2014 Edition"
 3. Portland cement concrete with a high range, water reducing admixture shall not be placed when the concrete mix temperature is below

5° F(40° F) or above 29° C(85° F).

4. Fresh concrete, threatened with rain damage, shall be protected by approved means. Sufficient material for covering all fresh concrete shall be on hand at all times for emergency use. The covering shall be supported above the surface of the concrete.

D. Transit Mix – Concrete mixed in transit mixers shall be placed within 90 minutes of addition of water at the plant. Delivery tickets shall state the time of departure from the plant.. No additional water shall be added without consulting the Authority. Any additional water added to the concrete on the site is the Contractor’s sole responsibility and risk. The contractor shall provide a Certificate of Compliance for each truckload of concrete to the Authority at the time of the load placement. The Certificate of Compliance shall be a form acceptable to the Authority and shall include the following:

1. Contract Name & Number
2. Facility/Building Name
3. Manufacturing Plant (Batching Facility)
4. Name of Contractor (Prime Contractor)
5. Date
6. Time Batched/Time Discharged
7. Truck No.
8. Quantity (Quantity Batched this Load)
9. Type of concrete by Class and Producer Design Mix No.
10. Cement Brand or Type, and Shipment Certification No.
11. Temperature of Concrete at Discharge
12. Target Weights per cubic yard and Actual Batched Weights for:
 - Cement
 - Coarse Concrete Aggregate
 - Fine Concrete Aggregate
 - Water (including free moisture in aggregates and water added at the project)
 - Admixtures Brand and Quantity (fluid ounces/cubic yard)
13. Air Entraining Admixture
14. Water Reducing Admixture
15. Other admixtures
16. Placement Location

E. Vibration

1. Power vibrators shall be provided by the Contractor to thoroughly consolidate and compact the concrete. Vibrators shall not be used to push or move concrete laterally in forms. Excessive vibration will not be permitted. A minimum of two power vibrators shall be on the site when pouring the concrete.
2. Vibrators shall be an approved type, with a frequency of 5,000 to 10,000 cycles per minute and shall be visibly capable of properly consolidating the designed mixture.
3. Sufficient vibrators shall be used to consolidate the incoming concrete within 5 minutes after placing.

3.4 Protection of Concrete

- A. All concrete shall be placed/protected in accordance with Section 502.08 Cold Weather

Concrete of the “State of Maine, Department of Transportation, Standard Specifications, November 2014 Edition”

- B. Fresh concrete shall be protected from rain, cold and excessive temperature. Concrete shall be placed at temperatures between 40°F and 90°F. When outside air temperatures are below 40°F, materials shall be heated and maintained above 50°F for at least 5 days after placement.
- C. All concrete surfaces, if not protected by forms, shall be kept thoroughly wet either by sprinkling or using wet burlap, cotton mats or other suitable fabric until the end of curing period of 7 days. Polyethylene sheets shall not be placed directly on the concrete, but may be placed over the fabric cover to prevent drying except, as provided in 3.2 Formwork, Section F.

3.5 Finishing

A. Exposed Concrete

- 1. After the removal of forms, remove all form ties to at least 1 inch below surfaces. Remove all loose and honeycombed concrete, fins and other surface irregularities.
- 2. Concrete patching – After cleaning out all holes, honeycombs and other areas to be patched, moisten surface and apply non-shrink grout or a mixture of one part Portland Cement and three parts sand, taking care to match the concrete.
- 3. All concrete which will be exposed to view, shall be hand rubbed using carborundum bricks, burlap or other approved method. Finished surfaces should present a smooth, even, uniform color appearance.
- 4. Interior Floor Slabs shall be float finished and steel troweled once the concrete has set in accordance with the most current version of ACI 302.1R. The finish shall be smooth, uniform and hard. Surface tolerance shall not be more than 1/4-inch under a 10-foot straight edge. Slabs in areas where floor drains occur shall be pitched to drains with a uniform gradual pitch in all directions. Floor slabs shall be covered and sealed with polyethylene sheeting and burlap or other approved material and cured for at least 7 days. Floor slabs are to be treated with approved surface hardener/sealer according to manufacturer's directions.

B. Unexposed Concrete

- 1. All unexposed concrete shall have tie holes, honeycombs and other holes filled with patching mortar as described above. Fins and other irregularities shall be removed to create a uniform surface.
- 2. Unexposed concrete will not require a rubbed finish after patching.

- C. Penetrations – All wall or floor penetrations by pipes, conduit and other inserts shall be sealed with non-shrink grout around entire penetration to provide a watertight finish.

3.6 Acceptance

- A. All concrete mixes must be batched and designed in accordance with this specification and the approved design.

END OF SECTION

SPECIAL PROVISION

SECTION 061000

ROUGH CARPENTRY

PART 1 – GENERAL

1.1 Summary

- A. This work consists of all labor, materials and equipment necessary to complete the work as shown on the Drawings and as specified herein.

1.2 References

- A. International Building Code, Latest Edition.

1.3 Workmanship

- A. Only experienced personnel shall be engaged in this work.

1.4 Delivery, Storage and Handling

- A. Deliver the materials to the job site and store in a safe area, out of the way of traffic, shored up off the ground and covered to protect from weather.

PART 2 – PRODUCTS

2.1 Dimension Lumber

- A. Dimension lumber shall be Spruce-Pine-Fir (SPF) or other wood approved by the Authority and shall comply with grading requirements of the Northeastern Lumber Manufacturers Association for Common, Number 2 or better, and shall bear the grade stamp.
- B. When specified on the Plans or in part 4, stress grade structural lumber shall be provided. Stress grade lumber shall bear appropriate stamp for the specified grade and species.
- C. Wood for pressure treating and special installation shall be southern yellow pine meeting the requirements of the Southern Pine Inspection Bureau (SPIB) for Number 2 or better.
- D. All lumber shall not exceed 19% moisture content.

2.2 Zip Sheathing

- A. Oriented Strand Board Wall Sheathing: With integral water-resistive barrier, Exposure 1 sheathing.
 - 1. Basis-of-Design Product: Subject to compliance with requirements, provide Huber Engineered Woods LLC; ZIP System Wall Sheathing.
 - 2. Span Rating and Performance Category: Not less than

32/16; ½ Performance Category

3. Edge Profile: Self-spacing profile.
4. Provide fastening guide on top panel surface with pre-spaced fastening symbols for 16-inches and 24-inches on center spacings.
5. Performance Standard: DOC PS2-10 and ICC-ES ESR-1474.
6. Factory laminated integral water-resistive barrier facer.
7. Perm Rating of Integral Water-Resistive Barrier: 12-16 perms.
8. Assembly maximum air leakage of 0.0072 cfm/sq. ft. infiltration and 0.0023 cfm/ sq. ft. exfiltration at a pressure differential of 1.57 psf.
9. Exposure Time: Designed to resist weather exposure for 180 days.

B. Oriented Strand Board Roof Sheathing: With integral water-resistive barrier, Exposure 1 sheathing.

1. Basis-of-Design Product: Subject to compliance with requirements, provide Huber Engineered Woods LLC; ZIP System Roof Sheathing.
2. Span Rating and Performance Category: Not less than 40/20; 5/8 Performance Category or approved equal by the Resident. Thickness of roof sheathing shall match existing sheathing.
3. Edge Profile: Tongue and groove
4. Provide fastening guide on top panel surface with pre-spaced fastening symbols for 16-inches and 24-inches on center spacings.
5. Performance Standard: DOC PS2 and ICC-ES ESR-1473.
6. Factory laminated integral roofing underlayment facer.
7. Exposure Time: Designed to resist weather exposure for 180 days.

C. Fasteners

1. Provide fasteners of size and type that comply with requirements specified in this article by the Authority having jurisdiction, International Building Code, Wood Frame Construction Manual, and National Design Specification.

D. Self Adhering and Flashing Tape

1. Basis-of-Design Product: Subject to compliance with requirements provide Huber Engineered Woods; ZIP System Seam and Flashing Tape.
2. Thickness: 0.012 inch.
3. Width: 6 inch at all roof valley areas and corners, 3.75 inch elsewhere
4. Code Compliance: Comply with requirements of authorities having jurisdiction and ICC Evaluation Service, Inc. "AC148 - Acceptance Criteria for Flexible Flashing Materials."
5. International Code Council (ICC), ICC-ES ESR2227 (ZIP System Tape).

2.3 Accessories

- A. Nails shall be new, galvanized as appropriate, common nails of appropriate lengths and sizes to adequately join the wood. Use galvanized where exposed to weather or pressure treated lumber or where shown on the Drawings.
- B. Framing anchors shall be 18-gauge, galvanized steel such as manufactured by Simpson Strong Tie, or approved equivalent.
- C. Special Nails shall be used where shown on the Drawings or as recommended by manufacturer.
- D. Glue shall be an all purpose subfloor and construction adhesive, suitable for interior and exterior use, as manufactured by DAP, GE, Ohio Sealants, or approved equivalents.

2.4 Pressure Treated Lumber (PT)

- A. Lumber or plywood in contact with ground or fresh water shall be treated in accordance with AWWA Standards C2 and LP-22 and shall be rated 0.60 retention.
- B. Lumber in direct contact with concrete, masonry, or steel, but not in contact with soil or fresh water shall be treated in accordance with AWWA Standards C2 and LP-2 and shall be rated 0.40 retention.
- C. Pressure treatment shall be water borne chromate copper arsenate (ACQ).
- D. Wood shall be dried after treatment.

2.5 Laminated Veneer Lumber (LVL)

- A. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated include, but are not limited to, the following:
 - 1. Boise Cascade Corporation
 - 2. Weyerhaeuser Company
 - 3. Louisiana Pacific
- B. Extreme Fiber Stress in Bending = 3,100 psi
- C. Modulus of Elasticity = 2,000,000 psi

PART 3 – EXECUTION

3.1 Preparation

- A. Carefully select individual lumber pieces so that knots and obvious defects will not interfere with placing bolts or proper nailing.
- B. Cut out and discard defects which render a piece unable to serve its intended function.
- C. Lumber will be rejected by the Authority if it is excessively warped, twisted, bowed, mildewed or molded, or if it is improperly installed.

3.2 Erection

- A. All framing work shall produce joints which are tight, true, and well nailed with members assembled in accordance with the Drawings and with pertinent codes and regulations.
- B. All framing and fastening shall equal or exceed HUD Minimum Property Standards, Manual of Accepted Practices and the requirements of the IBC.
- C. Do not shim any framing member.
- D. Install horizontal and sloped members with crown up.
- E. Do not notch, cut or bore members for pipes, ducts, conduits, or for any other reason, except as shown on the Drawings and as approved by the Authority.
- F. Bearing surfaces on which structural members rest shall provide a full, even support.
- G. Joists, rafters and similar members shall be fastened with at least two (2) galvanized steel hangers or anchors and nailed completely.
- H. Install solid block bridging at midpoint of joists or as shown on the Drawings.
- I. Provide all shims, blocking and bracing as shown on the Drawings and as approved by the Authority to complete the work.
- J. In addition to normal framing operations, install wood blocking or backing required to support the work of other trades.

3.3 Zip Sheathing

- A. Unless otherwise specified or approved by the Authority, install sheathing with the face grain perpendicular to framing and center joints over supports. Leave 1/8-inch gap where adjacent plywood panels meet.
- B. Stagger plywood joints so that all joints do not lie on the same support. Nail as shown in the recommended fastening schedule in this Section.
- C. Apply Zip System proprietary seam tape to joints between sheathing panels

3.4 Nailing

- A. Use galvanized nails except as otherwise indicated. Make tight connections between members. Countersink nail heads on exposed carpentry work and fill holes.
- B. Install fasteners without splitting wood; pre-drill as required.
- C. All nailing shall comply with the IBC, Recommended Fastening Schedule (found in table 2304.9.1), unless special requirements are shown on the Drawings.

3.5 Concrete Bearing

- A. All wood which bears against concrete, earth, steel or masonry shall be pressure treated as specified on the Drawings or as approved by the Authority.

END OF SECTION

SPECIAL PROVISION

SECTION 06400

FINISH CARPENTRY

PART 1 -GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings, Contract Conditions and other Technical Specifications Sections apply to work of this Section insofar as applicable.
- B. Coordinate work described in this section with that of all other trades to assure the steady progress of all Project work.

1.2 DESCRIPTION

- A. Finish carpentry work is shown in Drawings.
- B. Finish carpentry work includes, but is not limited to the following:
 - 1. Composite PVC standing and running trim and sills at windows.
 - 2. Composite PVC panel soffits with soffit vents.
 - 3. Composite PVC exterior standing and running trim around doors and vents.
 - 4. Composite PVC exterior standing and running trim fascia board.
 - 5. Interior plywood on the ceiling and walls of the building extension.

1.3 SUBMITTALS

- A. Product Data: Submit eight (8) copies of manufacturer's specifications and installation instructions for each product required.
- B. Shop Drawings: Submit eight (8) copies of shop drawings showing location of each item, dimensioned plans and elevations, large scale details, installation procedures and requirements, attachment devices and other components.
- C. Samples: Submit the following samples for each species and cut or pattern of architectural woodwork:
 - 1. Composite PVC trim for opaque finish; 6" x 3/4" x 18".

2. Plywood for painted finish (including edge banding), 1 finished sample of each type, 12 inches square.

1.6 PRODUCT DELIVERY, STORAGE AND HANDLING

Protect finish carpentry products during transit, delivery, storage and handling to prevent damage, soiling and deterioration.

PART 2 - MATERIALS

2.1 BASIC MATERIALS AND FABRICATION METHODS

- A. Except as otherwise indicated, comply with following requirements for architectural woodwork not specifically indicated as prefabricated or prefinished standard products.
- B. Wood Moisture Content: Provide kiln-dried (KD) lumber with an average moisture content range of 9% to 12% for interior work; 15% for exterior. Maintain temperature and relative humidity during fabrication, storage and finishing operations.
- C. Interior Wood:
 1. Concealed Solid Wood: Ponderosa Pine, Sugar Pine or Idaho Pine; No. 2 or better.
 2. Interior Plywood - Interior grade A-B DFPA Douglas
 3. For paint details see Section 09900 Painting.
- F. Exterior PVC
 1. Composite PVC Soffits - Painted Finish: Full vent vinyl soffit manufactured by Georgia-Pacific, or similar as approved by the Authority.
 2. Composite PVC Trim - Painted Finish: Azek Trim, or similar as approved by the Authority.
- G. Design and Construction Features: Comply with details shown for profile and construction of finish carpentry; and, where not otherwise shown, comply with applicable Quality Standards, with alternate details at the fabricator's option. PART 3 -EXECUTION

3.1 PREPARATION

- A. Condition finish carpentry to average prevailing humidity conditions in installation areas prior to installing.

- B. Meet at the site prior to delivery of finish carpentry and review coordination and environmental controls required for proper installation and ambient conditioning in areas to receive work. Include in meeting the Contractor, Resident and other Authority representatives; installers, painting, mechanical work and electrical work, and firms or persons responsible for continued operation (whether temporary or permanent) of HVAC system as required to maintain temperature and humidity conditions. Proceed with installation only when everyone concerned agrees that required ambient conditions can be properly maintained.
- C. Deliver inserts and similar anchoring devices to be built into substrates well in advance of time substrates are to be built.
- D. Prior to installation of, examine shop fabricated work for completion, and complete work as required, including back priming and removal of packing.

3.2 INSTALLATION OF WOODWORK

- A. Install the work plumb, level, true and straight with no distortions. Shim as required using concealed shims. Install to a tolerance of 1/8 inch in 8'-0" for plumb and level (including countertops); 1/16 inch maximum offset in flush adjoining surfaces; and 1/8 inch maximum offsets in revealed adjoining surfaces.
- B. Scribe and cut work to fit adjoining work and refinish cut surfaces or repair damaged finish at cuts.
- C. Anchor finish carpentry to anchors or blocking built-in or directly attached to substrates. Secure to grounds, stripping and blocking with countersunk, concealed fasteners and blind nailing as required for a complete installation. Except where prefinished matching fastener heads are required, use fine finishing nails for exposed nailings, countersunk and filled flush with woodwork, and matching final finish where transparent finish is indicated.
- D. Standing and Running Trim: Install with minimum number of joints possible, using full-length pieces (from maximum length of lumber available) to the greatest extent possible. Stagger joints in adjacent and related members. Cope at returns, miter at corners, and comply with Quality Standards for joinery.

3.3 INSTALLATION OF EXTERIOR SOFFITS & TRIM

Before installation, all exterior soffits and trim shall be mitered to tight, hair-line joints and shall be back and edge sealed with clear sealer after all cuts are made (including those for soffit vents). Joints in running material shall occur only at supports. Prior to installing, surfaces that will be inaccessible after installation shall be thoroughly back-primed. Fasteners shall be set below the finish surface and the holes filled and sanded smooth

3.4 ADJUSTMENT, CLEANING, FINISHING AND PROTECTION

- A. Repair damaged and defective work to eliminate functional and visual defects. Where it is not possible to repair items to the Resident's satisfaction, the Contractor must replace the work at no additional cost to the Authority. Adjust joinery for uniform appearance.
- B. Lubricate, make final adjustments for proper operation, and clean hardware.
- C. Clean composite PVC on exposed and semi-exposed surfaces. Touch-up finishes to restore damaged or soiled areas to the Engineer's satisfaction.
- D. Refer to Section 09900 for painting requirements.
- E. Protection:
 - 1. Protect finish carpentry during the remainder of the construction period to ensure that work will be without damage or deterioration at time of acceptance.
 - 2. Cover completed work with protective covering as necessary to protect from damage, and apply in a manner which will allow easy removal without damaging finish carpentry, or adjoining work. Remove coverings immediately before Final Acceptance.

END OF SECTION

SPECIAL PROVISION

SECTION 07200

THERMAL INSULATION

PART 1 - GENERAL

1.1 GENERAL DESCRIPTION

Work shall include the application of thermal insulation at the new construction of the rear wall and roof extension at each of the maintenance buildings in accordance with these specifications and in conformance with the design Plans.

1.2 RELATED DOCUMENTS

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

1.3 SUMMARY

- A. Section Includes:
 - 1. Thermal insulation.

1.4 ACTION SUBMITTALS

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

1.5 INFORMATIONAL SUBMITTALS

- A. Product Test Reports: Based on evaluation of comprehensive tests performed by a qualified testing agency, for each product.

1.6 QUALITY ASSURANCE

Follow manufacturers recommendations for installation.

1.7 DELIVERY, STORAGE, AND HANDLING

- A. Protect insulation materials from physical damage and from deterioration due to moisture, soiling, and other sources. Store inside and in a dry location. Comply with manufacturer's written instructions for handling, storing, and protecting during installation.

PART 2 - PRODUCTS

2.1 THERMAL INSULATION

- A. The contractor shall use fiberglass or spray foam insulation to achieve an R-19 value in the walls and an R-40 value in the ceiling.
 - a. At exterior walls to fill gaps at penetrations and door openings.

PART 3 - EXECUTION

3.1 PREPARATION

- A. Clean substrates of substances that are harmful to insulation or vapor retarders, including removing projections capable of puncturing vapor retarders, or that interfere with insulation attachment.

3.2 INSTALLATION, GENERAL

- A. Comply with insulation manufacturer's written instructions applicable to products and applications indicated.
- B. Install insulation that is undamaged, dry, and unsoiled and that has not been left exposed to ice, rain, or snow at any time.
- C. Extend insulation to envelop entire area to be insulated. Cut and fit tightly around obstructions and fill voids with insulation. Remove projections that interfere with placement.
- D. Provide sizes to fit applications indicated and selected from manufacturer's standard thicknesses, widths, and lengths. Apply single layer of insulation units to produce thickness indicated unless multiple layers are otherwise shown or required to make up total thickness.

- E. Do not apply insulation until installation of pipes, ducts, conduits, wiring, and electrical outlets in walls is completed and windows, electrical boxes, and other items not indicated to receive insulation are masked. After insulation is applied, make flush with face of studs by using method recommended by insulation manufacturer.
 - 1. Install insulation in miscellaneous voids and cavity spaces where required to prevent gaps in insulation.

3.3 PROTECTION

- A. Protect installed insulation and vapor retarders from damage due to harmful weather exposures, physical damage, and other causes. Provide temporary coverings or enclosures where insulation is subject to abuse and cannot be concealed and protected by permanent construction immediately after installation.

END OF SECTION

SPECIAL PROVISION
SECTION 07201
ROOF/CEILING INSULATION

PART 1 – GENERAL

1.1 General Description:

Work shall include the application of blown in cellulose insulation in the existing attic space above the ceiling in each of the maintenance garages in accordance with these specifications and in conformance with the design Plans. The work shall also include the installation of a rafter vent between the roof trusses to provide proper roof ventilation from the soffit to the gable vent. The rafter vents shall run parallel to the direction of the truss chords and extend from the soffit at the eave to the attic.

1.2 References:

- A. ASTM C739: Standard Specification for Cellulosic Fiber Loose-Fill Thermal Insulation.
- B. ASTM E-84: Standard Test Method for Surface Burning Characteristics of Building Materials.

1.3 Delivery, Storage and Handling

- A. Handle Products carefully, ensuring packaging is not damaged until opened for application.
- B. Store sealed bags in a dry, indoor location.
- C. Use dust control to maintain dust levels that are below what is required in the manufacturers specifications.

