TEMPORARY
MILK AND BLOOD LAB
MARQUARDT BUILDING

5/25/2016

Project Manual

Ames Associates, LLC 128 Broadway Bangor, ME 04401

DOCUMENT 000101 - PROJECT TITLE PAGE

PROJECT MANUAL

MILK and BLOOD LAB

Interior Improvements to:

Marquardt Hall

East Campus

City of Augusta, ME

Architect Project No. 2015114.01

ARCHITECTS ENGINEERS

HERA laboratory planners |

Ames Associates, LLC

128 Broadway

Bangor, ME 04401

Phone: (207) 974-3028

Web Site: amesmaine.com

Issued: May 25 2016

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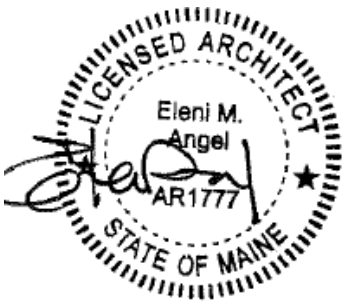
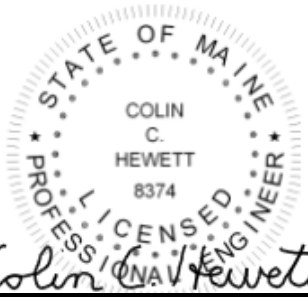
END OF DOCUMENT 000101

DOCUMENT 000107 - SEALS PAGE

1.1 DESIGN PROFESSIONALS OF RECORD

ARCHITECT	**Ellen Angel** **ARC 01777** Divisions 01 – 14 Sections except where indicated as prepared by other design professionals of record	
LABORATORY ARCHITECT	**Barbara Spitz** **ARC 0**	
HVAC ENGINEER	**Kenneth Whitney** **PE 8213** The following Sections: 230010; 230500; 230593; 230700; 230923; 232113; 232123; 232200; 232300; 233000; 233400; 236426; 237300; 238219	
ELECTRICAL ENGINEER	**Colin Hewett** **PE 8374** The following Sections: 260010 ; 260500 ; 262000 ; 265100 ; 270000 ; 274110 ; 283100	

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END OF SECTION 00 01 10

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Cross Reference
Master Format 2004 to Old BGS Numbering System

Master Format 2004	*Former BGS Document tag*	*Document name*
00 21 13	(Section 1-A)	Instructions to Bidders
00 22 13	(Section 1-B)	Instructions to Filed Sub-bidders
00 11 13	(Section 2-A)	Notice to Contractors
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00 73 46	(not tagged)	Wage Determination Schedule
00 73 73	(not tagged)	Municipal Building Ordinances

DOCUMENT 000115 - LIST OF DRAWING SHEETS

1.1 LIST OF DRAWINGS

A. Drawings: Drawings consist of the Contract Drawings and other drawings listed on the Table of Contents page of the separately bound drawing set titled Marquardt Milk and Blood Labs, dated May 6, 2016, as modified by subsequent Addenda and Contract modifications.

B. List of Drawings: Drawings consist of the following Contract Drawings and other drawings of type indicated:

ARCHITECTURAL	
ARCHITECTURAL LEGEND	A001
DOOR,WALL, FINISH PLAN AND SCHEDULE	A003
WHOLE SUILDING FLOOR PLAN	A100
EAST WIND DEVELOPMENT PLAN	A101
REMOVALS PLAN	A102
FLOOR PLAN	A103
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LABORATORY	
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LAB CASEWORK TYPES, LEGENDS, AND NOTES	QL030
LAB EQUIPMENT MATRIX	QL040
LAB AREA OF DEVELOPMENT ENLARGED LAB PLAN	QL102
TYPICAL DETAILS	QL901
PLUMBING	
FIRST FLOOR PLUMBING PARTIAL PLAN	P100
PLUMBING SCHEDULE AND DETAILS	P200
MECHANICAL	
FIRST FLOOR HVAC PARTIAL PLAN	H100
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FIRST FLOOR EXISTING & DEMOLITION PARTIAL PLAN	E100
FIRST FLOOR ELECTRICAL PROPOSED PARTIAL PLAN	E200
PANEL SCHEDULES	E300

END OF DOCUMENT 000115

00 11 13
Notice to Contractors

Temporary Milk and Blood Lab Renvoation Project
32 Blossom Lane, Augusta ME (Marquardt Building)

To develop within the existing, renovated, Marquardt Building on the East Campus located at 32 Blossom Lane Augusta Maine, a State Laboratory of approximately 2,000 square feet for the testing of Milk and Blood samples. Project includes new flooring, ceiling, plumbing,cabinetry and revsions to the existing mechanical and electrical systems.

The cost of the work is approximately $ 150,000.00. The work to be performed under this contract shall be completed on or before *31 August 2016*.

1. Sealed Contractor bids for the project noted above, in envelopes plainly marked "Bid for *Temporary Milk and Blood Lab*" and addressed to:
   Jill Instassi
   Bureau of General Services
   4th Floor, Cross State Office Building, 111 Sewall Street
   77 State House Station
   Augusta, Maine 04333-0077
   will be opened and read aloud at *the address shown above* at **2:00 p.m.** on ***July 8th, 2016***. Bids submitted after the noted time will not be considered and will be returned unopened.

2. The bid shall be submitted on the Contractor Bid Form (section 00 41 13) provided in the Bid Documents. The Owner reserves the right to accept or reject any or all bids as may best serve the interest of the Owner.

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

4. Performance and Payment Bonds *are required* on this project.
   The selected Contractor shall furnish a 100% contract Performance Bond (section 00 61 13.13) and a 100% contract Payment Bond (section 00 61 13.16) in the contract amount to cover the execution of the Work.