PART 2 –PRODUCTS

2.1 Manufacturers

- A. Green Fiber INS765LD or Approved Equivalent.
- B. ADO Products Durovent 22” x 48” Rafter Vent or Approved Equivalent.

2.2 Materials

- A. Blown in cellulose insulation: ASTM C739, Cellulosic Fiber Loose-Fill Thermal Insulation.
 - 1. Newsprint (Cellulose Fiber)

2. Boric Acid H₃BO₃
3. Sodium Polyborate
4. Sodium Tetraborate Pentahydrate
5. Distillate Mineral Oil

- B. R-40 Value Shall be achieved (~12" blown in insulation thickness) in addition to the existing insulation.
- C. Rafter vents shall be extruded polystyrene.

PART 3 – EXECUTION

3.1 Installation

- A. Seal all air leaks in ceiling penetrations.
- B. Install rafter vents between trusses as required by the manufacturer and as shown on the plans.
- C. Insulate access door with rigid board insulation or fiberglass batt insulation. Achieve a minimum of R-40.
- D. Mark insulation level to achieve R-40 on roof trusses.
- E. Fill the blower and blow cellulose insulation to desired level.

END OF SECTION

SPECIAL PROVISION

SECTION 07202

RIGID POLYSTYRENE BOARD INSULATION

PART 1 – GENERAL

1.4 References:

Work shall include the installation of rigid polystyrene board insulation 24” beneath grade around the perimeter of the new slab and vertically up the foundation wall to abut the siding around the extension at each of the maintenance garages. Additional board is required at all attic access doors per section 07201 in accordance with these specifications and in conformance with the design Plans.

1.5 References:

- A. ASTM C578-05a: Standard Specification for Rigid, Cellular Polystyrene Thermal Insulation.
- B. ASTM C208-95 (2001): Standard Specification for Cellulosic Fiber Insulating Board

1.6 Delivery, Storage and Handling

- A. Handle products carefully, ensuring board corners are not broken and boards are not damaged.
- B. Do not store Product exposed to direct sunlight. If stored outdoors, cover product with light-colored opaque tarpaulins to protect from solar radiation.

PART 2 –PRODUCTS

2.3 Manufacturers

- A. Dow Chemical Company
- B. Approved Equivalent

2.4 Materials

- A. Board Insulation: Extruded polystyrene board to ASTM C578, Type IV, rigid, closed celltype, with integral high density skin.
 - 1. Thermal Resistance (ASTM C518) R-5 per 1 inch of thickness.
 - 2. Board size: 2 x 8 feet or 4 x 8 feet, 2 inches thick
 - 3. Compressive strength: minimum 25 psi
 - 4. Water Absorption (ASTM D2842): 0.7% by volume maximum.
 - 5. Edges: Square

6. Water Vapor Permeance (ASTM E96): <1.5 perms
7. Flame Spread/Smoke Developed Values (ASTM E84): 5/165

PART 3 – EXECUTION

3.2 Examination

- A. Verify that the insulation boards and adjacent materials are compatible.
- B. Ensure vapor retardant membrane is clean and dry.
- C. Verify that substrate is flat, sound, clean and free of oil, grease, and irregularities.

3.3 Installation

- A. Exterior – prepare gravel subgrade to slope away from slab-on-grade.
- B. Exterior – subgrade shall be compacted to 98% density.

END OF SECTION

SPECIAL PROVISION

SECTION 07400

METAL SIDING

PART 1 – GENERAL

1.1 Summary

- A. Remove existing siding and underlayment if present, and inspect and replace any decayed wall sheathing as approved by the Authority prior to installing new siding.
- B. Provide preformed metal siding where shown on the Drawings, as specified herein and as needed for a complete and proper installation.
- C. All steel protection angles on garage door jambs shall be removed, stored, and reinstalled after metal siding is installed.
- D. All conduit fastened to the exterior of the building shall be removed prior to metal siding installation and reinstalled/replaced after metal siding installation.
- E. Related Work: Documents affecting work of this Section include, but are not necessarily limited to, Section 061000 - Rough Carpentry

1.2 Quality Assurance

- A. Use adequate number of skilled workmen who are thoroughly trained and experienced in the necessary crafts who are completely familiar with the specified requirements and the methods needed for proper performance of the work of this Section.

1.3 Submittals

- A. Within 15 calendar days after the Contractor has received the Authority's notice to proceed the Contractor shall submit:
 - Materials list of items proposed to be provided under this Section.
 - Manufacturer's specifications and other data needed to prove compliance with the specified requirements.
 - Shop drawings in sufficient detail to show fabrication, installation, anchorage and interface of the work of this Section with the work of related trades. See item "C" for more information.
 - Sample of two (2) full panel width by 6" length of finished exterior siding, interior liner and permanent trim pieces.
 - Sample of each fastener employed, one each.

- Manufacturer's recommended installation procedures which, when approved by the Authority, will become the basis for accepting or rejecting actual installation procedures used to complete the work.
- B. Submit two copies of detailed shop drawings to the Authority for review at least 15 days prior to incorporation into the work. Shop drawings shall be approved and assigned a number by the manufacturer.
- C. Shop drawings shall include the following:
 - Outline of building and building size.
 - Layout of panels
 - Location and types of proposed penetrations.
 - Perimeter details
 - Penetration details
 - Manufacturer's data on the proposed materials including panels, anchor clips and fasteners.
 - Calculations with registered engineer's seal, licensed in the State of Maine, verifying roof panel and attachment method resists applicable wind pressure imposed on it applicable with the IBC 2015.
- D. Submit written approval of Contractor by Manufacturer.
- E. Submit sample warranty and maintenance instructions.

PART 2 – PRODUCTS

2.1 Preformed Metal Siding

- A. Metal siding shall be 27 gauge, Everlast II with Patina Green color finish or equivalent.
- B. Panels shall be a maximum length possible to minimize end laps.

2.2 Sheathing

- A. Where existing sheathing is rotted, replacement sheathing shall match existing or as approved by the Resident. Contractor shall verify existing sheathing material by removing a portion of the existing siding. All new construction shall use ½" Zip Sheathing or approved equal as specified in section 06100 Rough Carpentry.

2.3 Underlayment

- A. If there is an existing weather barrier membrane between the sheathing and siding it will need to be removed to inspect the existing sheathing. After existing wall sheathing is inspected and replaced if needed, a new weather barrier membrane, Tyvek CommercialWrap or approved equal, shall be installed.

2.4 Accessory Items

- A. Provide subgirts, perimeter trim, closures and other required components as needed to comprise the complete preformed metal siding system, using the materials and gauges recommended by the manufacturer and approved by the Authority.

- B. Provide fasteners, washers and sealants as recommended by the manufacturer.

PART 3 - EXECUTION

3.1 Surface Conditions

- A. Examine the areas and conditions under which work of this Section will be performed. Correct conditions detrimental to timely and proper completion of the work. Do not proceed until unsatisfactory conditions are corrected.

3.2 Installation

- A. Install the work of this Section in strict accordance with the manufacturer's recommended installation procedures as approved by the Authority.
- B. Set siding plumb, level and true to line, without warp or rack, to a tolerance of 1 in 600.
- C. Touch up mars, scratches, and cut edges to match original finish.

3.3 Cleaning

The contractor, at all times, shall keep the premises free from accumulation of waste materials or rubbish caused by their operations. Upon the completion of the work, the contractor shall remove all waste materials and rubbish from the project as well as all tools, equipment, and machinery and;

- A. Clean Project site, yard, and grounds, in areas disturbed by construction activities, including landscape development areas, of rubbish, waste material, litter, and other foreign substances.
- B. Sweep paved areas broom clean. Remove petrochemical spills, stains, and other foreign deposits.
- C. Remove tools, construction equipment, machinery, and surplus material from Project site.
- D. Clean exposed exterior and interior hard-surfaced finishes to a dirt-free condition, free of stains, films, and similar foreign substances. Avoid disturbing natural weathering of exterior surfaces. Remove debris and surface dust from limited access spaces, including roofs, plenums, shafts, trenches, equipment vaults, manholes, attics, and similar spaces.
- E. Remove labels that are not permanent.
- F. Touch up and otherwise repair and restore all damaged, exposed finishes and surfaces. Replace finishes and surfaces that cannot be satisfactorily repaired or restored or that already show evidence of repair or restoration.

3.4 Final Inspection

- A. Touch up mars, scratches, and cut edges to match original finish. A final inspection of the roofing system shall be made by the roofing manufacturer's representative as soon as construction is complete. The contractor shall coordinate the final manufacturer's inspection with the

Authority. The contractor shall provide a written certification that the metal roof system has been installed in accordance with the manufacturer's recommendations.

END OF SECTION

SPECIAL PROVISION

SECTION 07500

SHEET METAL FLASHING AND TRIM

PART 1 - GENERAL

1.1 SUMMARY:

- A. Section Includes:
 - 1. Manufactured Products:
 - a. Manufactured flashing.

1.2 REFERENCES:

- A. American Architectural Manufacturers Association:
 - 1. AAMA 611-1998 - Voluntary Specification for Anodized Architectural Aluminum.
 - 2. AAMA 620-2002 - Voluntary Specification High Performance Organic Coatings on Coil Coated Architectural Aluminum.
 - 3. AAMA 621-2002 - Voluntary Specification for High Performance Organic coatings on Coil Coated Architectural Hot Dipped Galvanized (HDG) and Zinc-Aluminum Coated Steel Substrates.
- B. ASTM International:
 - 1. ASTM A153/A153M-05 - Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware.
 - 2. ASTM A653/A653M-05 - Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process.
 - 3. ASTM A755/A755M-03 - Specification for Steel Sheet, Metallic Coated by the Hot-Dip Process and Prepainted by the Coil-Coating Process for Exterior Exposed Building Products.
 - 4. ASTM A792/A792M-05 - Specification for Steel Sheet, 55% Aluminum-Zinc Alloy- Coated by the Hot-Dip Process.

1.3 PERFORMANCE REQUIREMENTS:

- A. General: Sheet metal flashing and trim assemblies as indicated shall withstand wind loads, structural movement, thermally induced movement, and exposure to weather without failure due to defective manufacture, fabrication, installation, or other defects in construction. Completed sheet metal flashing and trim shall not rattle, leak, or loosen, and shall remain watertight.
- B. Thermal Movements: Provide sheet metal flashing and trim that allows for thermal movements from ambient and surface

temperature changes.

1. Temperature Change (Range): 120°F (67°C), ambient; 180°F (100°C), material surfaces.

1.4 SUBMITTALS:

- A. Product Data: For each type of product indicated. Include construction details, material descriptions, dimensions of individual components and profiles, and finishes for each manufactured product and accessory.
- B. Submit two copies of detailed shop drawings to the Authority for review at least 15 days prior to incorporation into the work. Show fabrication and installation layouts of sheet metal flashing and trim, including plans, elevations, expansion-joint locations, and keyed details. Distinguish between shop- and field-assembled work. Include the following:
 1. Identification of material, thickness, weight, and finish for each item and location in Project.
 2. Details for forming sheet metal flashing and trim, including profiles, shapes, seams, and dimensions.
 3. Details for joining, supporting, and securing sheet metal flashing and trim, including layout of fasteners, cleats, clips, and other attachments. Include pattern of seams.
 4. Details of termination points and assemblies, including fixed points.
 5. Details of expansion joints and expansion-joint covers, including showing direction of expansion and contraction.
 6. Details of edge conditions, including eaves, crickets, and counter flashings as applicable.
 7. Details of connections to adjoining work.

1.5 INFORMATIONAL SUBMITTALS:

- A. Qualification Data: For qualified Fabricator.
- B. Warranty: Sample of special warranty.

1.6 CLOSEOUT SUBMITTALS:

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

1.7 QUALITY ASSURANCE:

- A. Fabricator Qualifications: Shop that employs skilled workers who custom fabricate sheet metal flashing and trim similar to that required for this Project and whose products have a record of successful in-service performance.
- B. Sheet Metal Flashing and Trim Standard: Comply with SMACNA's "Architectural Sheet Metal Manual" unless more stringent requirements are specified or shown on Drawings.

1.8 DELIVERY, STORAGE, AND HANDLING:

- A. Do not store sheet metal flashing and trim materials in contact with other materials that

might cause staining, denting, or other surface damage. Store sheet metal flashing and trim materials away from uncured concrete and masonry.

- B. Protect strippable protective covering on sheet metal flashing and trim from exposure to sunlight and high humidity, except to the extent necessary for the period of sheet metal flashing and trim installation.

1.9 WARRANTY:

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

PART 2 - PRODUCTS

2.1 SHEET METALS:

- A. General: Protect mechanical and other finishes on exposed surfaces from damage by applying a strippable, temporary protective film before shipping.
- B. Aluminum Sheet: ASTM B209 (ASTM B209M), alloy as standard with manufacturer for finish required, with temper as required to suit forming operations and performance required.
 - 1. As-Milled Finish: Standard one-side bright finish.
 - 2. Surface: Smooth, flat.
 - 3. Exposed Coil-Coated Finishes:
 - a. Two-Coat Fluoropolymer: AAMA 620. Fluoropolymer finish containing not less than 70% PVDF resin by weight in color coat. Prepare, pretreat, and apply coating to exposed metal surfaces to comply with coating and resin manufacturers' written instructions.
 - 4. Color: To be selected from manufacturer's full range of colors by The Authority.
 - 5. Concealed Finish: Pretreat with manufacturer's standard white or light-colored acrylic or polyester backer finish, consisting of prime coat and wash coat with a minimum total dry film thickness of 0.5 mil (0.013 mm).

2.2 MISCELLANEOUS MATERIALS:

- A. General: Provide materials and types of fasteners, solder, welding rods, protective coatings, separators, sealants, and other miscellaneous items as

required for complete sheet metal flashing and trim installation and recommended by manufacturer of primary sheet metal unless otherwise indicated.

- B. Fasteners: Wood screws, annular threaded nails, self-tapping screws, self-locking rivets and bolts, and other suitable fasteners designed to withstand design loads and recommended by manufacturer of primary sheet metal or manufactured item.
 - 1. General: Blind fasteners or self-drilling screws, gasketed, with hex-washer head.
 - a. Exposed Fasteners: Heads matching color of sheet metal using plastic caps or factory-applied coating.
 - b. Blind Fasteners: High-strength aluminum or stainless-steel rivets suitable for metal being fastened.
 - c. Spikes and Ferrules: Same material as gutter; with spike with ferrule matching internal gutter width.
 - 2. Fasteners for Aluminum Sheet: Aluminum or Series 300 stainless steel.
- C. Sealant Tape: Pressure-sensitive, 100% solids, gray polyisobutylene compound sealant tape with release-paper backing. Provide permanently elastic, nonsag, nontoxic, nonstaining tape 1/2 inch (13 mm) wide and 1/8 inch (3 mm) thick.
- D. Elastomeric Sealant: ASTM C920, elastomeric polyurethane polymer sealant; low modulus; of type, grade, class, and use classifications required to seal joints in sheet metal flashing and trim and remain watertight.

2.3 FABRICATION, GENERAL:

- A. General: Custom fabricate sheet metal flashing and trim to comply with recommendations in SMACNA's "Architectural Sheet Metal Manual" that apply to design, dimensions, geometry, metal thickness, and other characteristics of items indicated. Fabricate items at the shop to greatest extent possible.
 - 1. Fabricate sheet metal flashing and trim in thickness or weight needed to comply with performance requirements, but not less than that specified for each application and metal.
 - 2. Obtain field measurements for accurate fit before shop fabrication.
 - 3. Form sheet metal flashing and trim without excessive oil canning, buckling, and tool marks with true to line and levels indicated, and exposed edges folded back to form hems.
 - 4. Conceal fasteners and expansion provisions where possible. Exposed fasteners are not allowed on faces exposed to view.
- B. Fabrication Tolerances: Fabricate sheet metal flashing and trim that is capable of installation to a tolerance of 1/4 inch in 20 feet (6 mm in 6 m) on slope and location lines as indicated and within 1/8-inch (3-mm) offset of adjoining faces and of alignment of matching profiles.
- C. Sealed Joints: Form nonexpansion but movable joints in metal to accommodate elastomeric sealant.

- D. Expansion Provisions: Where lapped expansion provisions cannot be used, form expansion joints of intermeshing hooked flanges, not less than 1 inch (25 mm) deep, filled with butyl sealant concealed within joints.
- E. Fabricate cleats and attachment devices from same material as accessory being anchored or from compatible, noncorrosive metal.
- F. Fabricate cleats and attachment devices of sizes as recommended by SMACNA's "Architectural Sheet Metal Manual" and by FMG Loss Prevention Data Sheet 1-49 for application, but not less than thickness of metal being secured.
- G. Seams: Fabricate nonmoving seams with flat-lock seams. Form seams and seal with elastomeric sealant unless otherwise recommended by sealant manufacturer for intended use. Rivet joints where necessary for strength.

2.4 LOW-SLOPE ROOF SHEET METAL FABRICATIONS:

- A. Copings: Fabricate in minimum 96-inch- (2400-mm-) long, but not exceeding 10-foot- (3- m-) long, sections. Fabricate joint plates of same thickness as copings. Integrate exterior edge into metal panel coping extrusion and provide sealant to create watertight and flexible seal. Furnish with continuous cleats to support edge of interior leg. Miter corners, seal, and solder or weld watertight.
 - 1. Joint Style: Butt, with 12-inch- (300-mm-) wide, concealed backup plate.
 - 2. Fabricate from the following materials:
 - a. Aluminum: 0.050 inch (1.27 mm) thick.
- B. Base Flashing: Fabricate from the following materials:
 - 1. Aluminum: 0.040 inch (1.02 mm) thick.
- C. Counterflashing: Fabricate from the following materials:
 - 1. Aluminum: 0.032 inch (0.81 mm) thick.
- D. Flashing Receivers: Fabricate from the following materials:
 - 1. Aluminum: 0.032 inch (0.81 mm) thick.
- E. Roof-Penetration Flashing: Fabricate from the following materials:
 - 1. Stainless Steel: 0.019 inch (0.48 mm) thick.

PART 3 - EXECUTION

3.1 EXAMINATION:

- A. Examine substrates, areas, and conditions, with Installer present, to verify actual locations, dimensions and other conditions affecting performance of the Work.
 - 1. Verify compliance with requirements for installation tolerances of substrates.
 - 2. Verify that substrate is sound, dry, smooth, clean, sloped for drainage, and securely anchored.
- B. Proceed with installation only after any unsatisfactory conditions have been corrected.

3.2 INSTALLATION, GENERAL:

- A. General: Anchor sheet metal flashing, trim and other components of the Work securely in place, with provisions for thermal and structural movement. Use fasteners, solder, welding rods, protective coatings, separators, sealants, and other miscellaneous items as required to complete sheet metal flashing and trim system.
1. Install sheet metal flashing and trim true to line and levels indicated. Provide uniform, neat seams with minimum exposure of solder, welds, and sealant.
 2. Install sheet metal flashing and trim to fit substrates and to result in watertight performance. Verify shapes and dimensions of surfaces to be covered before fabricating sheet metal.
 3. Install continuous cleats anchored not more than 12 inches (300 mm) apart.
 4. Install exposed sheet metal flashing and trim without excessive oil canning, buckling, and tool marks.
 5. Install sealant tape where indicated.
 6. Torch cutting of sheet metal flashing and trim is not permitted.
 7. Do not use graphite pencils to mark metal surfaces.
- B. Metal Protection: Where dissimilar metals will contact each other or corrosive substrates, protect against galvanic action by painting contact surfaces with bituminous coating or other permanent separation as recommended by SMACNA.
1. Coat back side of uncoated aluminum and stainless-steel sheet metal flashing and trim with bituminous coating where flashing and trim will contact wood, ferrous metal, or cementitious construction.
- C. Expansion Provisions: Provide for thermal expansion of exposed flashing and trim. Install space movement joints at a maximum of 10 feet (3 m) with no joints allowed within 24 inches (600 mm) of corner or intersection. Where lapped expansion provisions cannot be used or would not be sufficiently watertight, form expansion joints of intermeshing hooked flanges, not less than 1 inch (25 mm) deep, filled with sealant concealed within joints.
- D. Fastener Sizes: Use fasteners of sizes that will penetrate metal decking not less than recommended by fastener manufacturer to achieve maximum pull-out resistance.
- E. Seal joints as required for watertight construction.
1. Where sealant-filled joints are used, embed hooked flanges of joint members at least 1 inch (25 mm) into sealant. Form joints to completely conceal sealant. When ambient temperature at time of installation is moderate, between 40 and 70°F (4 and 21°C), set joint members for 50% movement each way. Adjust setting proportionately for installation at higher ambient temperatures. Do not install sealant-type joints at temperatures below 40°F (4°C).
- F. Soldered Joints: Clean surfaces to be soldered, removing oils and foreign matter. Pre-tin edges of sheets to be soldered to a width of 1-1/2 inches (38 mm). Additionally, pre-tinning where pre-tinned surface would show in completed Work should be reduced.
1. Do not solder aluminum sheet.
 2. Do not use torches for soldering. Heat surfaces to receive solder and flow solder into joint. Fill joint completely. Completely remove flux and spatter from exposed surfaces.

3.3 ROOF FLASHING INSTALLATION:

- A. General: Install sheet metal flashing and trim to comply with performance requirements, sheet metal manufacturer's written installation instructions, and SMACNA's "Architectural Sheet Metal Manual." Provide concealed fasteners where possible, set units true to line, and level as indicated. Install work with laps, joints, and seams that will be permanently watertight and weather resistant.
- B. Pipe or Post Counterflashing: Install counterflashing umbrella with close-fitting collar with top edge flared for elastomeric sealant, extending a minimum of 4 inches (100 mm) over base flashing. Install stainless-steel draw band and tighten.
- C. Counterflashing: Coordinate installation of counterflashing with installation of base flashing. Insert counterflashing in reglets or receivers and fit tightly to base flashing. Extend counterflashing 4 inches (100 mm) over base flashing. Lap counterflashing joints a minimum of 4 inches (100 mm) and bed with sealant. Secure in a waterproof manner by means of snap- in installation and sealant or lead wedges and sealant.
- D. Roof-Penetration Flashing: Coordinate installation of roof-penetration flashing with installation of roofing and other items penetrating roof. Seal with elastomeric sealant and clamp flashing to pipes that penetrate roof.

3.4 ERECTION TOLERANCES:

- A. Installation Tolerances: Shim and align sheet metal flashing and trim within installed tolerance of 1/4 inch in 20 feet (6 mm in 6 m) on slope and location lines as indicated and within 1/8- inch (3-mm) offset of adjoining faces and of alignment of matching profiles.

3.5 CLEANING AND PROTECTION:

- A. Clean and neutralize flux materials. Clean off excess solder.
- B. Clean off excess sealants.
- C. Remove temporary protective coverings and strippable films as sheet metal flashing and trim are installed unless otherwise indicated in manufacturer's written installation instructions. On completion of installation, remove unused materials and clean finished surfaces. Maintain in a clean condition during construction.
- D. Replace sheet metal flashing and trim that have been damaged or that have deteriorated beyond successful repair by finish touchup or similar minor repair procedures.

END OF SECTION

SPECIAL PROVISION

SECTION 07610

METAL ROOFING

PART 1 - GENERAL

1.1 Summary

Work shall include removing existing shingles and underlayment, inspecting and replacing any decayed or rotted roofing boards as approved by the Authority, and furnishing and installing corrugated metal roofing complete with fasteners and accessories for a water tight system. Metal roofing shall match the pitch of the existing roof. The work shall also include the installation of prefabricated snow guards on the garage door side of the roof only. The snow guards shall be compatible with corrugated metal roofing.

1.2 Quality Assurance

Contractor shall be approved in writing by the roofing manufacturer and shall substantiate a minimum of three years' experience installing corrugated metal roofing.

1.3 Submittals

- A. Submit two copies of detailed shop drawings to the Authority for review at least 15 days prior to incorporation into the work. Shop drawings shall be approved prior to incorporation into the work.
- B. Shop drawings shall include the following:
 - Outline of roof and roof size.
 - Layout of panels
 - Location and types of proposed penetrations.
 - Perimeter details
 - Penetration details
 - Manufacturer's data on the proposed materials including panels, anchor clips and fasteners.
 - Calculations with a registered Professional Engineer's seal, licensed in the State of Maine, verifying the roof panels and attachment methods, due to wind pressure, meet the requirements of IBC 2015.
 - Manufacturers specifications and installation instructions
- C. Submit written approval of contractor by manufacturer. Submit sample warranty and maintenance instructions.
- D. The Contractor shall not be relieved of responsibility for any deviation from the requirements of the specifications unless the contractor has specifically informed the Authority in writing of such deviation at the time of submission and the Authority has given written approval to the specific deviation. The Contractor shall

not be relieved from responsibility for errors or omissions. No portion of the work shall be commenced until the Authority has approved the submittal.

1.4 Warranty

Roof finish coating shall be warranted against rust, peeling, chipping, cracking and blistering for a period of twenty years. The Contractor shall provide written twenty-year warranty, beginning with the date of Final Acceptance, guaranteeing the roof system to be watertight and free of defects. Final Acceptance is defined as all the Physical Work must be complete and in conformity with the Contract and all the Closeout Documentation has been submitted. All defects and warranty work occurring during warranty period, shall be corrected by the Contractor at no cost to the Authority.

Contractor shall provide detailed instructions for preventative maintenance and noting a list of harmful substances that may damage roofing.

All work not conforming to the contract requirements, including substitutions not properly approved and authorized, may be considered defective. If requested by the Authority, the contractor shall furnish satisfactory evidence as to the kind and quality of materials and equipment used.

Remedial Work to meet warranty obligations will be completed within three weeks unless a more immediate response is required for safety or convenience, as determined by the Authority.

The Contractor agrees that the warranty obligations provided by this Contract shall be reported as an outstanding obligation in the event of bankruptcy, dissolution, or the sale, merger, or cessation of operations of the Contractor.

PART 2 – PRODUCTS

2.1 Roof Panels

- A. Roof panels shall be 26 gauge corrugated metal
- B. Lap roof panels as recommended by the manufacturer.
- C. Roofing color will be Forest Green or as determined by the Authority.

2.2 Fasteners

- A. Panels shall be fastened to the substrate with a fastener as recommended by the roof panel manufacturer

2.3 Flashing

- A. Flash all other roof penetrations including chimneys.
- B. Flashing shall be as recommended by the roofing manufacturer and as approved by the Authority. Flashing shall be a minimum of 0.040 aluminum or 24 gauge galvanized steel.
- C. Rubber boot pipe flashing shall be used around vent pipes.

2.4 Sealants

- A. Sealants between roof panels shall be as recommended by the manufacturer.
- B. Provide all required sealants at trim, roof penetrations, etc.
- C. Sealants shall be non-drying elastomer based material.

2.5 Fascia, Trim and Accessories

- A. Ridge cap shall be a continuous non-venting metal ridge cover, as provided by the roofing manufacturer.
- B. Fascia and trim on the new building extension shall be in accordance with the roofing manufacturer.
- C. Trim for roof penetrations on the existing roof shall be in accordance with the roofing manufacturer. If Authority decides new fascia is required on the existing building it shall be installed in accordance with the roofing manufacturer.

2.6 Sheathing

- A. Where existing sheathing is rotted, replacement sheathing shall match existing or as approved by Resident. Contractor shall verify existing sheathing material by removing a portion of the existing shingles. All new construction shall use Zip Sheathing or approved equal as specified in 06100 Rough Carpentry. The Zip Sheathing thickness shall match the existing sheathing thickness.

2.7 Underlayment

- A. Self-Adhered roofing underlayment - Cold applied, self-adhering, high strength polyethylene film, Grace Ice & Water Shield or approved equal. Existing underlayment shall be removed before application of Grace Ice & Water Shield or approved equal.

2.8 Provisions for Expansion/Contraction

- A. End wall trim and roof transition flashings shall allow the roof to move relative to walls as the roof expands and contracts with temperature changes.
- B. Provide required fasteners, closure strips, support plates, and sealants as indicated in manufacturer's written instructions to allow for movement due to thermal expansion.

2.9 Snow Guards

- A. Snow guards shall be prefabricated bar type, mechanically fastened to the roof per the manufacturers recommendations, designed for use with corrugated metal roofing and complete with brackets and fasteners for anchoring, and snow clips, etc. Snow guard system to match color of roof or as approved by Authority.

2.10 Fall Protection Anchor Points for Metal Roof

- A. Contractor shall provide four (4) fall protection anchor points to be field located by the Resident engineer and an MTA representative.

2.11 Acceptable Manufacturers

- A. Union Corrugating Company or Approved Equal (26 guage).
- B. Rocky Mountain, Inc Snow Guards or approved equal. Snow guards shall be compatible with corrugated metal roof.
- C. Anchor Points shall be Guardian Fall Protection Anchorage Point or approved equal.

PART 3 – EXECUTION

3.1 Inspection

- A. Contractor shall inspect the substrate prior to installing metal roofing to ensure that the surface is sound and uniform. Correct any irregularities prior to proceeding with the work.
- B. The Contractor shall make provisions to allow safe access to the work for the Authority to inspect the work, facilitate ongoing inspection of the work and to measure the work for payment purposes.
- C. Roofing Manufacturer's representative shall examine the roof structures with installer prior to beginning roof installation. Roofing Manufacturer's representative shall be present during initial layout and installation of roofing system to ensure installer follows the manufacturer's installation recommendations and shop drawings.

3.2 Installation

- A. Install metal roof panel system in accordance with manufacturers written instructions, approved shop drawings, and project drawings. Install metal roof panels in orientation, sizes and locations indicated, free of waves, warps, buckles, fastening stresses, and distortions. Anchor panels and other components securely in place. Provide for thermal and structural movement.
- B. Remove and replace all roofing boards that are rotted or broken as approved by the Authority. The existing surface shall be smooth and free of protruding nails prior to placing membrane, underlayment and roofing.
- C. Starter and edge trim and fascia overlay should be completed before installing roof panels on the new extension portion of the roof.
- D. Lap panels shall be installed in accordance with manufacturer's recommendations.
- E. Cold applied, self-adhering, high strength polyethylene film Ice and Water shield or approved equal shall be applied over the entire sheathed area of the roof and any roof protrusions.
- F. Installation, handling and storage of metal roofing and underlayment shall be in accordance with manufacturer's recommendations. Install accessories such as penetration flashings and eave closures in accordance with manufacturer's recommendations, as approved by the Authority.
- G. The Contractor shall notify the Authority of the presence of any deteriorated or damaged fascia or other components that remain. Authority shall designate the fascia to be removed and replaced. No fascia or other components shall be replaced or covered until authorized by the Authority.

- H. Removal of existing materials shall be accomplished without damage to the portion of the structure that is to remain. The contractor shall be responsible for all damage to the existing structure resulting from an act, omission, neglect, or misconduct of the Contractor until Final Acceptance. The Contractor shall bear all risk of loss relating to the Work until Final Acceptance, regardless of cause, including completed Work, temporary Structures and all other items or Material not yet incorporated into the work. The Contractor shall, at its sole expense, rebuild, repair, restore, or replace such damage property or otherwise make any good losses that arise from such damage.
- I. All Work and the completed installation of the roof shall conform, to all applicable National, State and local codes and regulations.
- J. The Contractor shall dispose of demolition debris in accordance with applicable laws and standards.

3.3 Cleaning

The contractor, at all times, shall keep the premises free from accumulation of waste materials or rubbish caused by their operations. Upon the completion of the work, the contractor shall remove all waste materials and rubbish from the project as well as all tools, equipment, and machinery and;

- G. Clean Project site, yard, and grounds, in areas disturbed by construction activities, including landscape development areas, of rubbish, waste material, litter, and other foreign substances.
- H. Sweep paved areas broom clean. Remove petrochemical spills, stains, and other foreign deposits.
- I. Remove tools, construction equipment, machinery, and surplus material from Project site.
- J. Clean exposed exterior and interior hard-surfaced finishes to a dirt-free condition, free of stains, films, and similar foreign substances. Avoid disturbing natural weathering of exterior surfaces. Remove debris and surface dust from limited access spaces, including roofs, plenums, shafts, trenches, equipment vaults, manholes, attics, and similar spaces.
- K. Remove labels that are not permanent.
- L. Touch up and otherwise repair and restore all damaged, exposed finishes and surfaces. Replace finishes and surfaces that cannot be satisfactorily repaired or restored or that already show evidence of repair or restoration.

3.4 Final Inspection

- A. A final inspection of the roofing system shall be made by the roofing manufacturer's representative as soon as construction is complete. The contractor shall coordinate the final manufacturer's inspection with the Authority. The Contractor shall provide a written certification that the metal roof system has been installed in accordance with the manufacturer's recommendations.
- B. Remove all debris and rubbish caused by the work of this Section as the work progresses.

END OF SECTION

SPECIAL PROVISION
SECTION 079200

SEALANTS AND CAULKING

PART 1 – GENERAL

1.1 Summary

- A. Provide all labor, materials and equipment to complete sealing and caulking as shown on the drawings and as specified herein.

1.2 Scope of Work

- A. Sealing and caulking shall be performed on all exterior joints including but not limited to:
 - 1. Around door, frames and windows.
 - 2. Joints around wall, ceiling and penetrations such as electrical boxes, pipes, etc.
 - 3. Joints between dissimilar building materials such as brick and wood, wood and metal, etc., where water might enter.
- B. Interior caulking of all wall, floor, and ceiling penetrations.
- C. Sealing of concrete joints shall be SIKA 1A, 3/8" deep minimum as shown on the plans.

1.3 References

- A. All sealants and caulking shall comply with ASTM C920, Standard Specification for elastomeric joint sealants.

PART 2 – PRODUCTS

2.1 Exterior Caulking

- A. Exterior caulking between prefinished surfaces shall be a one component silicone joint sealant; "Spectrum 1" by Tremco Sealant Systems, Dow Corning "795 Silicone Building Sealant", or approved equivalent.
- B. Exterior caulking for use on paintable surfaces shall be an acrylic latex joint sealant; "Tremco Acrylic Latex Caulk"; Bostik "Chem-Caulk 600", or approved equivalents.

2.2 Interior Caulking

- A. Interior caulking for bedding electrical boxes, outlets, pipes or other wall penetrations and around interior doors, frames and windows shall be a non-hardening sealant; "Tremco Acoustical Sealant", Bostik "Chem-Caulk 600", or approved equivalents.
- B. Interior caulking per penetrations through fire wall or smoke barriers such as conduits, pipes and ducts shall be a one component fire resistant caulk or putty; 3M Fire Barrier Caulk "CP25" or Putty "303", or approved equivalents.

2.3 Joint Filler

- A. Joint filler for backing caulking shall be non-absorbent precompressed foam sealant; “Will-Seal 150”, by Will-Seal Construction Foams; “York-Seal 100” by York Manufacturing, Inc., or approved equivalents.

PART 3 – EXECUTION

3.1 Preparation

- A. All joints and spaces to be caulked shall be dry, clean and free from dust and loose materials.
- B. If necessary, mask or otherwise protect adjacent surfaces.

3.2 Installation

- A. All sealants and caulking shall be installed according to the manufacturer’s recommendations.
- B. Caulking shall be applied with suitable equipment such as with a caulking gun.
- C. Use foam backing for joints deeper than ½-inch. Pack into joint allowing at least ¼-inch for caulking.
- D. Caulking shall be applied so that surfaces are slightly concave, tight and smooth. Joints shall be air and water tight.
- E. Caulk or putty shall be applied around fire and smoke wall penetrations to provide a complete fire barrier sealing system.
- F. Remove excess caulking and clean adjacent surfaces with approved cleaners.

END OF SECTION

SPECIAL PROVISION

SECTION 08500

WINDOWS

PART 1 - GENERAL

1.1 Section Includes

- A. Stationary windows, glazing, weather strip, and standard or specified anchors, trim and attachments.

1.2 References

A. American Society for Testing and Materials (ASTM):

1. E 283: Standard Test Method for Rate of Air Leakage Through Exterior Windows, Curtain Walls, and Doors.
2. E 330: Standard Test Method for Structural Performance of Exterior Windows, Curtains Walls, and Doors by Uniform Static Air Pressure Difference.
3. E 547: Standard Test Method for Water Penetration of Exterior Windows, Curtain Walls, and Doors by Cyclic Static Air Pressure Differential.
4. E 2190: Standard Specification for Insulating Glass Unit Performance and Evaluation.
5. C 1036: Standard Specification for Flat Glass.
6. E 90-09: Standard Test Method for Laboratory Measurement of Airborne Sound Transmission Loss of Building Partitions and Elements.
7. F 2090-10: Standard Specification for Window Fall Prevention Devices with Emergency Escape (Egress) Release Mechanisms.

B. Insulating Glass Manufactures Alliance / Insulating Glass Certification Council (IGMA / IGCC).

C. American Architectural Manufacturers Association/Window and Door Manufacturers Association/Canadian Standards Association (AAMA/WDMA/CSA):

1. AAMA/WDMA/CSA-101/I.S.2/A440-05: Standard/Specification for windows, doors, and unit skylights
2. AAMA/WDMA/CSA-101/I.S.2/A440-08: North American Fenestration Standard/Specification for windows, doors, and skylights

C. Window and Door Manufacturers Association (WDMA):

HALLMARK Certification Program

- D. American Architectural Manufacturers Association (AMMA): 623-10: Voluntary Specification, Performance Requirements and Test Procedure for Organic Coatings on Fiber Reinforced Thermoset Profiles.
- E. National Fenestration Rating Council (NFRC): 101: Procedure for Determining Fenestration Product Thermal Properties.

1.3 Submittals

- A. Shop Drawings: Submit shop drawings, including locations, elevations, sections, materials, finishes, and attachments to The Authority fifteen (15) days prior to incorporation into the work.

1.4 Delivery

- A. Deliver materials in original packaging and protect from weather.

1.5 Storage and Handling

- A. Prime or seal wood surfaces, including surface to be concealed by wall construction, if more than thirty (30) days will pass between delivery and installation.
- B. Store window units in an upright position in a clean and dry storage area above ground and protect from weather.

1.6 Warranty

- A. Windows shall be warranted to be free from defects in manufacturing, materials, and workmanship for a period of ten (10) years from purchase date.
- B. Window glass shall be warranted to be free from defects in manufacturing, materials and workmanship for period of twenty (20) years from the purchase date.

PART 2 - PRODUCTS

2.1 Manufactured Units

- A. Description: Double Pane, Double Hung as manufactured by ThermaStar, or approved equivalent.

2.2 Frame Description

- A. 27.5" x 45.5" Rough Opening.
- B. Frame and Sash Material: Vinyl

2.3 Jamb depth: 2.69 inches glazing

- A. Argon gas inserted between 2 panes of glass.

2.4 Accessories and Trim

A. Exterior Casing:

1. 3 ½” Flat Casing available as full surround.
2. Material: As specified in Section 06400 Finish Carpentry Exterior PVC.
3. Colors: Forest Green.

B. Interior Casing:

1. 3 ½” Flat Casing available as full surround.
2. Colors: Ultra White.

PART 3 -

EXECUTION

3.1 Examination

- A. Verification of Conditions: Before Installation, verify openings are plumb, square, and of proper dimension. Report frame defects or unsuitable conditions to the General Contractor before proceeding.
- B. Acceptance of Conditions: Beginning of installation confirms acceptance of existing conditions.

3.2 Installation

- A. Assemble and install window unit according to manufacturer’s instructions and reviewed shop drawings.
- B. Install sealant and related backing materials at perimeter of unit or assembly in accordance with Joint Sealants. Do not use expansive foam sealant.
- C. Install accessory items as required.
- D. Use finish nails to apply wood trim and moldings.

3.3 Cleaning

- A. Remove visible labels and adhesive residue according to manufacturer’s instructions.
- B. Leave windows and glass in a clean condition.

3.4 Protecting Installed Construction

- A. Protect windows from damage by chemicals, solvents, paint, or other

construction operations that may cause damage.

END OF SECTION

SPECIAL PROVISION

SECTION 09900

PAINING

PART 1 – GENERAL

1.1 Summary

- A. This work shall consist of all labor, materials and equipment necessary to complete painting of the new interior plywood sheathing of the building extension as well as all existing interior surfaces (walls and ceiling) as shown on the Drawings and as specified herein.

1.2 Submittals

- A. Contractor shall submit color samples, manufacturer and paint specifications to the Authority for review fifteen (15) days prior to incorporation into the work. Provide two (2) copies of product information.

1.3 Scope of Work

- A. This work shall include prefinishing and painting of all interior surfaces of the interior plywood sheathing of the new building extension and the existing walls and ceiling.

PART 2 –PRODUCTS

2.1 Paint

- A. Acceptable manufacturers include: Sherwin Williams or approved equal.
- B. Product: Valspar semi-gloss Interior, paint and primer in one, or approved equal.
- C. Color: Off White, as approved by Maine Turnpike Authority before application.

2.2 Painting Accessories

- A. Turpentine shall be pure gum spirits conforming to ASTM DB-65.
- B. Putty shall be as recommended by paint manufacturers and as approved by the Authority.

PART 3 – EXECUTION

3.1 Preparation

- A. Prior to painting insure that all surfaces are finished and ready for application.
- B. Sand plywood surface smooth and wipe clean before applying paint.

3.2 All Surfaces

- A. Apply paint only to clean, dry surfaces. Do not paint in very humid conditions.
- B. Use masking tape, drop cloths and other means of protection to adequately prevent dip, spatters and overruns on adjacent surfaces.

3.3 Application

- A. Apply paint as recommended by the manufacturer on properly prepared surfaces.
- B. Thoroughly brush or roll all coats to achieve a uniformly smooth coverage.
- C. Allow each coat to dry 48 hours or longer if recommended by manufacturer before applying subsequent coats.
- D. Do not apply paint when temperatures are below 45°F unless provision for heating is made.
- E. All finishes shall be smooth, free from runs and sags, streak, brush fibers and other defects. All edges shall be straight and sharp.
- F. Refinish and paint any existing adjacent areas that were disturbed as a result of the work.

3.4 Cleanup and Protection

- A. Clean all areas of drippings, spatters and debris. Remove all masking tape and clean glass and other areas as required.
- B. Touch up all defective areas to the satisfaction of the Authority.
- C. Protect all surfaces until acceptance by the Authority.

3.5 Touch-Up Materials

- A. Partially used cans shall also be left with the Authority.

END OF SECTION

SECTION 15000

SUPPLEMENTAL MECHANICAL GENERAL REQUIREMENTS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. The General Provisions, Special Provisions and Notice to Contractors shall apply to this work. Read these to be familiar with conditions related to the installation of the work.