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

6. There *are no* Pre-qualified General Contractors on this project.
   The Pre-qualified General Contractors are listed below.

   insert name of company, city, state
   insert name of company, city, state
   insert name of company, city, state
   insert name of company, city, state
   insert name of company, city, state
   insert name of company, city, state
   insert name of company, city, state
   insert name of company, city, state
   insert name of company, city, state

insert name of company, city, state
insert name of company, city, state
insert name of company, city, state

7. An on-site pre-bid conference *will* be conducted for this project.
   The pre-bid conference is *mandatory* for General Contractors and optional for Subcontractors and suppliers. Contractors who arrive late or leave the meeting early may be prohibited from participating in this meeting and bidding. *June 20th at 10am at project site*.

8. Bid Documents - full sets only - will be available on or about *June 6th thru June 21st* and may be purchased *via digital download from Ames Associates* from:
   Ames Associates, LLC
   128 Broadway
   Bangor, Maine 04401
   eangel@amesmaine.com

9. Bid Documents may be examined at:
   AGC Maine
   188 Whitten Road
   Augusta, ME 04332
   Phone 207-622-4741 Fax 207-622-1625

   Construction Summary
   734 Chestnut Street
   Manchester, NH 03104
   Phone 603-627-8856 Fax 603-627-4524

00 21 13 Instructions to Bidders

1. Bidder Requirements

1.1 A bidder is a Contractor who is qualified, or has been specifically pre-qualified by the Bureau of General Services, to bid on the proposed project described in the Bid Documents.

1.2 Contractors and Subcontractors bidding on projects that utilize Filed Sub-bids shall follow the requirements outlined in these Bid Documents for such projects. See Section 00 22 13 for additional information.

1.3 Contractors are not eligible to bid on the project when their access to project design documents prior to the bid period distribution of documents creates an unfair bidding advantage. Prohibited access includes consultation with the Owner or with design professionals engaged by the Owner regarding cost estimating, constructability review, or project scheduling. This prohibition to bid applies to open, competitive bidding or pre-qualified contractor bidding or Filed Sub-bidding. The Bureau may require additional information to determine if the activities of a Contractor constitute an unfair bidding advantage.

1.4 Each bidder is responsible for becoming thoroughly familiar with the Bid Documents prior to submitting a bid. The failure of a bidder to review evident site conditions, to attend available pre-bid conferences, or to receive, examine, or act on addenda to the Bid Documents shall not relieve that bidder from any obligation with respect to their bid or the execution of the work as a Contractor.

1.5 Prior to the award of the contract, General Contractor bidders or Filed Sub-bidders may be required to provide documented evidence to the Owner or the Bureau showing compliance with the provisions of this section, their business experience, financial capability, or performance on previous projects.

1.6 The selected General Contractor bidder will be required to provide proof of insurance before a contract can be executed.

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

2. Authority of Owner

2.1 The Owner reserves the right to accept or reject any or all bids as may best serve the interest of the Owner.

2.2 Subject to the Owner's stated right to accept or reject any or all bids, the Contractor shall be selected on the basis of the sum of the lowest acceptable bid plus any Alternate Bids the Owner elects to include.

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

3. Submitting Bids and Bid Requirements

3.1 Each bid shall be submitted on the forms provided in the Bid Documents.

3.2 Each bid shall be valid for a period of thirty calendar days following the Project bid opening date and time.

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

3.4 Bidders shall include a Bid Bond or other approved bid security with the bid form submitted to the Owner when the bid form indicates such bid security is required. The bond value shall be 5% of the bid amount. The form of bond is shown in section 00 43 13.

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

3.6 Bidders may modify bids in writing prior to the bid closing time. Such written amendments shall not disclose the amount of the initial bid. If so disclosed, the entire bid is considered invalid.

3.7 Bidders shall acknowledge on the bid form all Addenda issued in a timely manner. The Architect shall not issue Addenda affecting bidders less than 72 hours prior to the bid closing time. Addenda shall be issued to all companies who are registered holders of Bid Documents.

3.8 A bid may be withdrawn without penalty if a written request by the bidder is presented to the Owner prior to the bid closing time. Such written withdrawal requests are subject to verification as required by the Bureau. After the bid closing time, such written withdrawal requests may be allowed in consideration of the bid bond or, without utilizing a bid bond, if the Contractor provides documented evidence to the satisfaction of the Bureau that factual errors had been made on the bid form.

3.9 Projects which require a State of Maine wage determination will include that schedule as part of the Bid Documents. See section 00 73 46, if such rates are required.

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

00 11 13
Contractor Bid Form

Temporary Milk and Blood Lab
Marquardt Building

To: *Jill Instasi, Director of Special Projects*
Bureau of General Services
4th Floor, Cross State Office Building, 111 Sewall Street
77 State House Station
Augusta, Maine 04333-0077

The undersigned, or "Bidder", having carefully examined the form of contract, general conditions, specifications and drawings dated *May 25, 2016*, prepared by *Ames Associates* for , _____ *Temporary Milk and Blood Lab Marquardt Building*, as well as the premises and conditions relating to the work, proposes to furnish all labor, equipment and materials necessary for and reasonably incidental to the construction and completion of this project for the Base Bid amount of:

_____ Dollars

$ _____

Allowances *are not included* on this project.

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

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

   Addendum No. ____ Dated: _____

   Addendum No. ____ Dated: _____

   Addendum No. ____ Dated: _____

   Addendum No. ____ Dated: _____

   Addendum No. ____ Dated: _____

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

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

Temporary Milk and Blood Lab
Marquardt Building

5. The Bidder agrees, if this bid is accepted by the Owner, to sign the designated Owner-Contractor contract and deliver it, with any and all bonds and affidavits of insurance specified in the Bid Documents, within twelve calendar days after the date of notification of such acceptance, except if the twelfth day falls on a State of Maine government holiday or other closure day, a Saturday, or a Sunday, in which case the aforementioned documents must be received before 12:00 noon on the day following the holiday or other closure day, Saturday or Sunday.