1.2 WORK SHOWN ON DRAWINGS

- A. The drawings accompanying this specification, as a part thereof, are working drawings indicating the location and arrangement of the increments of the systems of this section of work. Material deviation from this arrangement, process or means of application, shall bear the Engineer's review stamp before the change is made on the job or materials are ordered. Changes made without such review shall be ordered removed and items installed as specified shall be provided at no additional expense to the Owner.
- B. The drawings are not intended to show in minute detail minor items of installation or materials such as specific fittings or findings.

1.3 MATERIALS AND LABOR

- A. Furnish materials and labor necessary to deliver to the Owner a complete and operable system installed in accordance with the contract documents.
- B. Materials shall be of the best quality. Workmanship shall be of highest grade and construction shall be done according to best practices of the trade.
- C. Provide, when required, labeled samples of material or equipment specified herein or proposed to be used in this work.
- D. Where words "furnish", "provide", or "install" are mentioned, either singly or in combination, these words are hereby interpreted to mean "furnish and install" or "provide and install", including materials complete with connections, supplemental devices, accessories and appurtenances, unless specifically otherwise noted. These words are likewise hereby interpreted as being prefixed to materials, equipment, and apparatus hereinafter mentioned, either in abbreviated or scheduled information or in the technical sections of the specifications.

1.4 EQUIPMENT INSTALLATION IN HEATING SEASON

- A. The system shall be installed provided that the construction area will have sufficient heat to maintain temperature above 40°F throughout the construction period.

1.5 COOPERATION BETWEEN TRADES

- A. Provide information sufficiently in advance of this work, so that work by the other trades may be coordinated and installed without delays. Furnish and locate sleeves, supports, anchors and necessary access panels.
- B. Where work is concealed, assure it does not project beyond finished lines of floors, ceilings, or walls.
- C. Equipment or piping requiring access found to be located above sheetrock ceilings shall be brought immediately to the attention of the Architect for resolution.

1.6 VISITING THE PREMISES

- A. All bidders are required to visit the all the jobsites prebid.

1.7 ORDINANCES, AUTHORITIES, PERMITS, AND FEES

- A. Obtain necessary permits and licenses, give notices and comply with laws, ordinances, rules, regulations or orders affecting the work, and pay fees and charges in connection therewith.
- B. The "authority having jurisdiction" is the organization, office, or individual responsible for "approving" equipment, an installation, or a procedure.

1.8 PROTECTION OF WORK AND MATERIALS

- A. Protect and care for materials delivered and work performed until the completion of the work. Defective equipment or equipment damaged in the course of storage, installation or test shall be replaced or repaired to the satisfaction of the Engineer at no additional cost to the Authority.

1.9 INSURANCE

- A. Purchase and maintain Public Liability and Property Insurance during the progress of the work and until completion and acceptance of the entire project by the Owner in the amounts as specified in the General Conditions.

1.10 APPLICABLE CODES

- A. Work and materials shall conform to the latest rules and regulations listed below and these rules and regulations hereby are made part of this specification. They include, but are not necessarily limited to the following:

American Society for Testing and Materials (ASTM)
Underwriters' Laboratories, Inc. (UL)
Air Moving and Conditioning Assoc. (AMCA)
American Society of Heating, Refrigerating, and Air
Conditioning Engineers (ASHRAE)
American Society of Mechanical Engineers (ASME)
National Electrical Manufacturers Association (NEMA)
Institute of Electrical and Electronics Engineers (IEEE)
American National Standards Institute (ANSI)

National Fire Protection Association (NFPA)
American Water Works Association (AWWA)
Local Fire Code
Local Plumbing Codes
American Welding Society

1.11 SHOP DRAWINGS

- A. Submit shop drawings, manufacturers' data and certificates for equipment, materials and finish, and pertinent details for each system where specified in each individual section, eight (8) copies, to be submitted to the Resident. Shop drawings will be returned "No Exceptions Taken", "Make Corrections Noted", "Amend and Resubmit", "Submit Specified Item", or "Rejected" less two (2) copies. Work shall progress in accordance with "Reviewed" shop drawings (ONLY).
- B. Groups of similar shop drawings shall be submitted as individual bound documents with covers and indexes. Typical similar items would be "Diffusers and Registers", "Valves and Controls". Rejection of individual items shall not be cause for rejection of the entire document.
- C. Clearly indicate item(s) to be reviewed on each submission by highlighting or underlining intended item(s). Submissions not clearly marked shall be returned "Amend and Resubmit".
- D. Shop drawings must bear the Engineer's review stamp. In the event that the Engineer returns shop drawings "Amend and Resubmit" or "Rejected", the shop drawing must be revised and resubmitted for review.
- E. Furnishing of the specified item must still produce the results and performance, dependability and quality reasonably to be expected within the spirit of the specifications, drawings, and the standard of good mechanical performance normal to the trade.

1.12 SUBSTITUTIONS

- A. Where the specifications allow the substitution of a product, this product is still subject to review by the Engineer in accordance with the paragraph entitled "Shop Drawings". Review of a substitute item is an indication only that the substitute item is compatible with the specified item as a claim of the manufacturer. Insure dimensional propriety, performance, and quality of the substitute item.
- B. Reference in the specifications or on the drawings to any product, material, fixture, form or type of construction, by proprietary name, manufacturer, make or catalog number, establishes a standard of quality or design and is not meant to limit competition. Use any equivalent substitute, provided favorable written review by the Engineer is first obtained. The (ONLY) notation in the specification is an exception to this and leaves no option.
- C. For materials or equipment which are supplied with integral or factory applied finish, the colors will be considered in evaluating substitutions.
- D. For the purpose of avoiding conflicts with other trades, contracts, and adjoining work where more than one (1) article, device, material, fixture, form or proprietary name, manufacturer, make or catalog number, the first named shall be used as the basis of design and details. The

cost of any changes because of substituted item shall be borne by the Contractor requesting such change.

PART – 2

NOT USED

PART 3 - EXECUTION

3.1 GRADES AND ELEVATIONS

- A. Establish and maintain grades and elevations in connection with this work.

3.2 EQUIPMENT SUPPORTS

- A. Furnish and install equipment supports for mechanical equipment as required. Supports shall be subject to review by the Engineer.

3.3 SLEEVES AND PREPARED OPENINGS

- A. Coordinate core-drilling, cutting, patching and setting of sleeves, frames, framing and lintels for openings with other trades. Sleeves shall be furnished by the Contractor. Pipe sleeves shall be provided at all floor and wall penetrations. Sleeves shall be Schedule 40 steel pipe for iron pipe, Type “L” copper for copper pipe and Schedule 40 PVC for plastic pipe. Sleeves shall be firestopped, as specified.
- B. Failure to give timely notice of and to locate openings and furnish sleeves shall cause no additional expense to the Owner.

3.4 CONNECTION TO EQUIPMENT

- A. Provide piping connections, supports, brackets, compensators or flexible connections to prevent application of excessive stresses to equipment.
- B. Equipment shall be installed with flanges or unions in such a manner as to permit disconnecting for removal of tubes, coils, elements and other equipment for inspection, service and repairs.

3.5 ACCESS TO EQUIPMENT

- A. The installation of work performed shall provide reasonable accessibility for operation, inspection, and maintenance of equipment and accessories. The Engineer shall determine the adequacy of such accessibility.

3.6 ACCESS PANELS

- A. Access panels shall be provided where indicated on the drawings and as required for access to valves and other serviceable components. Access doors shall be Milcor, Zurn or approved equal hinged with primed finish and with allen wrench operated latch.
- B. Access panels installed in fire-rated assemblies shall have the same fire rating as the assembly.

3.7 PAINTING OF EQUIPMENT

- A. Exposed ironwork, including steel supports and hangers in unfinished spaces, mechanical rooms, pits, and trenches shall be properly cleaned, prepared and painted with two (2) coats of black asphaltum varnish.

3.8 GUARDS

- A. Exposed moving and rotating elements of mechanical equipment items shall be protected with suitable guards for personnel protection. Guards shall be of rigid construction, firmly positioned. Holes shall be provided in guards at shaft centers to facilitate tachometer readings.

3.9 LUBRICATION

- A. Furnish and install grease fittings for points requiring lubrication. Furnish extension type fittings as required to provide easy access for maintenance lubrication.
- B. Furnish initial charges of lubricants for equipment. Lubricants shall be in conformance with the manufacturer's requirements and recommendations.

3.10 ELECTRIC MOTORS AND MOTOR CONTROLS

- A. Unless otherwise noted, motors, motor starters and other electrical accessories, which are specified under Mechanical specifications shall be selected with characteristics as follows:

1/2 Horsepower and less - 120 volt, 1 phase, 60 Hz.
3/4 Horsepower and larger - 230 volt, 1 phase, 60 Hz.
- B. Motors shall be built in accordance with the latest applicable NEMA, IEEE and ANSI Standards. Motors shall be manufactured by Baldor, Magnetek or Toshiba, of the latest type and quality specified under individual items of equipment. Motor efficiencies shall be premium high efficiency type per the Consortium for Energy Efficiency Standard and/or be "Energy Star" compliant.
- C. Magnetic motor starters for mechanical items of equipment shall be furnished under Division 16 unless the starter is an integral part of a factory packaged item of equipment. Each starter furnished as an integral item of equipment shall be provided with overload heater elements. Starters shall have single phase protection or shall have relays installed to provide this feature. Starters shall be equipped with suitable step-down transformers to provide required control voltage.

D. Motors shall have a minimum continuous duty service factor of 1.15. Minimum motor efficiency shall be:

<u>MOTOR HORSEPOWER</u>	<u>PERCENTAGE EFFICIENCY</u>		
	<u>(1200RPM)</u>	<u>(1800 RPM)</u>	<u>(3600 RPM)</u>
1,1-1/2,2,3	----	86.5	85.5
5	89.5	89.5	86.5
7.5	90.2	91.0	88.5
10	91.7	91.7	89.5
15	91.7	93.0	90.2
20	92.4	93.0	91.0
25	93.0	93.6	91.7
30	93.6	94.1	91.7
40	94.1	94.1	92.4
50	94.1	94.5	93.0
60	94.5	95.0	93.6
75 & UP	94.5	95.0	93.6

3.11 CLEANING OF SYSTEMS

- A. Piping and duct systems shall be thoroughly cleaned and flushed prior to initial operation.
- B. Thoroughly clean exposed portions of the mechanical installation, removing labels and any foreign substances.
- C. Furnish detergents, solvents, cleaning compounds, and tools required for cleaning operations.
- D. Keep the premises free from accumulation of waste material or rubbish and at the completion of the work, remove from the job site tools, scaffolding, surplus materials, and rubbish, leaving the work areas "broom" clean.

3.12 STARTING OF EQUIPMENT

- A. Testing or starting of equipment shall be done in collaboration with trades concerned to ensure safe and proper operation of the equipment.
- B. Prior to starting equipment, provide lubrication at required points. Before starting any electrical or electric motor driven equipment, a check must be made to insure that proper heater coils are installed in the starters and that the equipment is rotating in the proper direction.

3.13 OPERATIONAL TESTING

- A. Operate systems until successful operation is demonstrated to the Engineer. This initial operation shall be in addition to the testing of the system and shall be done after the system is cleaned and finished.

3.14 RECORD DRAWINGS

- A. During construction, keep an accurate record of deviations to the installation of the work as indicated on the drawings. Upon completion of the work, furnish a copy of this record to the Engineer. **Submit record drawings before requesting final payment.**

3.15 MANUFACTURER'S REPRESENTATIVE

- A. As indicated in the Technical Sections of this specification or as directed by the Engineer, provide the services of a factory trained Engineer or Technician to inspect, adjust, and place in proper operating condition the equipment or item involved. No additional compensation will be allowed for such service.

3.16 MANUFACTURER'S INSTRUCTIONS, OPERATION AND MAINTENANCE DATA

- A. Provide for each item of equipment or apparatus furnished, a complete set of printed instructions obtained from the manufacturer covering proper operation, maintenance, lubrication, cleaning, servicing, adjustment, and safety instructions.
- B. Manufacturer's data shall include performance data (curves are preferred where applicable) complete parts lists, recommended spare parts lists, piping, and wiring diagrams.
- C. Arrange data in complete sets, properly indexed and marked.
- D. Data shall include a complete set of shop drawings.
- E. Material shall first be submitted in preliminary form for review by the Engineer. After review, submit three (3) copies in bound volumes to the Engineer for distribution.

3.17 GUARANTEES

- A. An item becomes "defective" when it ceases to conform to the Contract Documents. Guarantees begin on the date of issuance of a certificate authorizing final payment or certificate of substantial completion with the Authority taking occupancy or beneficial use thereafter.
- B. Upon completion of the work and before applying for final payment, furnish a written guarantee, stating that the work complies with the provisions of codes listed herein and the local enforcing authorities, and that it will be free from defects of material and workmanship for not less than one (1) year. Guarantee shall further state that the Contractor will, at his own expense, repair or replace any of his material and work which may become defective during the time of guarantee, together with other work or materials damaged as a consequence of such defective work.
- C. Where special guarantees, covering installation, operation or performance of any systems, or equipment furnished under are indicated, the full responsibility for the fulfillment of such guarantees must be assumed by the Contractor who shall obtain written guarantees in triplicate, two (2) copies of which shall be filed with the Engineer before final acceptance.
- D. Repeated malfunctioning or failure in service of any item or work of the system is sufficient cause for the Engineer to order the removal of the item, and its replacement with new item at the expense of the Contractor.

3.18 EXISTING UTILITIES AND EQUIPMENT

- A. Care shall be taken to protect or replace damaged existing utilities. Information indicated in the contract documents is the best information available as to the location of underground and concealed utilities and equipment.

3.19 FIRESTOPPING

- B. Firestopping shall be performed in accordance with Specification Section 07270 "Firestopping". All penetrations of fire-rated assemblies including walls and floors by mechanical system components (piping, ductwork, conduits, etc.) shall be firestopped as specified. Coordinate size, location and type of pipe and duct sleeves as required by firestopping systems.

END OF SECTION

SECTION 15250

INSULATION

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. The drawings and the specifications including the project manual are hereby made a part of the work of this section.

1.2 DESCRIPTION

- A. The work covered by this Section of the specifications includes the furnishing of labor, materials, equipment, transportation, permits, inspections and incidentals and the performing of operations required to insulate the heating, ventilating, air conditioning, and plumbing systems.

1.3 SUBMITTALS

- A. Substitutions: Your attention is directed to Section 15000-"Substitutions", relative to competition and the (ONLY) notation. Familiarity with this section shall be achieved before reading the PRODUCTS section of this specification.
- B. The items for which the submittals paragraph in Section 15000, Supplemental General Mechanical Requirements, apply are as follows: Piping insulation.

1.4 DEFINITIONS

- A. Finished Spaces: Spaces other than furred spaces, pipe and duct shafts, unheated spaces immediately below roof, spaces above ceilings, unexcavated spaces, crawl spaces, and tunnels, unless specifically listed below as an unfinished space.
- B. Unfinished Spaces: Mechanical rooms.
- C. Unconditioned Spaces: Spaces exposed to near outside ambient temperatures, such as unheated attic spaces or non-air conditioned areas.
- D. Outside: Areas beyond the exterior side of walls or above the roof, unexcavated spaces, and crawl spaces.
- E. Concealed: Not visible in finished or unfinished spaces. For example, above ceilings, below floors, between double walls, furred-in areas, pipe and duct shafts, and similar spaces.
- F. Exposed: Visible from a finished or unfinished space.

1.5 MANUFACTURER'S STAMP OR LABEL

- A. Packages or standard containers of insulation, jackets, cements, adhesives, and coatings delivered to the project site for use must have the manufacturer's stamp or label attached

giving name of manufacturer, brand, and description of material. Insulation shall be asbestos-free.

1.6 FLAME SPREAD AND SMOKE DEVELOPED RATINGS

- A. Materials shall have a flame-spread rating of not more than 25 and a smoke developed rating of not more than 50 when tested in accordance with NFPA 255, ASTM E84, or UL 723.
- B. Provide materials with flame resistant treatments not subject to deterioration due to aging, moisture, high humidity, oxygen, ozone, or heat.
- C. Materials Exempt From Fire-Resistant Rating: Nylon anchors for securing insulation to ducts or equipment.

PART 2 - PRODUCTS

2.1 PIPING INSULATION

- A. Fiberglass: Heavy density preformed fiberglass with thermal conductivity of 0.29 Btu-in/hr-ft²-°F at 150°F mean temperature. Insulation shall conform to ASTM C547 Class I and shall be suitable for 450°F service. Fitting insulation shall be of same material used for pipe.
 - 1. Insulation Jacket: All service (ASJ) type conforming to Fed. Spec. HH-B-100B Type I. Jacket permeability shall not exceed 0.02 perms (ASTM E96). Pipe fitting jacket shall be factory premolded, one-piece, PVC covers with pressure sensitive taped joints. Jackets in exposed locations shall have a white surface suitable for field painting. Provide vapor barrier as required by service.
- B. Fittings, Flanges, and Valves: Provide insulation for fittings, flanges, and valves premolded, precut, or job fabricated of the same thickness and conductivity as used on adjacent piping.

PART 3 - EXECUTION

3.1 SURFACE CONDITIONS

- A. Inspection:
 - 1. Prior to work of this Section, carefully inspect the installed work of other trades and verify that such work is complete to the point where this installation may properly commence.
 - 2. Verify that the insulation systems may be installed in accordance with pertinent codes and regulations and the reviewed Submittals.

3.2 GENERAL

- A. Insulate after system tests have been completed and surfaces to be insulated have been cleaned of dirt, rust, and scale and are dry.

- B. Install insulation with jackets drawn tight and cement down longitudinal and end laps. Do not use scrap pieces where a full length section will fit. Insulation shall be continuous through sleeves, wall and ceiling openings, except at fire dampers in duct systems and pipe penetrations through fire rated assemblies. Extend surface finishes to protect ends, and raw edges of insulation. Apply coatings and adhesives at the manufacturer's recommended coverage per gallon. Individually insulate piping and ductwork. Keep insulation dry during the application of the finish. Bevel and seal the edges of exposed insulation.

3.3 PIPING INSULATION

- A. Pipe Insulation (Fiberglass): Place sections of insulation around the pipe and joints, tightly butt into place. Draw jacket laps tight and smooth. Secure jacket with fire resistant adhesive, or factory applied self sealing lap. Cover circumferential joints with butt strips, not less than 3-inches wide, of material identical to the jacket material. Overlap longitudinal laps of jacket material not less than 1-1/2 inches. Adhesive used to secure the butt strip shall be the same as used to secure the jacket laps.
- B. Flanges, Unions, Valves and Fittings Insulation (Fiberglass): Factory fabricated removable and reusable insulation covers. Place factory premolded, precut or field-fabricated segmented insulation of the same thickness and conductivity as the adjoining pipe insulation around the flange, union, valve, and fitting abutting the adjoining pipe insulation. Install factory premolded one-piece PVC fitting covers over the insulation and secure by stapling or with metal or plastic tacks made for securing PVC fitting covers and secure with PVC vapor barrier tape.
- C. Pipe Insulation (Flexible Unicellular): Bond cuts, butt joints, ends, and longitudinal joints with adhesive. Miter 90-degree turns and elbows, tees, and valve insulation. Insulate flanges, unions, valves, and fittings.
- D. Where penetrating roofs and exterior walls, insulate piping to a point flush with the underside of the deck or wall and seal with a vapor barrier coating.
- E. Hangers and Anchors: Pipe insulation shall be continuous through pipe hangers. Where pipe is supported by the insulation, provide MSS SP-58, Type 40 galvanized steel shields (16 gage maximum). For fiberglass insulation systems on pipe sizes 2 inches through 3", provide insulation inserts at points of hangers and supports. Insulation inserts shall be of molded glass fiber (minimum 12 pcf). Insulation inserts shall cover the bottom half of the pipe circumference, 180 degrees, and be not less than 4" long. Vapor-barrier facing of the insert shall be of the same material as the facing on the adjacent insulation. Seal inserts into the insulation. Insulation inserts for pipe sizes 4" and larger shall be welded pipe saddles. Install insulation in void area of saddle of same material used on adjacent insulation. For pipe sizes 2" and smaller, insulation inserts for flexible unicellular insulation systems shall be wooden doweling set on end of length equal to insulation thickness. Seal dowel to insulation with adhesive.
- F. PVC or Metal Jackets: Provide over insulation. Machine cut jacket to smooth edge of circumferential joints. Overlap metal jacket not less than 2 inches at longitudinal and circumferential joints and secure with metal bands at not more than 9 inch centers. Overlap longitudinal joints down to shed water. Seal circumferential joints with a coating

recommended by insulation manufacturer for weatherproofing. Solvent weld PVC jacket system to provide continuous watertight seal.

3.4 INSULATION APPLICATION SCHEDULE

<u>SERVICE</u>	<u>THICKNESS</u>	<u>MATERIAL/JACKET</u>
PIPING:		
Domestic Hot Water Piping and Domestic Hot Water Recirculation Piping 2" and smaller	1"	Fiberglass w/ASJ or Flexible Unicellular

3.5 FIELD INSPECTION

- A. Visually inspect to ensure that materials used conform to specifications. Inspect installations progressively for compliance with requirements.

END OF SECTION

SECTION 15400

PLUMBING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

Drawings, Addenda, General Provisions of Contract, including General and Supplementary conditions and General Requirements apply to work specified in this Section.

1.2 DEFINITIONS

- A. ADA: Designed to meet the requirements of the Americans with Disabilities Act.
- B. Adaptable: Designed so in the future it can be easily adapted to meet most of the essential requirements of the Americans with Disabilities Act with minor additions and adjustments, such as change of height of counter or addition of a lift seat.
- C. Concealed: Shall mean in walls, in chases, above ceilings, within enclosed cabinets, otherwise enclosed.
- D. Equal: Shall mean essentially the same as that product specified, but a model of a different manufacturer
- E. Exposed: Shall mean in finished spaces, in closets, under counters, behind and/or under equipment and/or otherwise visible.
- F. Finished Spaces: Spaces other than mechanical and electrical equipment rooms, furred spaces, pipe and duct shafts, unheated spaces immediately below roof, spaces above ceilings, unexcavated spaces, crawl spaces, and tunnels.
- G. Materials: Shall mean any product used in the construction, including but not limited to: fixtures, equipment, piping and supplies.
- H. Others: Shall mean provided by sections other than this section. If not purposely assumed by another section, shall be provided by the Contractor.
- I. Piping: Shall mean pipe, fittings, hangers and valves.
- J. Provide: Shall mean the furnishing and installing of materials.
- K. Reviewed equal: Shall mean that the Architect or a designated Consultant, not the contractor, shall make final determination whether materials are an equal to that which is specified.
- L. Substitution: Shall mean of materials of significantly different physical, structural or electrical requirements, performance, dimensions, function, maintenance, quality or durability, than that specified.

1.4 DESCRIPTION OF WORK

A. Work Included

1. Furnish all labor, materials, equipment, transportation, and perform all operations to install complete plumbing systems in the building, in accordance with these specifications and applicable drawings.
2. Provide the following:
 - a. Sanitary, waste and vent systems.
 - b. Domestic hot and cold water system.
 - c. Pipe, valve and fittings
 - d. Water specialties
 - e. Drainage specialties
 - f. Electric water heater
 - g. Plumbing fixtures and accessories
 - h. Insulation
 - i. Installation and/or connections to fixtures/equipment provided by others.
3. Specifications and accompanying drawings do not indicate every detail of pipe, valves, fittings, hangers, fixtures and equipment necessary for complete installation; but are provided to show general arrangement and extent of work to be performed.

1.5 PERMITS

- A. This Contractor shall be responsible for providing and filing all Plans, Specifications and other documents, pay all requisite fees and secure all permits, inspections and approvals necessary for the legal installation and operation of the systems and/or equipment furnished under this Section of the Specifications.
- B. The Contractor shall frame under glass/ clear plastic all permits, secured by him, adjacent to the respective system and/or equipment and required to be displayed by Code, law or ordinance. Those permits secured but not required to be displayed shall be laminated in plastic and included in the Owner's maintenance manual.

1.6 CODES AND ORDINANCES

- A. All work performed under this Section of the Specifications shall be done in accordance with applicable Federal Laws, Maine State Laws, Maine State Plumbing Code, Subsurface Wastewater Disposal Rules, and local plumbing codes and ordinances. The following standards are also to be followed when applicable:

ADA	Americans With Disabilities Act
ANSI	American National Standards Institute
ASHRAE Engineers	American Society of Heating, Refrigeration and Air Conditioning
ASTM	American Society for Testing and Materials
NFPA	National Fire Protection Association (a.k.a. NFC, National Fire code)
NEMA	National Electrical Manufacturer's Association
OSHA	Occupational Safety and Health Act

- B. If an obsolete code section or standard is specified, the latest replacement issue of each Code or standard for the application, in effect at the time of bidding, shall be used. Code requirements are the minimum quality and/or performance acceptable. Where the Specifications and/or Drawings indicate more stringent requirements, these requirements shall govern.

1.7 QUALITY ASSURANCE

- A. Use sufficient qualified workmen and competent supervisors in execution of this portion of the work to ensure proper and adequate installation of the system throughout. Work performed shall conform to manufacturers' recommendations, good standard practice and industry standards.
- B. Any work deemed unacceptable by the Engineer, Architect or Clerk of the Works shall be redone correctly, at no additional cost to the owner.

1.8 ELECTRONIC DRAWINGS AND FILE SHARING

Plans and specifications may be made available in electronic format on request. Plans may be provided in either Adobe (.pdf) or CAD (.dwg or .dxf) formats and will be compressed using WinZip (.zip format). Recipient is responsible to obtain the necessary software to open the files. Note: CAD drawings will be made available to successful bidders only after a contract is awarded.

CAD drawings are produced with AutoCAD 2006 and may be provided in either the 2000 or 2004 file formats. Upon request for CAD files a release form will be provided which must be signed and returned to the Engineer prior to transmission of electronic files. Physical mailing address, telephone numbers and e-mail address for this office are indicated on each drawing. A signed release will not be required for Adobe based files.

All contract documents are copyrighted material. No portion of materials may be reproduced or duplicated except as indicated in the release form. Where release forms are not required (Adobe based files), materials may be printed for use by the intended recipient only and may not be reproduced or copied in any other manner unless written permission is obtained.

1.9 MATERIALS

All materials and equipment shall be new and of the latest design of respective manufacturers. All materials and equipment of the same classification shall be the product of the same manufacturer, unless specified otherwise.

1.10 SUBSTITUTIONS

See Section 15000, "Substitutions", relative to competition and the (ONLY) notation. Familiarity with this section shall be achieved before reading the PRODUCTS section of this specification.

1.11 PLANS AND SPECIFICATIONS FOR SUPPLIERS

This Contractor shall provide his Suppliers, and any related subcontractors, with a copy of the specification pages, and letter sized photocopies of equipment details and schedules, that pertain to the item to be supplied.

1.12 SHOP DRAWINGS & SUBMITTALS

- A. As soon as possible after award of Contract (but not longer than 21 calendar days), before any material or equipment is purchased, Plumbing Contractor shall submit to the Architect no less than ten (10) copies of shop drawings for approval. If shop drawings are not submitted within the allotted time frame all substitutions included the late shop drawings will be invalid and the equipment specified must be provided. Any costs resulting from delays in the project schedule due to failure to submit shop drawings related to this section in a timely manner shall be the responsibility of the Plumbing Contractor.
- B. Each item shall be properly identified, preferably by fixture/equipment tag number (such as WC-3), and shall describe in detail the material and equipment to be provided, including all dimensional data, performance data, pump curves, computer selection print-outs, etc. Capacities indicated are minimums. Equipment submitted with capacities below specified parameters will be refused.
- C. Corrections or comments made on the shop drawings do not relieve the contractor from compliance with requirements of the drawings and specifications. Shop drawing review is only for review of general conformance with the design concept of the project and general compliance with the information given in the contract documents. The contractor is responsible for confirming and correlating all quantities and dimensions, selecting fabrication processes and techniques of construction; coordinating his work with that of all other trades and performing his work in a safe and satisfactory manner.
- D. Should any materials or products be purchased and/or installed without prior review and comment the contractor shall be required to remove or replace those products and/or materials if directed by the Architect at his own expense. If the materials are not removed (or replaced) or if the project is delayed as a result the Architect reserves the right to order the withholding of payment until the situation is resolved in a manner satisfactory to the Architect.
- E. Shop drawings for sections 15400, 15600 and 15710 shall be submitted under separate cover or they will be refused for re-submittal. In order to maintain consistency, submittals shall be identified by job title, specification section and paragraph number. Electronic files shall be identified in the same manner (Leonardlake-15400-2.01-E.pdf for instance). Items under each paragraph may be combined into one submittal but do not combine items from multiple paragraphs. For instance, do not combine items specified under par 2.01 with items specified under par. 2.02.
- F. It is desirable for shop drawings to be submitted electronically, including all documentation outlined in paragraph "A" above. Hard copies of shop drawings must be original documents or good quality photocopies of original documents (photocopies of color samples are not acceptable). Faxed copies of submittal sheets will be refused.
- G. Review must be obtained on all items specified in Section 2 Products or shown on the drawing, and any significant items implied or otherwise required but not specified.
- H. Format

1. Related items shall be stapled or Bound together as a package. The number of copies of each package shall be as listed above. Examples of packages of related items include:
 - a. Hangers and Supports
 - b. Identification
 - c. Insulation
 - d. Valves
 - e. Piping
 - f. Plumbing Fixtures with accessories
 - g. Drainage Specialties
 - h. Water Specialties

1.13 PRODUCT HANDLING

Use all means necessary to protect materials before, during and after installation, and to protect the installed work and materials of all other trades. In the event of damage, immediately make all repairs and replacements necessary to the approval of the Architect at no additional cost to the Owner.

1.14 AS-BUILT DRAWINGS

Keep in good condition at the job, apart from all other prints used in actual construction, one complete set of all blueprints furnished for this job. On this special set of blueprints, record *completely and accurately* all differences between the work as actually installed and the design as shown on the drawings. These record prints must be kept up to date by recording all changes within one week of the time that the changes are authorized. At the completion of the work, this set of drawings shall be delivered to the Architect for the Owner electronically in the form of CAD drawings. If a complete record of changes is not made and electronic CAD drawings not provided by the Plumbing Contractor, a record shall be made by the Engineers, and *the cost of the record shall be paid by the Plumbing Contractor*. Copies of the plumbing CAD drawings may be made available electronically to the Contractor if desired. Drawings shall be dated accordingly and clearly identified as "AS-BUILT". Contact the Architect directly or the Engineer via e-mail at mechsyst@maine.rr.com. Specify required CAD format when requesting the files. CAD drawings were generated using AutoCAD 2006 and utilize both paper space and model space with external references to various other drawings. Files will be compressed and will require "WinZip" (<http://www.winzip.com>) for extraction. A release form will be provided which must be signed and returned to the Engineer prior to transfer of files.

1.15 MAINTENANCE MANUAL

On completion of this portion of the work, and as a condition of its acceptance, submit for review two copies of a manual describing the system. Plumbing equipment manuals shall be separate from mechanical manuals. All manuals shall be original copies, not photocopies, or they will be refused for resubmittal. Prepare manuals in durable 3-ring binders approximately 8.1/2" by 11" in size with at least the following:

- A. Project name on the spine and front cover, and identification on the front cover stating the project name, general nature of the manual, and name, address and telephone number of the General and Plumbing Contractors.
- B. Neatly typewritten index.

- C. Complete instructions regarding operation and maintenance of all equipment involved.
- D. Complete nomenclature of all frequently replaceable parts and supplies, their part numbers, and name, address and telephone number of the vendor.
- E. Copy of all guarantees and warranties issued, and dates of expiration.
- F. Shop drawings and equipment/fixtures manufacturer's catalog pages. Clearly indicate the precise item included in this installation and delete, cross out or otherwise clearly indicate, all manufacturers' data with which this installation is not concerned.

1.16 OBJECTIONABLE NOISE AND VIBRATION

All equipment shall operate without objectionable noise and vibration. Should objectionable noise or vibration be transmitted to any occupied part of the building by apparatus or piping, as determined by the Architect, the necessary changes eliminating the noise or vibration shall be made by this Contractor at no extra cost to the Owner.

1.17 GUARANTEE

This Contractor shall guarantee all materials and workmanship furnished by him or his sub-contractors to be free from all defects for a period of no less than one (1) year from date of final acceptance of completed system and shall make good, repair or replace any defective work which may develop within that time at his own expense and without expense to the Owner. Any additional costs required to extend manufacturer's guarantee and warranty for the period specified, shall be included in Contractor's base bid.

1.18 DEVIATIONS, DISCREPANCIES AND OMISSIONS

- A. The drawings are intended to indicate only diagrammatically the intent, extent, general character and approximate locations of plumbing work. Work indicated, but having details obviously omitted, shall be furnished complete to perform the functions intended without additional cost to the Owner. This shall include but not be limited to:
 1. All items that are required to meet all applicable codes and referenced standards.
 2. Piping for cold and hot water supply, drain, vent, gas, etc to each plumbing fixture/equipment shown on the drawings, or scheduled as required.
 3. Shut-off valves on lines feeding individual fixtures without integral stops.
 4. Minor single phase electrical wiring, or control wiring, between Plumbing provided items that require it, unless indicated on the Electrical Drawings.
 5. Plumbing related items indicated on the drawings of other trades.
 6. Items indicated on one plumbing drawing but not shown on a corresponding drawing.
 7. Items implied on the plumbing drawings but not shown.

8. All plumbing related items clearly shown in dark print on the Plumbing drawings but not included in the specification, unless it is noted as being provided by the owner or other contractor or unless other sections assume the responsibility.
- B. The drawings and specifications are complimentary to each other and what is called for in one shall be as binding as if called for by both. In the event of conflicting information on the drawings, or in the specifications, or between drawings and specifications, or between trades, that which is better, best or most stringent shall govern.

1.19 WORKPLACE SAFETY

- A. The Trade Contractor alone shall be responsible for the safety, efficiency and adequacy of his plant, appliances and methods, and for any damage, which may result from their failure of their improper construction, maintenance, or operation.

PART 2 - PRODUCTS

2.1 GENERAL

- A. Unless otherwise indicated, the materials to be furnished under this contract shall be new and the standard products of manufacturers regularly engaged in the production of such equipment, and shall be the manufacturer's latest standard design that complies with the specification requirements.
- B. All materials and equipment of the same classification shall be the product of the same manufacturer, unless specified otherwise. An entire product line may be rejected if one, or more, of the products submitted is not an equal to that specified.
- C. Unspecified items shall be by the same manufacturer and level of quality and as similar items specified, whenever possible. Whenever items have no similarity to those specified in this section, provide the equivalent item as specified in other Division 15 Sections. When no similarity exists in other sections, the Contractor shall submit for review an appropriate commercial/institutional quality item, complete to perform the functions intended, using his best discretion. The Architect or a designated Consultant, not the contractor, shall make final determination whether materials are of suitable quality and perform the functions intended.

2.2 HANGERS AND SUPPORTS

- A. General
 1. All hangers and supports shall be especially manufactured for that purpose and shall be the pattern, design and capacity required for the location of use.
 2. Piping specified herein shall not be supported from piping of other trades.
 3. All steel hangers shall be factory painted.
 4. Hangers shall be heavy-duty steel adjustable clevis type, plain for steel, cast iron and plastic pipe, and copper plated for piping in direct contact with copper tubing

(i.e. copper hot water piping) shall be equal to Carpenter & Paterson Inc., Fig. 100 (Fig. 100CT copper plated).

5. Hangers shall go outside of insulation for domestic water piping. Each hanger shall be furnished with metal shield; Fig. 100 SH.
6. Exposed vertical risers $\frac{3}{4}$ inch and smaller shall be supported at 6 foot intervals between floor and ceiling with split ring type hangers; copper plated for piping in direct contact with copper tubing equal to Carpenter & Paterson Inc., Fig.81 (Fig. 81CT copper plated). ALL PIPING DROPS TO FIXTURES SHALL BE ANCHORED SOLID TO WALL WITH A STEEL SUPPORT BRACKET WITH ADJUSTABLE CLIP, ESPECIALLY PIPING TO FLUSH VALVES
7. Piping suspended from walls and partitions shall be supported by steel support bracket with adjustable clips equal to Carpenter & Paterson Inc., Fig. 69. All attachments to bar joists shall be from top chord.

B. Hanger Rods & Attachments

1. Hanger rods shall be galvanized all thread rod. Rod size shall be as follows:

<u>Pipe Size</u>	<u>Rod Size</u>
3/8" to 2"	3/8"
2.1/2" to 3.1/2"	1/2"
4" to 5"	5/8"
6"	3/4"

2. All nuts for hanger rods and hangers to be galvanized steel.
3. Provide lag points with rod couplings for fastening to wood, toggle bolts in concrete blocks and compound anchor shields and bolts in poured concrete.
4. Provide toggle bolts with rod couplings for fastening in the pre-cast concrete plank decks.
5. Provide and install angle iron supports for pipe hangers in locations as required. Angle iron supports shall be adequate size for span and piping or equipment.
6. Hot and cold water piping at each fixture shall be securely fastened in wall with split ring type hanger fastened to studs within wall.

2.3 SEISMIC RESTRAINT

All seismic restraints shall be in accordance with the International Building Code.

2.4 IDENTIFICATION

- A. Tag each new pump /equipment, and switch with $2\frac{1}{2}$ inches x $\frac{3}{4}$ inch rectangular engraved nameplates with white letters on black, #2060-20 by Seton Name Plate Corp. or reviewed equals. Nameplates shall be mechanically fastened to equipment (adhesives are not acceptable). Embossed labels are not acceptable.

- B. Identify all new water and drain piping with “Set Mark” snap-around pipe markers by Seton Name Plate Corporation or reviewed equal. Markers shall include both identification and arrows indicating direction of flow. Markers shall be placed on pipe segments 5 feet and longer, and spaced no less than 10 feet apart. Heating hot water piping shall be labeled differently from Domestic hot water piping. On parallel runs of piping, plumbing markers shall be grouped together, and grouped with heating markers whenever practical.

<u>Legend</u>	<u>Background/Letter Color</u>
“Cold Water”	Green/ white letters
“Domestic 120°F Water”	Yellow/ black letters
“Plumbing Vent”	Green/ white letters
“Sanitary Drain”	Green/ white letters

- C. Tag all new valves with Seton #M4506 1½ inch square brass tags and #6 bead chains, stamped with the following identification: “CW”, “HW”, “HWR” or “140HW”. Tag shall be consecutively numbered. DO NOT DUPLICATE EXISTING VALVE IDENTIFICATION NUMBERS. Fixture stops, control valves or valves adjacent to equipment, the use of which is obvious, are not to be tagged.
- D. Provide valve charts identifying valve number, valve identification and service (i.e. Apt. 203, HW). Mount charts in Boiler Room and Mechanical Room in 8½ inch x 10 inch and 8½ inch x 11 inch self-closing aluminum frame with plastic windows. Provide additional copies for maintenance manuals.

2.5 INSULATION

See section 15250

2.6 VALVES

A. General

1. Valves shall be provided as shown and as required to make the installation and its apparatus complete in operation; locate to permit easy operation, replacement and repair.
2. All valves must be so constructed that they may be repacked under pressure while open.
3. Check valves shall be installed in all lines where flow may reverse from intended direction.
4. Valves shall have name and/or trademark of manufacturer as well as working pressure stamped or cast on valve body.
5. Valves shall comply with Manufacturer’s Standards Society (MSS) specifications and be so listed.

B. Types and Manufacturers

All valves shall be of one manufacturer and by one of the manufacturers listed. The following list is provided as a means of identifying the quality and type required.

1. Ball valves 1¼ inches in size and smaller

Shall have bronze bodies, Type 316 stainless steel stems and balls, reinforced Teflon seats and seals, blowout proof stems and adjustable stem gland. Shall be equipped with suitable packing for service intended. Ports shall be “full port”. Rated for 400# WOG and 350°F:

	<u>Soldered Ends</u>	<u>Screwed Ends</u>
Milwaukee	BA-350S	BA-300S
Apollo	82-200	82-100
Watts	B-6081	B-6080
NIBCO	-----	-----
Hammond	8614	8604

2. Ball valves 1½ inches in size and larger

Shall have bronze bodies, Type 316 stainless steel stems and balls, reinforced Teflon seats and seals, blowout proof stems and adjustable stem gland. Shall be equipped with suitable packing for service intended. Ports shall be “conventional port”. Rated for 400# WOG and 350°F:

	<u>Soldered Ends</u>	<u>Screwed Ends</u>
Apollo	70-200	70-300
Watts	B-6000-SS	B-6001-SS
NIBCO	S-585-66	T-585-66
Hammond	8514	8503

3. Check Valves 2 inches in size and smaller

Shall be horizontal swing type with bronze body, Teflon disc. Rated for 125# WSP, 200# WOG:

	<u>Soldered Ends</u>	<u>Screwed Ends</u>
Milwaukee	1509-T	509-T
Stockham	B-310-T	B-320-T
NIBCO	S-413-Y	T-413-Y
Hammond	IB945	IB904

4. Drain Valves

Shall be conventional ball valves and provided with hose nipples and threaded metal cap on chain. Watts B-6001-CC or reviewed equal.

2.7 DOMESTIC WATER PIPING

A. Interior Exposed, High temperature and Supportive

1. All exposed piping carrying domestic water, all piping with a temperature above 140 deg. F., all piping supporting inline equipment, and piping within 6 ft of the water heaters, shall be hard-drawn type “L” copper tube with cast or wrought fittings and made up with lead-free solder. Care shall be taken not to over flux.

B. Interior Concealed

All concealed hot (below 141) and cold water piping above finish floor (not buried) shall be one or more of the following:

1. Type L Copper and fittings, all sizes
2. All buried water and trap primer piping shall be AquaPEX or type “K” soft copper tubing. No joints below slab.
3. All buried hot water piping shall be insulated and sealed with ½” Armaflex. **Do not direct bury copper hot water piping.**
4. All exposed, uninsulated water piping near fixtures in finished areas shall be chromium plated I.P.S. copper or red brass pipe or tubing and fittings. Valves shall also be chrome plated brass or bronze. Any chrome trim with wrench marks shall be removed and new trim installed.
5. Type of tubing shall be stamped or printed on each length by Manufacturer.

2.8 SANITARY WASTE AND VENT PIPING (if any)

A. All Vent Piping, and Most Sanitary Waste and any Storm Water Piping

Piping and fittings shall be PVC Schedule 40 polyvinyl chloride plastic, as per ASTM-A-2665 or latest standard. Solvent as per ASTM-D-2564. Exposed vent piping above roof shall be **black** PVC or CPVC for appearance and solar heat dissipation of frost.