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

6. This bid is hereby submitted by:

Signature: _____

Printed name and title: _____

Company name: _____

Mailing address: _____

City, state, zip code: _____

Phone number: _____

Email address: _____

State of incorporation, if a corporation: _____

List of all partners, if a partnership: _____

00 13 13
Contractor Bid Bond

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

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

Now therefore:

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

If said bid shall be accepted and the principal shall execute and deliver a contract in the form of contract attached hereto, properly completed in accordance with said bid, and shall furnish a bond for the faithful performance of said contract, and for the payment of all persons performing labor or furnishing material in connection therewith, and shall in all other respects perform the agreement created by the acceptance of said bid, then this obligation shall be void.

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

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

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

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

Contractor

_____

(Signature)

insert name and title

insert company name

insert address
insert city state zip code

Surety

_____

(Signature)

insert name and title

insert company name

insert address
insert city state zip code

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

00 61 13.13
Contractor Performance Bond

Bond No.: **insert bond number**

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

The condition of the above obligation is such that if the principal shall promptly and faithfully perform the contract entered into this ***insert day, i.e.: 8th*** day of ***select month***, ***select year***, which is the same date as that of the construction contract, for the construction of ***Milk and Blood Lab, Marquardt Building***, then this obligation shall be null and void.

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

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

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

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

Contractor

_____

(Signature)

insert name and title

insert company name

insert address
insert city state zip code

Surety

_____

(Signature)

insert name and title

insert company name

insert address
insert city state zip code

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

00 61 13.16
Contractor Payment Bond

Bond No.: **insert bond number**

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

The condition of the above obligation is such that if the principal shall promptly satisfy all claims and demands incurred for all labor and materials, used or required by the principal in connection with the work described in the contract entered into this ***insert day, i.e.: 8th*** day of ***select month***, ***select year***, which is the same date as that of the construction contract, for the construction of ***Milk and Blood Lab, Marquardt Building***, and shall fully reimburse the oblige for all outlay and expense with said oblige may incur in making good any default of said principal, then this obligation shall be null and void.

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

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

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

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

Contractor

_____

(Signature)

insert name and title

insert company name

insert address
insert city state zip code

Surety

_____

(Signature)

insert name and title

insert company name

insert address
insert city state zip code

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

AIA Document G703™ – 1992

Continuation Sheet

AIA Document, G702™–1992, Application and Certification for Payment, or G736™–2009, Project Application and Project Certificate for Payment, Construction Manager as Adviser Edition, containing Contractor's signed certification is attached.
In tabulations below, amounts are in US dollars.
Use Column I on Contracts where variable retainage for line items may apply.

APPLICATION NO:
APPLICATION DATE:
PERIOD TO:
ARCHITECT'S PROJECT NO:

A	B	C	D	E	F	G		H	I
			WORK COMPLETED						
ITEM NO.	DESCRIPTION OF WORK	SCHEDULED VALUE	FROM PREVIOUS APPLICATION (D + E)	THIS PERIOD	MATERIALS PRESENTLY STORED (NOT IN D OR E)	TOTAL COMPLETED AND STORED TO DATE (D+E+F)	% (G ÷ C)	BALANCE TO FINISH (C - G)	RETAINAGE (IF VARIABLE RATE)
		0.00	0.00	0.00	0.00	0.00	0.00 %	0.00	0.00
		0.00	0.00	0.00	0.00	0.00	0.00 %	0.00	0.00
		0.00	0.00	0.00	0.00	0.00	0.00 %	0.00	0.00
		0.00	0.00	0.00	0.00	0.00	0.00 %	0.00	0.00
		0.00	0.00	0.00	0.00	0.00	0.00 %	0.00	0.00
		0.00	0.00	0.00	0.00	0.00	0.00 %	0.00	0.00
		0.00	0.00	0.00	0.00	0.00	0.00 %	0.00	0.00
		0.00	0.00	0.00	0.00	0.00	0.00 %	0.00	0.00
		0.00	0.00	0.00	0.00	0.00	0.00 %	0.00	0.00
		0.00	0.00	0.00	0.00	0.00	0.00 %	0.00	0.00
		0.00	0.00	0.00	0.00	0.00	0.00 %	0.00	0.00
		0.00	0.00	0.00	0.00	0.00	0.00 %	0.00	0.00
		0.00	0.00	0.00	0.00	0.00	0.00 %	0.00	0.00
		0.00	0.00	0.00	0.00	0.00	0.00 %	0.00	0.00
		0.00	0.00	0.00	0.00	0.00	0.00 %	0.00	0.00
		0.00	0.00	0.00	0.00	0.00	0.00 %	0.00	0.00
		0.00	0.00	0.00	0.00	0.00	0.00 %	0.00	0.00
		0.00	0.00	0.00	0.00	0.00	0.00 %	0.00	0.00
		0.00	0.00	0.00	0.00	0.00	0.00 %	0.00	0.00
	GRAND TOTAL	$0.00	$0.00	$0.00	$0.00	$0.00	0.00 %	$0.00	$0.00

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Definitions

1. Definitions

1.1 *Addendum*: A document issued by the Architect that amends the Bid Documents. Addenda shall not be issued less than seventy-two hours prior to the specified bid opening time.

1.2 *Allowance*: A specified dollar amount for a particular scope of work or service included in the Work that is identified in the Bid Documents and included in each Bidder's Bid. The Contractor shall document expenditures for an Allowance during the Project. Any unused balance shall be credited to the Owner. The Contractor is responsible for notifying the Owner of anticipated expenses greater than the specified amount and the Owner is responsible for those additional expenses.