2.9 GAS DISTRIBUTION SYSTEM

A. Coordinate with gas supplier for supply to building.

B. Piping after the entrance and inside shall be Schedule 40 black steel pipe, ASTM 120 with 150# fittings.

- a. Piping 2” and less in diameter shall be screwed pattern malleable iron fittings, shall meet ASTM A-47, ASA B16.3. Pipe joint compound shall be used on all threaded joints. Piping shall use welded fittings if over 2” in diameter, or if pressure in excess of 14” W.C.
- b. Substitution of Gastite corrugated stainless steel tubing and fittings is allowed, but direct nominal substitution in not. Size the tubing according to the appropriate tables in the Uniform Plumbing Code and the manufacture’s recommendations.

C. Provide dirt leg, gas cock and union at each boiler. Provide gas cock and flex connect with union at each clothes dryer.

D. Installation shall meet the requirements of the gas supplier and NFPA 54.

2.10 COMPRESSED AIR SYSTEM

A. Compressor

- a. Ingersoll Rand - 1 Phase - Electrical Vertical Tank Mounted 7.50HP - Stationary Air Compressor, 80 gal. Model 2475N7.5. Or reviewed equal.
- b. Supply a minimum of two (2) sets of air compressor consumable replacement parts to the Authority at completion.
- B. Speedair model 4ZLO2 3/4" NPT filter regulator,. 212 CFM, 150 PSI max, pressure gauge, wall mount. Or reviewed equal.
- C. Piping shall be Schedule 40 black steel pipe, ASTM 120 with 150# fittings.
- D. Provide drainable leg, ball valve and quick disconnect at each drop.

2.11 PIPE SLEEVES AND ESCUTCHEONS

A. Sleeves

- 1. Contractor shall set sleeves for all piping penetrating walls and floors. Sleeves through masonry shall be steel pipe sleeves two sizes larger than pipe. Piping passing through walls other than masonry shall be provided with # 24 gauge galvanized steel tubes with wired or hemmed edges.
- 2. Sleeves set in concrete floors shall finish flush with underside, but extend minimum of 1 inch above finish floor. Weld clips to sleeves for support in concrete pre-cast planks of a size that will be covered by concrete topping. Sleeves set in partitions shall finish flush with each side.
- 3. Space between sleeves and pipes shall be sealed to make smoke and water tight with 3M Brand Fire Barrier Caulk CP25 or Putty 303.
- 4. Masonry sleeves shall be Schedule 40 steel pipe.
- 5. This Contractor has the option to use the Pro-set system on lieu of the above.

B. Exterior Sleeves (if any)

Where piping passes through exterior walls, provide and install a complete pipe sleeve/hydrostatic wall closure system.

- 1. Wall sleeve shall be schedule 40 steel pipe, two pipe sizes larger than carrier pipe. Sleeve shall be the same length as the thickness of the wall served.
- 2. The hydrostatic closure device shall consist of identical interlocking links of solid synthetic rubber compounded to resist ozone, water, chemicals and extreme temperature variations. Each link shall be connected by corrosion resistant bolts and nuts to form a belt that is to fit snugly around the pipe. Under each bolt and nut there shall be a metal pressure plate so that when each nut is tightened the rubber links will expand between the pipe and sleeve to form a continuous, air tight and water tight seal.

3. Units to be Link-Seal system Model LS wall seal by Thunderline Corp. or reviewed equal.

C. Escutcheons

Where piping passes through finish walls, floors, ceilings and partitions, provide and set two piece nickel plated steel floor and ceiling plates.

2.12 EQUIPMENT OR PLUMBING FIXTURES BY OTHERS

Any equipment and fixtures by other sections will be provided and set in place by those sections. This contractor will connect gas, domestic hot water, waste and vent as required.

2.13 PLUMBING SPECIALTIES, DRAINAGE

A. Traps

1. Traps of material and design as approved by the State and shall be furnished and installed at all fixtures and appliances. Trap each fixture separately, keeping all trap screws below water line; vent each trap. Make offsets in vent piping with 45-degree angle fittings when possible. Pitch horizontal vents toward waste lines, group vents and take through roof as shown. All traps, at fixtures and appliances shall be provided with accessible clean outs.

B. Cleanouts

Provide cleanouts for soil and waste where shown on the drawings and as required by code.

2.14 PLUMBING SPECIALTIES, WATER

A. Shock Absorbers (SA)

Shock protection shall be provided where shown on drawings and at all quick closing devices. Devices shall be stainless steel shell, welded expansion bellows surrounded by on-toxic mineral oil or gas, pressurized compression chamber charged and factory sealed, all, in-line design, threaded nipple and PDI reviewed. Sized to meet the conditions.

1. Type "1", 'A' P.D.I. units

Zurn Z-1700, #600. Or reviewed equal.

B. Thermometer (T)

Units to be dial type, 4.1/2" with 30° to 180° range; Trerice Universal angle or reviewed equal.

C. Vacuum Relief Valve

Watts Model N36 or reviewed equal.

D. Relief Valve

Watts #530 calibrated pressure relief valve. Set at 100 PSI. Or reviewed equal.

E. Braided Stainless Steel Water Connectors

EPDM tubing jacketed by type 304 stainless steel braid, stainless ferrule, brass nuts. By Zurn or reviewed equal.

F. Dielectric Unions

Series 3000 as manufactured by Watts or reviewed equal.

G. Mixing Valves (MV)

1. Type "1" Master Mixer

Leonard valve model 270-LF, ½", capacity 3.5 GPM @ 5 psi differential pressure for exposed piping, rough bronze, set at 120°F. Or reviewed equal.

H. Expansion Tank (ET)

Watts Model DET-5-M1. Potable water expansion tank, 0.85 gallon acceptance, 3/4" connection, precharged to 40 psi. One per water heater. Or reviewed equal.

I. Hose Bibs (HB)

1. Type "1" Exterior Hose Bib

Zurn Z-1321 exposed Ecolotrol "Anti-Siphon" automatic draining, non-freeze wall hydrant, integral backflow preventer, all bronze interior parts, operating key. Or reviewed equal.

2. Type "2" Hot and Cold Water Mixing Station

Leonard Valve model SS-HA-2 Hot and Cold Water mixing station complete with thermometer, hose holder, hose and spray. Or reviewed equal

2.15 WATER HEATERS (WH)

ProMax EJC-10, 10 gallon electric water heater, 4500 KW, top or side connect, magnesium anode, 1 year warranty. Or reviewed equal. Provide shelf Holdrite 30-SWHP (or equal), all water piping, valves and accessories required for a complete installation

PART 3 – EXECUTION

3.1 SURFACE CONDITIONS

A. Inspection

1. Prior to all work of this section, carefully inspect the installed work of all other trades and verify that all such work is complete to the point where this installation may properly commence.

2. Verify that plumbing may be installed in strict accordance with all pertinent codes and regulations and the reviewed Shop Drawings.

B. Discrepancies

1. In the event of discrepancy, immediately notify the Architect. Do not proceed with installation in areas of discrepancy until such discrepancies have been fully resolved.

3.3 INSTALLATION OF PIPING AND EQUIPMENT

A. General

1. Install all piping promptly, making pipe generally level and plumb, free from traps, and in a manner to conserve space for other work.
2. Provide uniform pitch of at least ¼ inch per foot for all horizontal waste and soil piping 3” or less. For piping 4” and above, slope at 1/8” minimum per foot
3. Inspect each piece of pipe, tubing, fittings, and equipment for defects and obstructions; promptly remove all defective material from the jobs site.
4. Install pipes to clear all beams and obstructions. Do not cut into or reduce the size of load carrying members without the approval of the Architect.
5. Allow room between all piping and other obstructions to allow for the installation of the specified pipe insulation.
6. Plumbing vents
 - a. Back vent all plumbing fixtures.
 - b. Pitch all vents at 1/64” per foot minimum toward waste lines for proper drainage to prevent unintended traps.
 - c. Install vent piping with each bend 45 degrees minimum from the horizontal, wherever structural conditions will permit.
 - d. Group plumbing vents and take through roof as shown.
 - e. Increase vents 3” and smaller one size before going thru roof. Make size transition a minimum of 12” below the surface of flat roofs and 72” (or as structure permits) below sloped roofs.
 - f. Terminate 18” to 24” above roof.
 - g. If installing in locations other than as shown on the drawings, line up with other plumbing vents for a neat appearance.
 - h. Do not install plumbing vents within 10 feet of an operable window or door or within 25 feet of a ventilation air intake.
6. All risers and off-sets shall be substantially supported.
7. Pipe hangers shall be placed on center as follows:

<u>MATERIAL</u>	<u>HORIZONTAL</u>	<u>VERTICAL</u>
Copper 1-1/4" & less	6'	6'

	1-1/2"	6'	10'
	2" & up	10'	10'
PVC, DWV		4'	4'
Steel		10'	10'

8. Arrange all piping to maintain required grade and pitch to lines to prevent vibration. Expansion loops to anchors shall be provided where shown on drawings.
9. Make all changes in pipe size with reducing fittings.
10. All low points in water piping shall be drained with ½" gate valve with hose nipple and metal cap.
11. No piping shall be installed in such a manner to permit back-siphonage or flow of any liquid in water piping under any conditions.
12. No water piping shall be installed outside of building or in an exterior wall unless adequate provisions are made to protect such pipe from freezing.
13. All piping and drain openings left unattended will be capped, plugged or securely covered to prevent accidental entry of foreign matter. Roof drains in use will be provided with domes.

B. Joints and Connections

1. Smoothly ream all cut pipe; cut all threads straight and true; apply best quality Teflon tape to all male pipe threads but not to inside the fittings; use graphite on all clean out plugs. DO NOT use Teflon tape on gas piping.
2. Smoothly ream all cut P.V.C. pipe. Clean and use solvent for fitting connection and in strict accordance with the manufacturer's recommendations.
3. Make all joints in copper water tube with solder applied in strict accordance with the manufacturer's recommendations.

3.4 STERILIZATION AND FLUSHING OF PIPES

- A. After preliminary purging of the system, chlorinate the new potable water system in accordance with the current recommendations of the American Water Works Association, and in accordance with all pertinent codes and regulations. Chlorinate only when the building is unoccupied.
- B. Upon completion of the sterilization, thoroughly flush the entire potable water system.
- C. After sterilization and flushing are complete, a sample shall be collected from the end of the longest main, or at any other location selected by the Architect, and a water analysis test provided. The test must prove the water acceptable or additional disinfecting of system performed. A copy of the test report shall be submitted to the Architect.

3.5 CLOSING IN UNINSPECTED WORK

Do not cover up or enclose work until it has been properly and completely inspected and approved. Should any of the work be covered up or enclosed prior to all required inspections and approvals, uncover the work as required and after it has been completely inspected and approved, make all repairs and replacements with such materials as are necessary to the approval of the Architect and at no additional cost to the Owner.

3.6 TESTING OF PIPING

Tests shall be applied to the plumbing installation as required by codes and where as directed by the Architect, and in all cases before work is covered by earth fill or pipe covering.

- A. Sanitary piping shall be tested when all underground work is complete (before covering) and again, after all piping is installed, but before it is further closed in. Sanitary systems shall be securely stopped, except at the highest point, and the entire system filled with water to the point of overflow for 24 hours. All leaks shall be repaired. Cracked pipes and fitting shall be removed and replaced. No doping of soil pipe or fittings will be allowed. Plan testing around expected weather and temperature conditions or provide protection so that pipes do not freeze.
- B. New domestic water piping shall be filled and subjected to a hydrostatic pressure test of 150 psi for 8 hours with no leaks. If leaks are detected they shall be repaired and the test repeated until work is tight. NOTE: Testing with compressed air only is NOT ACCEPTABLE.

3.7 CLEANING

Prior to acceptance of the buildings, thoroughly clean all exposed portions of the this installation, removing all labels and all traces of foreign substance, using only a cleaning solution approved by the manufacturer of the plumbing item, being careful to avoid all damage to finished surfaces. Additional attention may be required to thoroughly clean any used, re-used or owner provided fixtures. Clean out all strainers and aerators and adjust or replace washers, cartridges, etc

3.8 INSTRUCTIONS

On completion of the job, this Contractor shall provide a competent technician to thoroughly instruct the Owner's Representative in the care and operation of the system. The time of instruction shall be arranged with the Owner.

3.9 RECYCLING

Discarded materials, both new and removed, shall be recycled whenever practical through metal salvage dealers (piping, etc.), paper salvage (cardboard shipping containers, etc.), wood products, etc. The Plumbing Contractor shall retain the salvage value of discarded materials and may use this value to offset his project bid price if so desired. Toxic materials such as adhesives, coolants, etc. SHALL be disposed of in a manner acceptable to the State of Maine Department of Environmental Protection.

3.10 HAZARDOUS MATERIALS

Mercury or any other material deemed by the Federal Environmental Protection Agency or the State Department of Environmental Protection to be hazardous shall not be used in any components of the plumbing systems.

SECTION 15700

HVAC SYSTEM

PART 1 - GENERAL

1.1 DESCRIPTION

- A. The work covered by this Section of the specifications includes the furnishing of labor, materials, equipment, transportation, permits, inspections and incidentals and the performing of operations required to install the heating, ventilating and air conditioning systems indicated.

1.2 RELATED DOCUMENTS

- A. The drawings and the specifications including SECTION 15000 "SUPPLEMENTAL MECHANICAL GENERAL REQUIREMENTS" are hereby made a part of the work of this section.

1.3 SUBMITTALS

- A. Substitutions: Your attention is directed to Section 15000-"Substitutions", relative to competition and the (ONLY) notation. Familiarity with this section should be achieved before reading the PRODUCTS section of this specification.
- B. The items for which the submittals paragraph in Section 15000, Supplemental Mechanical General Requirements, apply are as follows:
 - 1. Blower Unit Heaters
 - 2. Destratification Fans
 - 3. Ceiling Exhaust Fan

PART 2 - PRODUCTS

2.1 BLOWER UNIT HEATERS

A. General

Design is based on Modine. Other acceptable manufacturers include Trane, Sterling and Reznor

B Mechanical Configuration

Condensing furnace section with 93% minimum efficiency provided by an indirect-fired tubular heat exchanger with individually fired tubes coupled to a secondary recuperative heat exchanger for maximum heat recovery.

C. Venting/Combustion Air Arrangement

The unit shall be separated combustion. The venting shall be a power exhausted arrangement with a separate combustion air intake pipe connection to allow for fresh combustion air from outside the conditioned space. The unit shall be tested to insure proper ignition when the unit is subjected to 40 mile per hour wind velocities. The unit shall also include a factory mounted differential pressure switch designed to prevent main burner ignition until positive venting has been proven.

Venting shall be Schedule 40 PVC.

D. Unit Casing

The unit heater(s) casing shall be constructed of not less than 20 gauge aluminized steel with minimization of exposed fasteners.

All exterior casing parts casing parts shall be cleaned of all oils and a phosphate coating applied prior to painting. The exterior casing parts shall then be painted with an electrostatically applied baked-on gray-green polyester powder paint (7-mil thickness) for corrosion resistance.

The unit shall be furnished with horizontal air deflectors. The deflectors are adjustable to provide for horizontal directional airflow control (up or down).

E. Furnace Section

The primary heat exchanger(s) shall be made of 18 gauge aluminized steel (opt 409 stainless steel) tubes and headers. Each heat exchanger tube shall be individually and directly flame-fired. The heat exchanger tube shall be crimped to allow for thermal expansion and contraction. The flue collector box shall be made of 20 gauge AL29-4C stainless steel.

The thermal efficiency of the unit(s) shall be a minimum of 93% efficient for all air flow ranges through the use of a secondary recuperative heat exchanger. The secondary heat exchanger shall be constructed of AL29-4C stainless steel to withstand the corrosive environment of condensing gas fired equipment.

The heat exchanger(s) seams and duct connections shall be certified to withstand 0.9" W.C. external static pressure without burner flame disturbance.

The burner(s) shall be in-shot type, directly firing each heat exchanger tube individually and are designed for good lighting characteristics without noise of extinction for both natural and propane gas.

The ignition controller(s) shall be 100% shut-off with continuous retry.

The gas pressure shall be between 6-7" W.C for natural gas (opt). The gas pressure shall be 11-14" W.C. for propane gas.

The solid state ignition system shall directly light the gas by means of a direct spark igniter each time the thermostat calls for heat.

The unit gas controls shall be provided with the following:

Single-stage gas controls with a single-stage combination gas control, an ignition control, and a single-stage low voltage thermostat. The unit fires at 100% full fire based on a call

for heat from a room thermostat.

An automatic reset high limit switch mounted in the air stream to shut off the gas supply in the event of overheating.

An automatic reset high limit switch mounted on the power exhaustor housing to shut off the gas supply in the event of overheating flue gas temperatures.

A condensate drain line overflow switch that senses if the condensate line is clogged and shuts the unit heater down.

A time delay relay that delays the start of the air mover to allow the heat exchanger a warm-up period after a call for heat. The time delay relay shall also continue the air mover operation after the thermostat has been satisfied to remove any residual heat on the heat exchanger.

F. Electrical

All electrical components shall carry UL, ETL, or CSA listing.

Low voltage terminal board.

A single 115V to 24V step down transformer shall be provided for all unit control.

2.2 DESTRATIFICATION FANS.

- A. Acceptable Manufacturer: Airius, LLC, which is located at: 811 S. Sherman St., Longmont, CO 80501 Toll Free Tel: 888-247-7327; Tel: 303-772-2633; Email: info@airiusfans.com; Web: www.airiusfans.com **Or pre-bid approved equal**
- B. Performance: Coordinated design of housing, stator and motor shall provide columnar laminar airflow to produce a minimum of 100 fpm at center of column at grade level when installed within 2'-0" of ceiling.
- C. Housing: The fan housing shall be made of PC/ABS resin, rated 5VA for flame resistance.
1. Housing color:
 - a. PMS Gray 432C (gray)
- D. Safety Cable: Models 10 through 60 are supplied with 6'-0" steel cable fastened to seismic restraint point integrated into housing.
- E. Motor Mounting: Enclosed in housing, above stator.
- F. Stator: The fan shall be equipped with a patented multiple-vane stator coordinated with fan design for maximizing columnar laminar flow.
- G. Certification: UL Standard 507 for Safety Electric Fans, CAN/CSA C22.2#60335-1 and UL 94 5VA as certified by nationally recognized testing laboratory. Acceptable laboratories include ETL, UL or other nationally recognized testing laboratories.
- H. Identification: Permanently affixed manufacturer's nameplate including the following: Model Number, Serial Number, Motor Power Specifications, Country of Manufacture and Safety Marks: ETL (US & CA) & CE (EU).

- I. Power Cord: 6 foot, 300-volt AC, UL rated. Motors within the voltage range of 100-130VAC are provided with a standard 3-prong plug. Motors within the voltage range of 200-277VAC are not provided with a plug.
- J. Destratification Fan] shall be an Air Pear Thermal Equalizer Model 45.
 - 1. Size and Weight: 24 inch height to bail, 18 inch height to rim, 15 inch diameter, 14 lb (6.4 kg).
 - 2. Motor (EC or EL): Electronically commutated motor, up to 92% efficient. Steel blades welded to steel hub. Ball bearings shall be permanently lubricated and shielded. Up to 1290 cfm, 3050 rpm, 79 dBA. Thermally protected motor with an operating range of -13° F (-25° C) to +140° F (+60° C).
 - a. Recommended ceiling height up to 45 feet (13.7 m) and area coverage up to 1500 sq. ft (140 sq. m); 22 feet (6.75 m) from the fan's center in all directions.
 - b. Electrical Requirements:
 - 1) 100-130V AC, single phase, 50/60 Hz.; 0 – 2.2 Amps; 0 - 170 watts
 - 2) 200-277V AC, single phase, 50/60 Hz.; 0 – 1.4 Amps; 0 - 175 watts
 - c. Controls shall be coordinated with motor selection (EC or EL).
 - 1) EC motor shall be controlled by 0-10VDC control signal via BAS. Uses low voltage control circuit. See wiring diagram.
 - 2) EC motor shall be controlled by wall mounted potentiometer. Uses low voltage control circuit. See wiring diagram.
 - 3) EL motor shall be controlled by FanCenter management system with the ability to control/monitor speed, blade rotation direction, runtime, 24/7/365 scheduling and error reporting. Requires 120VAC, single phase power. Monitoring/control connection is made via an Ethernet cable directly to a PC or a PC on a local area network (LAN). An Ethernet drop should be provided within 6 ft of the FanCenter Manager installation location if connecting to a LAN.
 - a) Wired. Daisy chained low voltage wires between fans and linked to FanCenter Manager.
 - b) Wireless mesh network, 2.4Ghz modified ZigBee protocol.

- J. POT-1 Potentiometer
 - Precision potentiometer
 - Panel mounting style
 - Linear taper
 - 1 turn
 - Resistance tolerance: 5k Ω +/- 5%
 - Linearity tolerance: +/- 0.25%
 - Faceplate (4.5" x 2.75"), electrical box, knob and screws included
 - A single controller can be used to control multiple fans with the same speed setting

2.3 EXHAUST FAN -- E-2

A. General

- 1. Fans with capacity and types shown on the drawings shall be provided and installed. In order to establish a standard, fan model numbers indicated below are based on Broan, NutonePanasonic or Greenheck (unless noted otherwise). Equivalent units by Acme, Cook and Penn ONLY will be considered

2. All fans shall bear the AMCA Certified Ratings Seal for sound and air performance and shall be listed by the Canadian Standards Association Testing Laboratory (CSA). Sones indicated on drawings are AMCA ratings and are the maximum allowable. HVI sound ratings are not acceptable.
3. Wall caps shall be provided under Par. 2.21, "SHEETMETAL".