1.3 *Alternate Bid*: The Contractor's written offer of a specified dollar amount, submitted on the Bid Form, for the performance of a particular scope of work described in the Bid Documents. The Owner determines the low bidder based on the sum of the base Bid and any combination of Alternate Bids that the Owner selects.

1.4 *Architect*: The Architect or Engineer acting as Professional-of-Record for the project. The Architect is responsible for the design of the Project.

1.5 *Architectural Supplemental Instruction (ASI)*: A written instruction from the Architect for the purpose of clarification of the Contract Documents. An ASI does not alter the Contract Price or Contract Time. ASIs may be responses to RFIs and shall be issued by the Architect in a timely manner to avoid any negative impact on the Schedule of Work.

1.6 *Bid*: The Contractor's written offer of a specified dollar amount or amounts, submitted on a form included in the Bid Documents, for the performance of the Work. A Bid may include bonds or other requirements. A base Bid is separate and distinct from Alternate Bids, being the only cost component necessary for the award of the contract, and representing the minimum amount of Work that is essential for the functioning of the project.

1.7 *Bid Bond*: The security designated in the Bid Documents, furnished by Bidders as a guaranty of good faith to enter into a contract with the Owner, should a contract be awarded to that Bidder.

1.8 *Bidder*: Any business entity, individual or corporation that submits a bid for the performance of the work described in the Bid Documents, acting directly or through a duly authorized representative.

1.9 *Bid Documents*: The drawings, procurement and contracting requirements, general requirements, and the written specifications -including all addenda, that a bidder is required to reference in the submission of a bid.

1.10 *Bureau*: The State of Maine Bureau of General Services in the Department of Administrative and Financial Services.

1.11 *Calendar days*: Consecutive days, as occurring on a calendar, taking into account each day of the week, month, year, and any religious, national or local holidays.

1.12 *Certificate of Substantial Completion*: A document developed by the Architect that describes the final status of the Work and establishes the date that the Owner may use the facility for its intended

purpose. The Certificate of Substantial Completion also include a provisional list of items (a "punch list") remaining to be corrected by the Contractor, if any, and identifies a date from which the project warranty period commences.

1.13 *Certificate of Occupancy*: A document developed by a local jurisdiction such as the Code Enforcement Officer that grants permission to the Owner to occupy a building.

1.14 *Change Order (CO)*: A document that modifies the contract and establishes the basis of a specific adjustment to the Contract Price or the Contract Time, or both. Change Orders may address correction of omissions, errors, and document discrepancies, or additional requirements. Change Orders should include all labor, materials and incidentals required to complete the work described. A Change Order is not valid until signed by the Contractor, Owner and Architect and approved by the Bureau.

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

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

1.17 *Construction Change Directive (CCD)*: A written order prepared by the Architect and signed by the Owner and Architect, directing a change in the Work prior to final agreement with the Contractor on adjustment, if any, in the Contract Price or Contract Time, or both.

1.18 *Contract*: A written agreement between the Owner and the successful bidder which obligates the Contractor to perform the work specified in the Contract Documents and obligates the Owner to compensate the Contractor at the mutually accepted sum, rates or prices.

1.19 *Contract Bonds (also known as Payment and Performance Bonds)*: The approved forms of security, furnished by the Contractor and their surety, which guarantee the faithful performance of all the terms of the contract and the payment of all bills for labor, materials and equipment by the Contractor.

1.20 *Contract Documents*: The drawings and written specifications (including all addenda), Standard General Conditions, and the contract (including all Change Orders subsequently incorporated in the documents).

1.21 *Contract Price*: The dollar amount of the construction contract, also called *Contract Sum*.

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

1.23 *Contractor*: Also called the "General Contractor" or "GC" the individual or entity undertaking the execution of the general contract work under the terms of the contract with the Owner, acting directly or through a duly authorized representative. The Contractor is responsible for the means, methods and materials utilized in the execution and completion of the Work.

1.24 *Drawings*: The graphic and pictorial portion of the Contract Documents showing the design, location and dimensions of the Work, generally including plans, elevations, sections, details, schedules, and diagrams.

1.25 *Filed Sub-bid*: The designated major Subcontractor's (or, in some cases, Contractor's) written offer of a specified dollar amount or amounts, submitted on a form included in the Bid Documents, for the performance of a particular portion of the Work. A Filed Sub-bid may include bonds or other requirements.

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

1.27 *General Requirements*: The on-site overhead expense items the Contractor provides for the Project, typically including, but not limited to, building permits, construction supervision, Contract Bonds, insurance, field office, temporary utilities, rubbish removal, and site fencing. Overhead expenses of the Contractor's general operation are not included. Sometimes referred to as the Contractor's General Conditions.

1.28 *Owner*: The State agency which is represented by duly authorized individuals. The Owner is responsible for defining the scope of the Project and compensation to the Architect and Contractor.

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

1.30 *Overhead*: General and administrative expenses of the Contractor's principal and branch offices, including payroll costs and other compensation of Contractor employees, deductibles paid on any insurance policy, charges against the Contractor for delinquent payments, and costs related to the correction of defective work, and the Contractor's capital expenses, including interest on capital used for the work.

1.31 *Performance and Payment Bonds (also known as Contract Bonds)*: The approved forms of security, furnished by the Contractor and their surety, which guarantee the faithful performance of all the terms of the contract and the payment of all bills for labor, materials and equipment by the Contractor.

1.32 *Post-Bid Addendum*: Document issued by the Architect that defines a potential Change Order prior to signing of the construction contract. The Post-Bid Addendum allows the Owner to negotiate contract changes with the Bidder submitting the lowest valid bid, only if the negotiated changes to the Bid Documents result in no change or no increase in the bid price.

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

1.33 *Project*: The construction project proposed by the Owner to be constructed according to the Contract Documents. The entire public improvement project may also include separate construction and other

activities conducted by the Owner or other contractors. The Owner shall inform all contractors of the scope of the entire public improvement project relative to each individual contract.

1.34 *Proposal*: The Contractor's written offer submitted to the Owner for consideration containing a specified dollar amount or rate, for a specific scope of work, and including a schedule impact, if any. A proposal shall include all costs for overhead and profit. After acceptance by all parties a proposal amends the contract and is implemented by the Contractor.

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

1.36 *Punch List*: A document that identifies the items of work remaining to be done by the Contractor at the Close Out of a Project. The Punch List is created as a result of a final inspection of the work only after the Contractor attests that all of the Work is in its complete and permanent status.

1.37 *Request For Information (RFI)*: A Contractor's written request to the Architect for clarification, definition or description of the Work. RFIs shall be presented by the Contractor in a timely manner to avoid any negative impact on the Schedule of Work.

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

1.39 *Requisition for Payment*: The document in which the Contractor certifies that the Work described is, to the best of the Contractor's knowledge, information and belief, complete and that all previous payments have been paid by the Contractor to Subcontractors and suppliers, and that the current requested payment is now due. See *Schedule of Values.*

1.40 *Retainage*: The amount, calculated at five percent (5%) of the contract value or a scheduled value, that the Owner shall withhold from the Contractor until the work or portion of work is declared substantially complete or otherwise accepted by the Owner. The Owner may, if requested, reduce the amount withheld if the Owner deems it desirable and prudent to do so. (See Title 5 M.R.S.A., Section 1746.)

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

1.42 *Schedule of the Work*: The document prepared by the Contractor and approved by the Owner that specifies the dates on which the Contractor plans to begin and complete various parts of the Work, including dates on which information and approvals are required from the Owner.

1.43 *Schedule of Values*: The document prepared by the Contractor and approved by the Owner before the commencement of the Work that specifies the dollar values of discrete portions of the Work equal in sum to the contract amount. The Schedule of Values is used to document progress payments of the Work in regular (usually monthly) requisitions for payment. See *Requisition for Payment*.

1.44 *Shop Drawings*: The drawings, diagrams, schedules and other data specially prepared for the Work by the Contractor or a Subcontractor, manufacturer, supplier or distributor to illustrate some portion of the Work.

1.45 *Specifications*: The portion of the Contract Documents consisting of the written requirements of the Work for materials, equipment, systems, standards, workmanship, and performance of related services.

1.46 *Subcontractor*: An individual or entity undertaking the execution of any part of the Work by virtue of a written agreement with the Contractor or any other Subcontractor. Also, an individual or entity retained by the Contractor or any other Subcontractor as an independent contractor to provide the labor, materials, equipment or services necessary to complete a specific portion of the Work.

1.47 *Substantial Completion*: Project status indicating when the Work or a designated portion of the Work is sufficiently complete in compliance with the Contract Documents so that the Owner can occupy or utilize the Work for its intended purpose without unscheduled disruption. Substantial Completion is documented by the date of the Certificate of Substantial Completion signed by the Owner and the Contractor.

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

1.49 *Surety*: The individual or entity that is legally bound with the Contractor and Subcontractor to insure the faithful performance of the contract and for the payment of the bills for labor, materials and equipment by the Contractor and Subcontractors.

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

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General Conditions

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1. Preconstruction Conference

1.1 The Contractor shall, upon acceptance of a contract and prior to commencing work, schedule a preconstruction conference with the Owner and Architect. The purpose of this conference is to:

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

b) review the responsibilities of each party;

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

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

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

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

g) discuss jobsite issues;

h) discuss Project close-out procedures;

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

j) schedule regular meetings at appropriate intervals for the review of the progress of the Work.

2. Intent and Correlation of Contract Documents

2.1 The intent of the Contract Documents is to describe the complete Project. The Contract Documents consist of various components; each component complements the others. What is shown as a requirement by any one component shall be inferred as a requirement on all corresponding components.

2.2 The Contractor shall furnish all labor, equipment and materials, tools, transportation, insurance, services, supplies, operations and methods necessary for, and reasonably incidental to, the construction and completion of the Project. Any work that deviates from the Contract Documents which appears to be required by the exigencies of construction or by inconsistencies in the Contract Documents, will be determined by the Architect and authorized in writing by the Architect, Owner and the Bureau prior to execution. The Contractor shall be responsible for requesting clarifying information where the intent of the Contract Documents is uncertain.

2.3 The Contractor shall not utilize any apparent error or omission in the Contract Documents to the disadvantage of the Owner. The Contractor shall promptly notify the Architect in writing of such errors or omissions. The Architect shall make any corrections or clarifications necessary in such a situation to document the true intent of the Contract Documents.

3. Additional Drawings and Specifications

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

3.2 The Architect shall promptly furnish additional revised Drawings and Specifications that are created due to corrections or clarifications made by the Architect. All such information shall be consistent with, and reasonably inferred from, the Contract Documents. The Contractor shall do no work without the proper Drawings and Specifications.

4. Record of Documents

4.1 The Contractor shall maintain one complete set of Contract Documents on the jobsite, in good order and current status, for access by the Owner and Architect.

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

5. Ownership of Contract Documents

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

6. Shop Drawings

6.1 The Contractor shall administer Shop Drawings prepared by the Contractor, Subcontractors, suppliers or others to conform to the approved Schedule of the Work. The Contractor shall verify all field measurements, check and authorize all Shop Drawings and schedules required by the Work. The Contractor is the responsible party and contact for the Contractor's work as well as that of Subcontractors, suppliers or others who provide Shop Drawings.

6.2 The Architect shall review and acknowledge Shop Drawings, with reasonable promptness, for general conformity with the design concept of the project and compliance with the information provided in the Contract Documents.