B. Types

1. Units tagged as "EF" shall be ceiling mounted, direct driven, centrifugal exhaust fan, Broan/Nutone QTXEN110 or equal by Panasonic

Fans shall be listed by Underwriters Laboratories (UL 705) and shall be UL listed for use above tub/shower enclosures. Fans shall bear the Energy Star seal.

The outlet duct hood shall include an aluminum backdraft damper with continuous aluminum hinge rod. Motor shall be isolation mounted to a one piece galvanized stamped steel integral motor mount/inlet. A field wiring compartment with receptacle shall be standard. A white, high impact styrene injection molded grill shall be provided as standard.

Wheel shall be centrifugal forward curved type, injection molded of polypropylene resin. Wheel shall be balanced in accordance with AMCA Standard 204-96, *Balance Quality and Vibration Levels for Fans*.

Motor shall be open drip proof type with permanently lubricated sealed ball bearings and include impedance or thermal overload protection and disconnect plug. Motor shall be furnished at the specified voltage and phase.

2.4 EXHAUST FANS -- EF-1

A. General

1. Fan to Be Greenheck or approved equal;
2. Sidewall mounted applications

B. Wheel:

1. Propeller shall be fabricated steel blades and hubs
2. Securely attached to fan shaft with standard square key and set screw or tapered bushing
3. Statically and dynamically balanced in accordance with AMCA Standard 204-05
4. The propeller and fan inlet will be matched and shall have precise running tolerances for maximum performance and operating efficiency

C. Motors:

1. Motor enclosures: Open driproof motors are permanently lubricated, heavy duty ball bearing type to match with the fan load and furnished at the specific voltage and phase
2. Accessible for maintenance

D. Drive Frame:

1. Frames and Panels shall be bolted construction
2. Drive frame assemblies and fan panels shall be galvanized steel

3. Drive frame shall have welded wire or formed channels and fan panels shall have prepunched mounting holes, formed flanges and a deep formed one piece inlet venture
- E. Disconnect Switches:
1. NEMA rated: 1
 2. Positive electrical shut-off
 3. Wired from fan motor to junction box
- F. Options/Accessories:
- a. Type: Motorized
 - b. Prevents outside air from entering back into the building when fan is off
 - c. Balanced for minimal resistance to flow
 - d. Galvanized frames with prepunched mounting holes
2. Dampers Guards:
- a. Guard material: Galvanized
 - b. Shall completely enclose the damper or wall opening on the discharge side of the fan
3. Wall Collar:
- a. Constructed of galvanized steel with heavy gauge mounting flanges and prepunched mounting holes
4. Motor Side Guard:
- a. Guard type: Standard Guard
 - b. Protective guard completely enclose the motor and drive side of the fan

PART 3 - EXECUTION

3.1 SURFACE CONDITIONS

A. Inspection:

1. Prior to work of this Section, carefully inspect the installed work of other trades and verify that such work is complete to the point where this installation may properly commence.
2. Verify that the heating system may be installed in accordance with pertinent codes and regulations and the reviewed Submittals.

3.2 INSTALLATION OF VENTS & CONDENSATE PIPING

- A. In general, piping shall be run concealed above ceilings in occupied areas. Piping in other areas may be run exposed. Piping shall not be exposed in occupied spaces unless written authorization is given by the Architect.
- B. Provide and erect in accordance with the best practice of the trade piping shown on the Drawings and as required to complete the intended installation. Make offsets as shown or required to place piping in proper position to avoid other work and to allow the application of insulation and finish painting to the satisfaction of the Architect.
- C. All joints to be a mechanical connection or Brazed. Clean surfaces to be Brazed and flow Nitrogen through the system during the brazing process.

- D. PVC piping shall have solvent welded joints except at connections to equipment and valves which shall be screwed for sizes 2" and smaller and flanged for sizes 2-1/2" and larger. Solvent welded joints: Pipe ends deburred, and beveled. Pipe end and fitting: Cleaned and dried, primed to soften bonding surfaces. Pipe end: Apply even full layer of solvent cement after priming. Before cement starts to set, insert pipe end into fitting and turn 1/4 turn to evenly distribute cement. Hold joint together until cement sets-up, wipe excess cement off joint.
- E. Pipe penetrations through walls, floors and ceilings shall have pipe sleeves of the same material as the pipe and in accordance with Section 15000 "Supplemental Mechanical General Requirements" and BOCA. Pipe sleeves shall be suitable for firestopping in accordance with the firestopping manufacturers recommendations. Traverse points of piping shall be escutcheoned with split chrome floor and ceiling plates and spring anchors, where visible to occupancy.

3.3 PIPE HANGERS

- A. Impact driven studs are not acceptable.
- B. Pipes (copper or steel) shall be supported at intervals and rod sizes as follows, double nuts on hangers and on beam clips.

Pipe Size	Hanger Intervals	Rod Sizes
1/2"	5'	3/8"
3/4"	6'	3/8"
1"	7'	3/8"
1-1/4"	8'	3/8"
1-1/2"	9'	3/8"
2"	10'	3/8"
2-1/2"	11'	1/2"
3"	12'	1/2"

- C. Verticals: Supported at the base and at intervals as follows by use of clamp hangers:

Steel Pipe: Not more than 16 ft.

Copper Pipe and Tubing:

1-1/2" and larger - Not more than 12 ft.

1-1/4" and smaller - Not more than 6 ft.

- D. Provide welded steel saddles at each hanger on steel piping systems 4" and larger.
- E. PVC Piping: Supported at 4' intervals.

3.4 CLOSING IN WORK

- A. Cover up or enclose work after it has been properly and completely tested and reviewed.
- B. No additional cost to the Owner will be allowed for uncovering or recovering any work that is covered or enclosed prior to required test and review.

3.5 TEST AND ADJUST

- A. Piping Systems: Test with water to a pressure of 75 psi and hold for a period of two hours. Repair any leaks and retest the piping system; repeat process until systems are leak-free. Test piping before it is insulated.
- B. Before operating any system, flush the piping to remove oil and foreign materials.
- C. After the installation is complete and ready for operation, test the system under normal operating conditions in the presence of the Architect and demonstrate that the system functions as designed.
- D. Demonstrate that the HVAC systems have free and noiseless circulation of water, that all air has been purged, and that systems are watertight.
- E. Correct defects, which develop in operational testing, conduct additional testing until defect free operation is achieved.

3.7 CLEANUP AND CORROSION PREVENTION

- A. Piping and equipment shall be thoroughly cleaned. Dirt, dust, and debris shall be removed and the premises left in a clean and neat condition.
- B. Before covering is applied to piping systems, clips, rods, clevises and other hanger attachments, and before uncovered piping is permitted to be concealed, corrosion and rust shall be wire brushed and cleaned and in the case of iron products, a coat of approved protective paint applied to these surfaces. When corrosion is from the effects of hot solder paste, the areas shall be cleaned and polished and a wash of bicarbonate of soda and water used to neutralize the acid condition.

3.8 INSTRUCTIONS

- A. On completion of the project, instruct the Owner's representative in the care and operation of the system. The total period of instruction shall not exceed four (4) hours per building. The time of instruction shall be arranged with the Owner. In addition to the prime Mechanical Contractor, the control system Contractor, Balancing Contractor, and Owner's representative shall be present and participate in the Owner's instruction.

3.9 FIRESTOPPING

- A. All penetrations of fire-rated assemblies including walls and floors by mechanical system components (piping, ductwork, conduits, etc.) shall be firestopped as specified.

END OF SECTION

SECTION 15800

DUCTWORK AND ACCESSORIES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. The drawings and the specifications including SECTION 15000 "SUPPLEMENTAL MECHANICAL GENERAL REQUIREMENTS" are hereby made a part of the work of this section.

1.2 DESCRIPTION OF WORK

- A. The work covered by this Section of the specifications includes the furnishing of labor, materials, equipment, transportation, permits, inspections and incidentals and the performing of operations required to install the ductwork systems indicated.

1.3 SUBMITTALS

- A. Substitutions: Your attention is directed to Section 15000-"Substitutions", relative to competition and the (ONLY) notation. Familiarity with this section should be achieved before reading the PRODUCTS section of this specification.
- B. The items for which the submittals paragraph in Section 15000, Supplemental General Mechanical Requirements, apply are as follows:
 - 1. Ductwork.
 - 2. Ductwork accessories.
 - 3. Firestopping materials and methods.
 - 4. Ductwork sealing products.

PART 2 - PRODUCTS

2.1 DUCTWORK

- A. Classification of Ductwork: Low pressure ductwork: up to 2" W.G. static pressure. The duct pressure class shall be determined by multiplying the total static pressure scheduled in the fan schedules by 1.2.
- B. Materials: Unless otherwise indicated low pressure ductwork shall be galvanized steel. Galvanized sheet metal shall be new galvanized steel sheets of lock forming quality with zinc coating that will not flake or peel under forming operation.
- C. Construction for Low Pressure Round and Rectangular Ductwork:
 - 1. Material: Galvanized steel conforming to ASTM A527, weight of galvanized coating shall be not less than 1-1/4 ounces total for both sides of one sq.ft. of a sheet.

Construction, metal gage, and reinforcements shall conform with SMACNA "Duct Construction Standards" and NFPA 90A for 2" W.G. pressure class.

2. Fittings: Shall be constructed in accordance with SMACNA Standards and shall be of the types indicated (ONLY).
3. Longitudinal joints shall be Pittsburgh lockseam (ONLY). Button punch snap locks are not acceptable.
4. Joints shall be sealed to SMACNA seal class B.

2.2 DUCTWORK ACCESSORIES

A. Access Doors:

1. Low Pressure Duct Systems: Ruskin Model ADC2, 12"x12" size, 24 gauge galvanized steel, steel on both sides of door, foam gasket seals, 1" insulation, 2 cam locks, no hinge.

B. Counter Balanced Dampers (CBD): Aluminum frame and blades, extruded vinyl edge seals, 2-1/4" deep, set 0.06" WG.

C. Backdraft Dampers (BDD): Ruskin Model CBD2 or American Warming and Ventilating aluminum frame and blades, extruded vinyl edge seals, field set at 0.10" W.G. pressure differential for full open operation.

D. Flexible Duct Connections: Ventfabrics, Inc. neoprene coated glass fabric.

E. Drawbands for Flexible Ducts: Clinch type stainless steel with screwdriver adjustment, or nylon with lever action tightening tool provided by the drawband manufacturer.

F. Turning Vanes: (Low Pressure):

1. Solid blade, mounted with the long edge down stream in accordance with duct construction details indicated. Submit a 12"x12" sample elbow for review prior to fabrication.

G. Joint Sealer:

1. Hardcast DT tape and FTA-20 activator.
2. Provide waterproof sealer where watertight seal is specified.

2.3 REGISTERS, GRILLES & DIFFUSERS

A. High Capacity Drum Louvers

HCD1 High Capacity Drum Louvers Furnish and install Price model HCD1 supply outlets of the sizes and models indicated on the plans and outlet schedule. The outlets shall consist of individually adjustable spread control vanes housed within a rotatable drum. Curved outer drum and vanes shall be extruded aluminum, other components shall be steel. The drum pivot mechanism shall incorporate a positive positioning detent device to hold field adjusted drum angles of up to 30° off center. Adjustable vanes are to pivot and

maintain blade setting. The border shall be constructed of formed steel with welded, reinforced corners for extra strength. Screw holes shall be countersunk for aesthetic appeal.

The unit shall be finished in B15 Aluminum Powder Coat). Paint finish shall pass 500 hours of salt spray exposure with no measurable creep in accordance with ASTM D1654 and 1000 hours with no rusting or blistering as per ASTM D610 and ASTM D714. The optional integral volume control damper shall be of the opposed blade type and shall be constructed of cold rolled steel. The damper shall be operable from the register face. The damper shall be coated steel. Or: The optional Heavy Duty balancing damper shall be of opposed blade type and shall be constructed from a minimum 18 gage thick cold rolled steel. Damper frame corners shall overlap and be of welded construction for added strength. The damper shall be operable from the register face. The damper shall come fitted with a face accessible screw type blade locking mechanism. The damper shall be coated steel.

B. Double Deflection Grilles

Steel Louvered Supply Grille A. Description: 1. Furnish and install Price steel louvered supply grilles and registers of sizes and mounting types designated by the plans and air distribution schedule.

The grille blades and border shall be steel construction. 2. Grilles shall be [single deflection] or [double deflection] louver type, and shall have (select one): a. One set of fully adjustable blades, with 3/4 inch on center blade spacing [Model 510]. b. One set of fixed blades with 0 degree deflection and 3/4 inch on center blade spacing [Model 510Z]. c. Two sets of fully adjustable blades with 3/4 inch on center blade spacing [Model 520]. 3. The grilles front blade orientation shall be (select one), as indicated on the outlet schedule. a. Front blades parallel to the long dimension. b. Front blades parallel to the short dimension.

Paint Specification: 1. Paint finish shall White and withstand a minimum salt spray exposure of 1000 hours with no measurable creep in accordance with ASTM D1654, and 1000 hours of exposure with no rusting or blistering as per ASTM D610 and ASTM D714. 5. The finish shall have an impact resistance of 80 inch-pounds. b. All components shall have a custom finish in a color to match a customer supplied sample.

Construction: 1. The grille blades and border shall be steel construction. 2. Grilles shall be 45 degree deflection fixed louver type to minimize see-through, and shall have (select one): a. One set of fixed blades with 3/4 inch on center blade spacing [Model 530] b. One set of fixed blades with 1/2 inch on center blade spacing [Model 535]. 3. The grilles blade orientation shall be (select one), as indicated on the outlet schedule. a. Blades parallel to the long dimension. b. Blades parallel to the short dimension.

Paint Specification: 1. Paint finish shall be (select one): a. All components shall have a baked-on powder coat finish. 1. The paint finish must demonstrate no degradation when tested in accordance with ASTM D1308 (covered and spot immersion) and ASTM D4752 (MEK double rub) paint durability tests. 2. The paint film thickness shall be a minimum of 2.0 mils. 3. The finish shall have a hardness of 2H. 4. The finish shall withstand a minimum salt spray exposure of 1000 hours with no measurable creep in

accordance with ASTM D1654, and 1000 hours of exposure with no rusting or blistering as per ASTM D610 and ASTM D714. 5. The finish shall have an impact resistance of 80 inch-pounds. b. All components shall have a custom finish in a color to match a customer supplied sample.

2.4 LOUVERS

All exterior louvers shall be extruded aluminum construction with interior bird screens and anodized in finish color to be selected by Architect. Provide not less than 2 color chip cards with submittals for review (*photocopies and digital copies are not acceptable*). Frames and blades shall have not less than 55% minimum free area and no less than 0.081 inches thick. All louvers shall comply with Section 08400 of this specification. The following list is based on model numbers of Ruskin to establish a standard of quality; approved equal units by American Air Warming and Arrow are acceptable.

All louvers shall be stationary blade type. Units to be 6 inches deep with certified rating of zero water penetration at free area velocity of 900 FPM based on tests in accordance with AMCA Standard 500. Units 48 inches and less in width shall be Model ELF6375X. Units greater than 48 inches in width shall have drainable blades, Model ELF6375DX.

2.4 MOTORIZED DAMPERS.

Dampers shall have 16 gauge galvanized frames not less than 2 inches in width with airfoil blades not less than 14 gauge galvanized steel, and shall be adequately braced to form a rigid assembly. No dampers shall have blades more than 6 inches wide. Dampers shall be painted with one coat of lacquer. Dampers shall be two position, opposed blade type with linkage concealed within the frame. Oilite bronze bearings shall be provided at the ends of damper blades. All dampers shall be mounted with the blades oriented horizontally. Damper operators shall be provided with bracket arrangement for location outside of air stream wherever possible. All damper motors shall be sufficient size to operate dampers, including slow opening and fast closing.

Dampers shall be provided with flexible metal edge and jamb seals and neoprene blade edge seals for tight closure. Leakage shall be certified to be no more than 2.0 CFM per square foot at 1 inch w.g. on units 24 inches wide and larger, 3.0 CFM per square foot at 1 inch w.g. on units less than 24 inches wide.

Dampers shall be Ruskin Model CD60, Air Balance Model AC-516, Arrow, or approved equal.

PART 3 - EXECUTION

3.1 SURFACE CONDITIONS

A. Inspection:

1. Prior to work of this Section, carefully inspect the installed work of other trades and verify that such work is complete to the point where this installation may properly commence.
2. Verify that the duct systems may be installed in accordance with pertinent codes and regulations and the reviewed Submittals.

3.2 INSTALLATION OF DUCTWORK AND AIR DEVICES

- A. Provide and erect in accordance with the best practice of the trade ductwork shown on the drawings and as required to complete the intended installation. Make offsets as shown or required to place ductwork in proper position to avoid conflicts with other work and to allow the application of insulation and finish painting to the satisfaction of the Architect. Sizes given are "inside - clear" dimensions and not necessarily that of sheet metal. Ducts shall be arranged to adjust to "field conditions". The Sheet Metal trades shall coordinate their work with other trades. Work shall conform to ASHRAE duct construction recommendations, SMACNA "Duct Construction Standards", NFPA, and the requirements of BOCA code.
- B. Joint Sealing: See PRODUCTS section.
- C. Longitudinal joints: See PRODUCTS section.
- D. Turns shall be made with long radius elbows or, if physically impossible to use long radius elbows, shall be square turns with specified turning vanes. CAUTION: Turns not conforming to this requirement shall be ordered removed and replaced with properly built turns.
- E. Access Doors: Provide access doors for concealed apparatus requiring service and inspection in the duct system including but not limited to dampers, sensors and motors, and upstream and downstream from duct coils.
- F. Duct Sleeves and Prepared Openings: Install duct sleeves and prepared openings for duct mains, duct branches, and ducts passing through walls, roofs, and ceilings. Insure the proper size and location of sleeves and prepared openings. Allow one-inch clearance between duct and sleeve or one-inch clearance between insulation and sleeve for insulated ducts, except at grilles, registers, and diffusers.
- G. Duct Supports: Unless otherwise indicated, provide one-inch wide by 16 gage galvanized steel sheet metal strips on each side of ducts. Anchor risers in the center of the vertical run to allow ends or riser free vertical movements. Attach supports only to structural framing members. Do not anchor supports to metal decking unless a means is provided (architectural review required) for preventing the anchors from puncturing the metal decking. Where supports are required between structural framing members, provide suitable intermediate metal framing. Where C clamps are used, use retainer clips.
- H. Flexible Collars and Connections: Provide flexible collars between fans and ducts or casings and where ducts are of dissimilar metals, as indicated or required. For round ducts, securely fasten flexible connections using stainless steel clinch-type draw-band. Nylon drawbands may be used if installed using the drawband manufacturer's lever-action tightening tool. For rectangular ducts, lock flexible connections to metal collars.

- I. Any deviation in the duct system must be submitted as a shop drawing and stamped.
CAUTION: Any deviation not submitted and favorably reviewed will be ordered removed from the system and replaced with that which is shown on the Drawings.
- J. Discrepancies between actual field conditions and the Contract Documents shall be brought to the attention of the Architect prior to fabrication.
- K. Field Changes to Ductwork: Field changes of ducts such as those required to suit the sizes of factory-fabricated equipment actually furnished shall be designed to minimize expansion and contraction. Use 4:1 transitions in field changes as well as modifications to connecting ducts.
- L. Transitions with a slope greater than 4 to 1 shall be ordered removed from the system and replaced with a transition, which meets this criteria.
- M. Joints and seams at intake and exhaust plenums and joints on intake and exhaust ductwork for a distance of 3 feet from the plenum shall be sealed watertight on the bottom and side joints and seams.
- N. Isolation dampers at intake and exhaust louvers and vent hoods shall be sealed to the ductwork to provide an airtight assembly with similar performance characteristics to the isolation damper.

3.3 CLOSING IN WORK

- A. Cover up or enclose work after it has been properly and completely tested and reviewed.
- B. No additional cost to the Owner will be allowed for uncovering or recovering any work that is covered or enclosed prior to required test and review.

3.4 TEST AND ADJUST

- A. Ductwork shall be leak tested in accordance with Section 15990 "Testing and Balancing Air and Water Systems". Provide end cap and closure pieces. Close off and seal openings in ductwork to be tested. Ductwork shall be tested before it is insulated.
- B. Before operating any system, the system shall be cleaned out to remove dust and foreign materials.
- C. After the installation is complete and ready for operation, test the system under normal operating conditions in the presence of the Architect and demonstrate that the system functions as designed.
- D. Correct defects, which develop during the test period, conduct additional testing until defect free operation is achieved.

3.5 CLEANUP AND CORROSION PREVENTION

- A. Ductwork and equipment shall be thoroughly cleaned. Dirt, dust, and debris shall be removed and the premises left in a clean and neat condition.

- B. Before covering is applied to duct systems, clips, rods, clevises and other hanger attachments, and before uncovered piping is permitted to be concealed, corrosion and rust shall be wire brushed and cleaned and in the case of iron products, a coat of approved protective paint applied to these surfaces.