6.3 The Contractor shall provide monthly updated logs containing: requests for information, information bulletins, supplemental instructions, supplemental sketches, change order proposals, change orders, submittals, testing and deficiencies.

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

7. Samples

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

8. Substitutions

8.1 The Contractor shall furnish items and materials described in the Contract Documents. If the item or material specified describes a proprietary product, or uses the name of a manufacturer, the term "or approved equal" shall be implied, if it is not included in the text. The specific item or material specified establishes a minimum standard for the general design, level of quality, type, function, durability, efficiency, reliability, compatibility, warranty coverage, installation factors and required maintenance. The Drawing or written Specification shall not be construed to exclude other manufacturers products of comparable design, quality, and efficiency.

8.2 The Contractor may submit detailed information about a proposed substitution to the Architect for consideration. Particular models of items and particular materials which the Contractor asserts to be equal to the items and materials identified in the Contract Documents shall be allowed only with written approval by the Architect. The request for substitution shall include a cost comparison and a reason or reasons for the substitution.

8.3 The Architect may request additional information about the proposed substitution. The approval or rejection of a proposed substitution may be based on timeliness of the request, source of the information, the considerations of minimum standards described above, or other considerations. The Architect should briefly state the rationale for the decision. The decision shall be considered final.

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

9. Patents and Royalties

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

9.2 Any royalty payments related to the work done by the Contractor for the Project shall be borne by the Contractor. The Contractor shall hold the Owner harmless regarding any royalty payments that may arise due to installations made by the Contractor.

10. Surveys, Layout of Work

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

10.2 The Contractor is responsible for correctly staking out the Work on the site. The Contractor shall employ a competent surveyor to position all construction on the site. The surveyor shall run the

axis lines, establish correct datum points and check each line and point on the site to insure their accuracy. All such lines and points shall be carefully preserved throughout the construction.

10.3 The Contractor shall lay out all work from dimensions given on the Drawings. The Contractor shall take measurements and verify dimensions of any existing work that affects the Work or to which the Work is to be fitted. The Contractor is solely responsible for the accuracy of all measurements. The Contractor shall verify all grades, lines, levels, elevations and dimensions shown on the Drawings and report any errors or inconsistencies to the Architect prior to commencing work.

11. Permits, Laws, and Regulations

11.1 The Owner is responsible for obtaining any zoning approvals or other similar local project approvals necessary to complete the Work, unless otherwise specified in the Contract Documents.

11.2 The Owner is responsible for obtaining Maine Department of Environmental Protection, Maine Department of Transportation, or other similar state government project approvals necessary to complete the Work, unless otherwise indicated in the Contract Documents.

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

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

11.5 The Contractor is responsible for obtaining and paying for all permits and licenses necessary for the implementation of the Work. The Contractor shall notify the Owner of any delays, variance or restrictions that may result from the issuing of permits and licenses.

11.6 The Contractor shall comply with all ordinances, laws, rules and regulations and make all required notices bearing on the implementation of the Work. In the event the Contractor observes disagreement between the Drawings and Specifications and any ordinances, laws, rules and regulations, the Contractor shall promptly notify the Architect in writing. Any necessary changes shall be made as provided in the contract for changes in the work. The Contractor shall not perform any work knowing it to be contrary to such ordinances, laws, rules and regulations.

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

12. Taxes

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

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

12.3 The Contractor may contact Maine Revenue Services, 24 State House Station, Augusta, Maine 04333 for guidance on tax exempt regulations authorized by 36 M.R.S.A. §1760 and detailed in Rule 302 (18-125 CMR 302).

13. Labor and Wages

13.1 The Contractor shall conform to the labor laws of the State of Maine, and all other laws, ordinances, and legal requirements affecting the work in Maine.

13.2 The Architect shall include a wage determination document prepared by the Maine Department of Labor in the Contract Documents for state-funded contracts in excess of $50,000. The document shows the minimum wages required to be paid to each category of labor employed on the project.

13.3 On projects requiring a Maine wage determination, the Contractor shall submit monthly payroll records to the Owner ("the contracting agency") showing the name and occupation of all workers and all independent contractors employed on the project. The monthly submission must also include the Contractor's company name, the title of the project, hours worked, hourly rate or other method of remuneration, and the actual wages or other compensation paid to each person.

13.4 The Contractor shall not reveal, in the payroll records submitted to the Owner, personal information regarding workers and independent contractors, other than the information described above. Such information shall not include Social Security number, employee identification number, or employee address or phone number, for example.

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

13.6 The Contractor shall enforce strict discipline and good order among their employees at all times, and shall not employ any person unfit or unskilled to do the work assigned to them.

13.7 The Contractor shall promptly pay all employees when their compensation is due, shall promptly pay all others who have billed and are due for materials, supplies and services used in the Work, and shall promptly pay all others who have billed and are due for insurance, workers compensation coverage, federal and state unemployment compensation, and Social Security charges pertaining to this Project. Before final payments are made, the Contractor shall furnish to the Owner affidavits that all such payments described above have been made.

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

14. Insurance Requirements

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

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

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

14.4 Workers' Compensation Insurance

Worker's Compensation insurance for all employees on site in accordance with the requirements of the Workers' Compensation law of the State of Maine.

Minimum acceptable limits for Employer's Liability are:

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

14.5 Liability Insurance

a) General Liability Insurance

General liability insurance for bodily injury and property damage liability for all hazards of the Project including premise and operations, products and completed operations, contractual, and personal injury liabilities. It shall include collapse and underground coverage - as well as explosion coverage if explosion hazards exist. Aggregate limits shall apply on a per location or project basis.

Minimum acceptable limits are:

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

b) Automobile Liability Insurance

Automobile liability insurance against claims for bodily injury, death or property damage resulting from the maintenance, ownership or use of all owned, non-owned and hired automobiles, trucks and trailers.

Minimum acceptable limit is:

Any one accident or loss $1,000,000

c) Owners Protective Liability Insurance

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

Minimum acceptable limits are:

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

d) Pollution Liability Insurance

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

Minimum acceptable limit is:

Each occurrence limit $1,000,000

14.6 Property Insurance

a) New Construction Only

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

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

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

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

15. Contract Bonds

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

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

16. Allowances

16.1 The Contract Price shall include all allowances described in the Contract Documents. The Contractor shall include all overhead and profit necessary to implement each allowance in their Contract Price.

16.2 The Contractor shall not be required to employ parties for allowance work against whom the Contractor has a reasonable objection. In such a case, the Contractor shall notify the Owner in writing of their position and shall propose an alternative party to complete the work of the allowance.

17. Assignment of Contract

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

18. Separate Contracts

18.1 The Owner reserves the right to create other contracts in connection with this Project using similar General Conditions. The Contractor shall allow the Owner's other contractors reasonable opportunity for the delivery and storage of materials and the execution of their work. The Contractor shall coordinate and properly connect the Work of all contractors.

18.2 The Contractor shall promptly report to the Architect and Owner any apparent deficiencies in work of the Owner's other contractors that impacts the proper execution or results of the Contractor. The Contractor's failure to observe or report any deficiencies constitutes an acceptance of the Owner's other contractors work as suitable for the interface of the Contractor's work, except for latent deficiencies in the Owner's other contractors work.

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

18.4 The Contractor shall report to the Architect and Owner any conflicts or claims for damages with the Owner's other contractors and settle such conflicts or claims for damages by mutual agreement or arbitration, if necessary, at no expense to the Owner.

18.5 In the event the Owner's other contractors sue the Owner regarding any damage alleged to have been caused by the Contractor, the Owner shall notify the Contractor, who shall defend such proceedings at the Contractor's expense. The Contractor shall pay or satisfy any judgment that may arise against the Owner, and pay all other costs incurred.

19. Subcontracts

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

19.2 The Contractor shall submit a complete list of named Subcontractors and material suppliers to the Architect and Owner for approval by the Owner prior to commencing work. The Subcontractors named shall be reputable companies of recognized standing with a record of satisfactory work.

19.3 The Contractor shall not employ any Subcontractor or use any material until they have been approved, or where there is reason to believe the resulting work will not comply with the Contract Documents.

19.4 The Contractor, not the Owner, is as fully responsible for the acts and omissions of Subcontractors and of persons employed by them, as the Contractor is for the acts and omissions of persons directly or indirectly employed by the Contractor.

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

20. Contractor-Subcontractor Relationship

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

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

20.3 The Contractor shall pay the Subcontractor accordingly if the Contract Documents or the subcontract provide for earlier or larger payments than described in the provision above.

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

20.5 The Contractor shall not make a claim for liquidated damages or penalty for delay in any amount in excess of amounts that are specified by the subcontract.

20.6 The Contractor shall not make a claim for services rendered or materials furnished by the Subcontractor unless written notice is given by the Contractor to the Subcontractor within ten calendar days of the day in which the claim originated.

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

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

20.9 The Subcontractor shall be bound to the Contractor by the terms of the Contract Documents and assumes toward the Contractor all the obligations and responsibilities that the Contractor, by those documents, assumes toward the Owner.

20.10 The Subcontractor shall submit applications for payment to the Contractor in such reasonable time as to enable the Contractor to apply for payment as specified.

20.11 The Subcontractor shall make any claims for extra cost, extensions of time or damages, to the Contractor in the manner provided in these General Conditions for like claims by the Contractor to the Owner, except that the time for the Subcontractor to make claims for extra cost is seven calendar days after the receipt of Architect's instructions.

21. Supervision of the Work

21.1 During all stages of the Work the Contractor shall have a competent superintendent, with any necessary assistant superintendents, overseeing the project. The superintendent shall not be reassigned without the consent of the Owner unless a superintendent ceases to be employed by the Contractor due to unsatisfactory performance.

21.2 The superintendent represents the Contractor on the jobsite. Directives given by the Architect or Owner to the superintendent shall be as binding as if given directly to the Contractor's main office. All important directives shall be confirmed in writing to the Contractor. The Architect and Owner are not responsible for the acts or omissions of the superintendent or assistant superintendents.

21.3 The Contractor shall provide supervision of the Work equal to the industry's highest standard of care. The superintendent shall carefully study and compare all Contract Documents and promptly report any error, inconsistency or omission discovered to the Architect. The Contractor may not necessarily be held liable for damages resulting directly from any error, inconsistency or omission in the Contract Documents or other instructions by the Architect that was not revealed by the superintendent in a timely way.

22. Observation of the Work

22.1 The Contractor shall allow the Owner, the Architect and the Bureau continuous access to the site for the purpose of observation of the progress of the work. All necessary safeguards and accommodations for such observations shall be provided by the Contractor.

22.2 The Contractor shall coordinate all required testing, approval or demonstration of the Work. The Contractor shall give sufficient notice to the appropriate parties of readiness for testing, inspection or examination.

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

22.4 The Architect shall make all scheduled observations promptly, prior to the work being concealed or buried by the Contractor. If approval of the Work is required of the Architect, the Contractor shall notify the Architect of the construction schedule in this regard. Work concealed or buried prior to the Architect's approval may need to be uncovered at the Contractor’s expense.

22.5 The Architect may order reexamination of questioned work, and, if so ordered, the work must be uncovered by the Contractor. If the work is found to conform to the Contract Documents, the Owner shall pay the expense of the reexamination and remedial work. If the work is found to not conform to the Contract Documents, the Contractor shall pay the expense, unless the defect in the work was caused by the Owner's Contractor, whose responsibility the reexamination expense becomes.