3.6 INSTRUCTIONS

- A. On completion of the project, instruct the Owner's representative in the care and operation of the system. The total period of instruction shall not exceed four (4) hours. The time of instruction shall be arranged with the Owner. In addition to the prime Mechanical Contractor, the control system Contractor, Balancing Contractor, and Owner's representative shall be present and participate in the Owner's instruction.

3.7 FIRESTOPPING

- A. All penetrations of fire-rated assemblies including walls and floors by mechanical system components (piping, ductwork, conduits, etc.) shall be firestopped as specified.

END OF SECTION

SECTION 15900

AUTOMATIC TEMPERATURE CONTROLS

PART 1 - GENERAL

1.1 DESCRIPTION

- A. The work covered by this Section of the specifications includes the furnishing of labor, materials, equipment, transportation, permits, inspections and incidentals and the performing of operations required to install the automatic temperature control system indicated. The system shall be a electric/electronic (not DDC) system to provide the sequences as described in these specifications. The ATC system shall be complete including required components including, low voltage and line voltage wiring. The system shall function as a completely independent system and shall include a wall mounted interface panel for adjusting system settings. The system shall not require a computer terminal or laptop be present to adjust any systems settings.

1.2 RELATED DOCUMENTS

- A. The drawings and the specifications including SECTION 15000 "SUPPLEMENTAL MECHANICAL GENERAL REQUIREMENTS" are hereby made a part of the work of this section.

1.3 QUALIFICATIONS: The ATC system shall be one of the following: Honeywell, Siemens, Trane, JCI, IB Controls or Maine Controls.

1.4 SUBMITTALS

- A. Substitutions: Your attention is directed to Section 15000 relative to competition and the (ONLY) notation. Familiarity with this section should be achieved before reading the PRODUCTS section of this specification.
- B. The items for which the shop drawings paragraph in Section 15000, Supplemental General Mechanical Requirements, apply are as follows:
 - 1. Temperature control system schematic including variables, flow diagrams, ladder diagrams, and point to point wiring diagrams, indicating set points, reset ranges, throttling ranges, controller gains, differentials, operating ranges, normal positions, controller action, dial ranges, voltages, currents, mounting locations, indicators, and terminal strip points.
 - 2. Sequence of operation for each system and function.
 - 3. Generic, functional description of each control component indicated.
 - 4. Equipment interlocks required by sequence of operation.
 - 5. Manufacturer's Data:
 - a. Controllers, including wiring and connection diagrams.
 - b. Thermostats, temperature sensors, including wiring and connection diagrams.

- c. Switches, relays, transmitters, transformers, including wiring and connection diagrams.

PART 2 - PRODUCTS

2.1 CONTROL PANELS

- A. In general, relays, transformers, or other control devices (not including room thermostats or duct-mounted instruments) shall be grouped and mounted in a factory-built cabinet enclosure.

2.2 SEQUENCE OF CONTROL

- A. Provide and install electronic/electric components to enable the mechanical system to operate in the following sequences:
 1. Unit heaters shall be controlled by a wall or column-mounted heating only thermostat. On a call for heating, the thermostat shall energize associated blower and gas valve.
 2. Destratification Fans shall be controlled by a wall or column mounted controller provided by the Fan Manufacturer. Wire all Destratification fans in series with low voltage control wiring.
 3. Exhaust Fan in Kennebunk #2. Fan to energized with lights (by Electrical Contractor).

PART 3 - EXECUTION

3.1 SURFACE CONDITIONS

- A. Inspection:
 1. Prior to work of this Section, carefully inspect the installed work of other trades and verify that such work is complete to the point where this installation may properly commence.
 2. Verify that the automatic temperature control and system may be installed in strict accordance with pertinent codes and regulations and the reviewed Shop Drawings.

3.2 INSTALLATION

- A. Provide wiring, and conduit to connect the ATC components for an operational ATC system. Wiring and installation shall conform to NFPA 70. **ALL EXPOSED CONTROL WIRING TO BE INSTALLED IN EMT CONDUIT.**
- B. Identification: Label or code each field wire at each end. Permanently label or code each point of field terminal strips to show the instrument or item served. Color-coded cable with annotated cable diagrams may be used to accomplish cable identification.

3.3 ADJUSTMENTS

- A. Adjust controls and equipment to maintain the conditions indicated, to perform the functions indicated, and to operate in the sequence specified.

3.4 INSTRUCTING OPERATING PERSONNEL

- A. Upon completion of the work and when designated by the Architect, furnish the services of a competent technician regularly employed by the temperature control manufacturer for the instruction of Owner in the operation and maintenance of each automatic space temperature control system. The period of instruction shall be for not less than two 8-hour working days and shall include videotape demonstration of controllers.

3.5 FIELD INSPECTION AND TESTS

- A. Tests shall be performed or supervised by employees of the ATC system or manufacturer of the ATC system, or by an authorized representative of the ATC manufacturer. Give Architect 14 calendar days advance written notice prior to the date of the field acceptance testing. If the Architect witnesses tests, such tests shall be subject to approval. If the Architect does not witness tests, provide performance certification.
- B. Plan for Inspections and Tests: Furnish a written inspections and tests plan at least 60 days prior to the field acceptance test date. This plan shall be developed by the manufacturer of the ATC system. The plan shall delineate the inspections and testing procedures required for the ATC system to demonstrate compliance with the requirements specified. Additionally, the test plan shall indicate how ATC system is to be tested, what variables will be monitored during test, names of individuals performing tests, and what criteria for acceptance should be used. Indicate how operation of H&V system and ATC system in each seasonal condition will be simulated.
- C. Field Acceptance Testing: Upon completion of 72 hours of continuous H&V and ATC systems operation and before final acceptance of work, test the automatic temperature control systems in service with the heating, ventilating and air conditioning systems to demonstrate compliance with contract requirements. Test controls through each cycle of operation, including simulation of each season insofar as possible. Test safety controls to demonstrate performance of required function. Adjust or repair defective or malfunctioning automatic space temperature control equipment or replace with new equipment. Repeat tests to demonstrate compliance with contract requirements.

3.6 FIRESTOPPING

- A. All penetrations of fire-rated assemblies including walls and floors by mechanical system components (piping, ductwork, conduits, etc.) shall be firestopped as specified.

END OF SECTION

SPECIAL PROVISION

SECTION 22150

AIR COMPRESSOR

PART 1 – GENERAL

1.1 Summary

- A. This work shall include all labor, materials and equipment necessary to install an air compressor and accessories as shown on the drawings and as specified herein.
- B. All work shall conform to the National Electrical Code and other applicable codes.

1.2 Submittals

- A. Contractor shall submit two (2) copies of all equipment and accessories to the Authority at least fifteen (15) days prior to incorporation into the work.
- B. Provide data sheets and operating manual.

1.3 Permits

- A. Contractor shall obtain and pay for electrical permit from local electrical inspector.
- B. Copies of permit shall be sent to the Authority.

PART 2 – PRODUCTS

2.1 Air Compressor

- A. Ingersoll Rand - 1 Phase - Electrical Vertical Tank Mounted 7.50HP - Stationary Air Compressor, 80 gal. Model 2475N7.5 or approved equal.

PART 3 – EXECUTION

3.1 Installation

- A. Install air compressor where shown on the drawings, complete with all accessories securely fastened in place.
- B. Follow manufacturer's instructions and recommendations completely.
- C. Air compressor shall be installed in accordance with the latest edition of the "National Electrical Code"

3.2 Cleanup and Testing

- A. Test all equipment to the satisfaction of the Authority.
- B. Repair or replace any defective equipment.
- C. Clean all equipment at the completion of the project.

3.3 Warrantee

- A. All materials and work shall be warranted for one (1) year from date of acceptance by the Authority.
- B. Contractor shall supply a minimum of two (2) sets of air compressor consumable replacement parts to the Authority at completion.
- C. Any additional parts needed beyond the spares provided shall be replaced at no additional cost to the Authority during the warranty period.

END OF SECTION

SPECIAL PROVISION

SECTION 26000

ELECTRICAL

PART 1 - GENERAL

1.01 SCOPE OF WORK

- A. Provide required electrical work associated with electrical systems for maintenance garage expansion. Work shall include the following:
 - 1. Provide electrical branch circuit connections to mechanical systems equipment.
 - 2. Provide interior and exterior lighting and associated conduit and wiring.
 - 3. Provide wiring devices and associated conduit, outlet boxes and wiring.
- B. Furnish all materials, labor, tools, transportation, incidentals, and appurtenances to complete in every detail and leave in working order all items of work called for herein or shown on the accompanying drawings.
- C. Include any minor items of work necessary to provide a complete and fully operative electrical system.

1.02 REFERENCES

- A. ANSI C80.3 - Electrical Metallic Tubing, Zinc-Coated.
- B. ANSI / NEMA FB 1 - Fittings and Supports for Conduit and Cable Assemblies.
- C. ANSI / NFPA 70 - National Electrical Code.
- D. NEMA OS-1 – Sheet Steel Outlet Boxes, Device Boxes, Covers and Box Supports.
- E. NEMA WD 1 – General Purpose Wiring Devices.
- F. NEMA TC 2 – Schedule 40 PVC conduit
- G. UL 50 – Cabinets and Boxes

1.03 GENERAL REQUIREMENTS

- A. Contractor shall read the entire specifications covering other branches of work. He is responsible for coordination of his work with work performed by other trades.
- B. Consult all Contract drawings which may affect the location of any equipment or

apparatus furnished under this work and make minor adjustments in location as necessary to secure coordination.

- C. System layout is schematic and exact locations shall be determined by structural and other conditions. This shall not be construed to mean that the design of the system may be arbitrarily changed. The equipment layout is to fit into the building as constructed and to coordinate with equipment included under other Divisions of work.
- D. Contractor shall contact the Owner's Representative immediately if he notices any discrepancies or omissions in either the drawings or the specifications, or if there are any questions regarding the meaning or intent thereof.
- E. Submit all changes, other than minor adjustments, to the Designer for approval before proceeding with the work.
- F. Contractor shall meet with Designer on site prior to rough-in of electrical to verify location of lighting fixtures, conduit location, wiring devices, destratification fans, unit heaters, water heaters and air compressors.
- G. Route wire as required to meet Project Conditions. Include wire lengths within 10 feet of length shown for all wiring devices.
- H. Where wire routing is not shown, and destination only is indicated, determine exact routing and lengths required.

1.04 SUBMITTALS

- A. Submit shop drawings and product data grouped to include complete submittals of related systems, products, and accessories in single submittals.
- B. Mark dimensions and values in units to match those specified.
- C. Contractor shall check all shop drawings for dimensional correctness, interferences and conformance to specifications and plans. Stamp drawings "approved" and indicate when stipulated check has been made before forwarding them. Identify submittal data by project name and equipment identification number.

1.05 REGULATORY REQUIREMENTS

- A. Complete installation shall conform with all applicable Federal, State and Local laws, Codes and Ordinances, included but not limited to latest approved editions of the following:
 - 1. State Building Codes.
 - 2. Specific Construction Safety Requirements, State Industrial Commission.
 - 3. National Electrical Code (NFPA 70).
 - 4. Occupational Safety and Health Act (OSHA) of 1971 and all amendments thereto.
 - 5. Local Building Code(s).

6. Maine Turnpike Authority Standards

- B. Nothing contained in the drawings and specifications shall be construed to conflict with these laws, codes, and ordinances and they are thereby included in these specifications.
- C. The Contractor shall visit the site to become familiar with all existing conditions affecting this work. No claim will be recognized for extra compensation due to failure of contractor to familiarize himself/herself with the conditions and extent of proposed work.
- D. Obtaining permits. All permit requests shall be submitted to the Maine Turnpike Authority and NOT to the local municipality. All permits will be attained by the Maine Turnpike Authority.

1.06 RECORD DRAWINGS

- A. Record any changes in location of boxes, service runs, and similar construction on a set of prints and deliver them to the Owner's Representative upon completion of the work.

1.07 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 Owner and Designer before proceeding.

1.08 TEMPORARY POWER AND LIGHTING

- A. The Contractor shall be responsible for provision of temporary electrical power and lighting as required to facilitate construction work.
 - 1. Temporary electrical power shall be obtained from the existing facility distribution system.
 - 2. The Contractor shall provide temporary electrical power distribution as required to facilitate construction activities including:
 - a. Wire/conduit
 - b. Over-current protection
 - c. Receptacle outlets
 - d. Motor disconnect means
 - e. Grounding
 - 3. The Contractor shall provide temporary lighting as required to facilitate construction activities.
 - 4. All temporary electrical power and lighting shall be completely removed prior to substantial completion of the project.

1.09 WARRANTIES

- B. All work performed and all material and equipment furnished under this contract shall be free from defects and shall remain so for a period of at least one (1) year from the date of acceptance.

PART 2 - PRODUCTS

2.01 CONDUIT AND FITTINGS

- A. Electrical Metallic Tubing (EMT): ANSI C80.3 galvanized tubing, 3/4" minimum size.
 - 1. Fittings: Set screw-type ANSI/NEMA FB1.
- B. Flexible Metal Conduit: Steel, 3/4" minimum size.
 - 1. Fittings: ANSI/NEMA FB1.
- C. Liquid-Tight Flexible Metal Conduit: Flexible metal conduit with PVC jacket.
 - 1. Fittings: ANSI/NEMA FB1.
- D. Rigid steel conduit (RGS): Galvanized rigid steel, ANSI C80.1.
 - 1. Fittings: ANSI/NEMA FB1, threaded-type.
- E. Plastic Conduit: NEMA TC-2 Schedule 40 PVC.
 - 1. Fittings: NEMA TC-3.

2.02 BUILDING WIRE

- A. Description: Single conductor insulated wire, #12 AWG minimum size.
- B. Conductor: Copper.
- C. Insulation Voltage Rating: 600 volts.
- D. Insulation Type: THW or XHHW.

2.03 METAL CLAD CABLE

- A. Description: NFPA 70 Type MC.
- B. Conductor: Copper only, #12 AWG minimum size.
- C. Insulation Voltage Rating: 600 volts.
- D. Insulation Temperature Rating: 60 degrees C.
- E. Insulation Material: Thermoplastic.
- F. Armor Material: Steel or Aluminum, interlocking tape.

2.04 BOXES

- A. Outlet boxes: NEMA OS 1, galvanized steel.

2.05 WIRING DEVICES

- A. Manufacturers: *Pass & Seymour* model numbers are listed below to establish configuration and type. Equal devices by the following other approved manufacturers will be accepted.

1. *Leviton*
2. *Hubbell*

- B. Wall Switches

1. Description: NEMA WD1, specification grade, AC only general-use snap-switch.
2. Voltage Rating: 120-277 volts, AC.
3. Current Rating: 20 Amperes.
4. Color: White.
5. SPST: *CS20AC1-W*
6. 3-Way: *CS20AC3-W*

- C. Receptacles

1. Description: NEMA WD1; Heavy-duty type, 125-volt grounded duplex receptacle.
2. Device Body: Ivory nylon (normal power circuits); Green nylon (clean power circuits)
3. Configuration: NEMA 5-20.
4. Color: White.
5. Model: *CR20-W*

- D. Ground Fault:

1. Description: UL 498, 544, 943; 125 volt, ground fault interrupt type duplex receptacle with TEST and RESET.
2. Device Body: Ivory, Thermoplastic.
3. Configuration: NEMA 5-20.
4. Model Number: *2095-w*

- E. Wall Plates

1. Description: White colored nylon.

2.06 DISCONNECT SWITCHES

- A. Acceptable Manufacturers:

1. *Square D*
2. *General Electric*
3. *Cutler-Hammer*
4. *Siemens*
5. Substitutions: None Permitted.

- B. Nonfusible Switch Assemblies: NEMA KS 1; Type HD; quick-make, quick-break, load interrupter enclosed knife switch with externally operable handle interlocked to prevent opening front with switch in ON position. Handle lockable in OFF position.

2.07 GROUNDING MATERIALS

- A. Branch Circuit Ground Conductors: Insulated (green) copper conductors, #12 AWG, minimum.
- B. Grounding Electrodes: 5/8-inch diameter by 8-feet long copper clad ground rod.

PART 3 - EXECUTION

3.01 WIRING INSTALLATION

- A. Provide type MC cable where concealed in partitions and/or above.
 1. Install wiring in accordance with manufacturers' instructions.
 2. Neatly train and lace wiring inside boxes, equipment, and panelboards.
 3. Use split bolt connectors for copper conductor splices and taps, 6 AWG and larger. Tape uninsulated conductors and connector with electrical tape to 150 percent of insulation rating of conductor. Use insulated spring wire connectors with plastic caps for conductor splices and taps, 10 AWG and smaller.
 4. Use 10 AWG conductors for 20-ampere, 120-volt branch circuits longer than 75 feet.
 5. Verify continuity of each branch circuit conductor after installation.

3.02 OUTLET, JUNCTION & PULL BOX INSTALLATION

- A. Install electrical boxes as required for splices, taps, wire pulling, equipment connections and compliance with regulatory requirements.
- B. Install electrical boxes to maintain headroom and to present neat mechanical appearance.
- C. Support boxes independently of conduit.
- D. Use flush mounting outlet boxes in finished areas.
- E. Do not install flush mounting boxes back-to-back in walls; provide minimum 6-inch separation. Provide minimum 24 inches separation in acoustic rated walls.
- F. Secure flush mounting box to interior wall and partition studs. Accurately position to allow for surface finish thickness.
- G. Use stamped steel bridges to fasten flush mounting outlet box between studs.

- H. Install flush mounting box without damaging wall insulation or reducing its effectiveness.
- I. Use gang boxes where more than one device is mounted together. Do not use sectional box. Provide 2-gang plaster rings for 2-gang boxes.
- J. Align adjacent wall-mounted outlet boxes for switches, receptacle outlets, thermostats, and similar devices with each other.
- K. Mounting Heights:
 - 1. Light Switch Boxes: 48" AFF.
 - 2. Receptacle Outlet Boxes: 42" AFF.

3.03 WIRING DEVICE INSTALLATION

- A. Verify wall openings are neatly cut and will be completely covered by wall plates.
- B. Provide extension rings to bring outlet boxes flush with finished surface.
- C. Install products in accordance with manufacturer's instructions.
- D. Install devices plumb and level.
- E. Install switches with OFF position down.
- F. Install receptacles with grounding pole on top.
- G. Connect wiring device grounding terminal to branch circuit equipment grounding conductor.
- H. Adjust devices and wall plates to be flush and level.

3.04 DISCONNECT SWITCH INSTALLATION

- A. Provide disconnect switches for all mechanical systems motorized equipment that is not furnished with an integral means of disconnect. Mount disconnect switch within sight of motors being served.

3.05 GROUNDING

- A. Install all ground system components in conformance with Article 250 of NFPA 70.
- B. Provide insulated ground conductors with all branch circuits.
- C. Terminate each ground conductor end on a grounding lug, bus, or bushing.

END OF SECTION

SPECIAL PROVISION

SECTION 26500

LIGHTING

PART 1 – GENERAL

1.4 Summary

- A. This work shall include all labor, materials and equipment necessary to install lighting fixtures and accessories as specified herein.
- B. Interior lighting for the existing portion of the building shall be replaced with new fixtures in the existing locations.
- C. Interior lighting for the proposed section of the building shall be installed perpendicular to the existing lights and along the center of the proposed ceiling. The Resident Inspector will confirm location prior to installations. A total of 8 fixtures, centered on each bay shall be installed in the proposed section of the maintenance garage. The lights shall be wired to two separate switches with every other light on one of the two switches.
- D. Four exterior lighting shall be installed on every other column on the front of the buildings (total of 4). Three exterior lighting shall be installed, equally spaced, on the back of the buildings. Two exterior lighting shall be installed on the gable ends of the building (one on each end).
- E. All work shall conform to the National Electrical Code and other applicable codes.

1.5 Submittals

- A. Contractor shall submit two (2) copies of all lighting equipment and accessories to the Authority at least fifteen (15) days prior to incorporation into the work.
- B. Provide photometric data on all lighting units.

1.6 Permits

- A. Contractor shall obtain and pay for a state electrical permit.
- B. Copies of permit shall be sent to the Authority.

PART 2 – PRODUCTS

2.1 Interior Lights

- B. H.E. Williams Fully Enclosed & Gasketed Industrial LED Light Fixture, Model # 96-8-L80/830-HIAFR-SSCMB/SSLATCH-DRV-120

2.2 Exterior Lights

- A. LED Flood Light Equivalent to RAB FF LED 80TN for front and back of buildings and RAB FXLED 105TN for gable ends of the building with photocell and switch.

PART 3 – EXECUTION

3.1 Installation

- 3.1.1 Install light fixture as specified herein, complete with lamps, lenses and all accessories securely fastened in place.
- 3.1.2 Follow manufacturer's instructions and recommendations completely.
- 3.1.3 Light fixtures shall be installed in accordance with the latest edition of the "National Electrical Code"

3.2 Cleanup and Testing

- 3.1.4 Test all fixtures and equipment to the satisfaction of the Authority.
- 3.1.5 Repair or replace any defective fixtures, lamps or finishes.
- 3.1.6 Clean all fixtures and lenses at the completion of the project.

3.3 Warrantee

- 3.1.7 All materials and work shall be warranted for one (1) year from date of acceptance by the Authority.
- 3.1.8 Contractor shall supply a minimum of 10% spare lamps and 5% spare driver to the Authority at completion.
- 3.1.9 Any additional lamps beyond the spares provided shall be replaced at no additional cost to the Authority during the warranty period.

END OF SECTION