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

23. Architect's Status

23.1 The Architect represents the Owner during the construction period, and observes the work in progress on behalf of the Owner. The Architect has authority to act on behalf of the Owner only to the extent expressly provided by the Contract Documents or otherwise demonstrated to the Contractor. The Architect has authority to stop the work whenever such an action is necessary, in the Architect's reasonable opinion, to ensure the proper execution of the contract.

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

23.3 In the event of the termination of the Architect's employment on the project prior to completion of the work, the Owner shall appoint a capable and reputable replacement. The status of the new Architect relative to this contract shall be that of the former Architect.

24. Management of the Premises

24.1 The Contractor shall place equipment and materials, and conduct activities on the premises in a manner that does not unreasonably hinder site circulation, environmental stability, or any long term effect. Likewise, the Architect's directions shall not cause the use of premises to be impeded for the Contractor or Owner.

24.2 The Contractor shall not use the premises for any purpose other that that which is directly related to the scope of work. The Owner shall not use the premises for any purpose incompatible with the proposed work simultaneous to the work of the Contractor.

24.3 The Contractor shall enforce the Architect's instructions regarding information posted on the premises such as signage and advertisements, as well as activities conducted on the premises such as fires, and smoking.

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

25. Safety and Security of the Premises

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

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

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

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

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

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

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

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

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

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

25.11 The Contractor shall keep the premises free of any unsafe accumulation of waste materials caused by the work. The Contractor shall regularly keep the spaces "broom clean". See the Close-out of the Work provisions of this section regarding cleaning at the completion of the project.

26. Changes in the Work

26.1 The Contractor shall not proceed with extra work without an approved Change Order or Construction Change Directive. A Change Order which has been properly signed by all parties shall become a part of the contract.

26.2 A Change Order is the usual document for directing changes in the Work. In certain circumstances, however, the Owner may utilize a Construction Change Directive to direct the Contractor to perform changes in the Work that are generally consistent with the scope of the project. The Owner shall use a Construction Change Directive only when the normal process for approving changes to the Work has failed to the detriment of the Project, or when agreement on the terms of a Change Order cannot be met, or when an urgent situation requires, in the Owner's judgment, prompt action by the Contractor.

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

26.4 The Contractor shall promptly carry out a Construction Change Directive which has been signed by the Owner and the Architect. Work thus completed by the Contractor constitutes the basis for a Change Order. Changes in the Contract Price and Contract Time shall be as defined in the Construction Change Directive unless subsequently negotiated with some other terms.

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

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

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

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

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

26.8 Cost reflected in Change Orders shall be limited to the following: cost of materials, cost of delivery, cost of labor (including Social Security, pension, Workers' Compensation insurance, and unemployment insurance), and cost of rental of power tools and equipment. Labor cost may include a pro-ratio share of a foreman's time only in the case of an extension of contract time granted due to the Change Order.

26.9 Overhead reflected in Change Orders shall be limited to the following: bond premium, supervision, wages of clerks, time keepers, and watchmen, small tools, incidental expenses, general office expenses, and all other overhead expenses directly related to the Change Order.

26.10 The Contractor shall provide credit to the Owner for labor, materials, equipment and other costs but not overhead and profit expenses for those Change Order items that result in a net value of credit to the contract.

26.11 The Owner may change the scope of work of the Project without invalidating the contract. The Owner shall notify the Contractor of a change of the scope of work for the Owner's Contractors, which may affect the work of this Contractor, without invalidating the contract. Change Orders for extension of the time caused by such changes shall be developed at the time of directing the change in scope of work.

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

26.13 The Contractor shall immediately give written notification to the Architect of latent conditions discovered at the site which materially differ from those represented in the Drawings or Specifications, and which may eventually result in a change in the scope of work. The Contractor shall suspend work until receiving direction from the Architect. The Architect shall promptly investigate the conditions and respond to the Contractor's notice with direction that avoids any unnecessary delay of the Work. The Architect shall determine if the discovered conditions warrant a Change Order.

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

27. Correction of the Work

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

27.2 The Owner may elect to remove non-conforming work if it is not removed by the Contractor within a reasonable time, that time defined in a written notice from the Architect. The Owner may elect to store removed non-conforming work not removed by the Contractor at the Contractor's expense. The Owner may, with ten days written notice, dispose of materials which the Contractor does not remove. The Owner may sell the materials and apply the net proceeds, after deducting all expenses, to the costs that should have been borne by the Contractor.

27.3 The Contractor shall remedy any defects due to faulty materials or workmanship and pay for any related damage to other work which appears within a period of one year from the date of substantial completion, and in accord with the terms of any guarantees provided in the contract.

The Owner shall promptly give notice of observed defects to the Contractor and Architect. The Architect shall determine the status of all claimed defects.

27.4 The Architect may authorize, after a reasonable notification to the Contractor, an equitable deduction from the contract amount in lieu of the Contractor correcting non-conforming or defective work.

28. Owner's Right to do Work

28.1 The Owner may, using other contractors, correct deficiencies attributable to the Contractor, or complete unfinished work. Such action shall take place only after giving the Contractor three days written notice, and provided the Architect approves of the proposed course of action as an appropriate remedy. The Owner may then deduct the cost of the remedial work from the amount due the Contractor.

28.2 The Owner may act with their sole discretion when the Contractor is unable to take action in emergency situations that potentially effect health, life or serious damage to the premises or adjacent properties, to prevent such potential loss or injury. The Owner shall inform the Contractor of the emergency work performed, particularly where it may affect the work of the Contractor.

29. Termination of Contract and Stop Work Action

29.1 The Owner may, owing to a certificate of the Architect indicating that sufficient cause exists to justify such action, without prejudice to any other right or remedy and after giving the Contractor and the Contractor's surety seven days written notice, terminate the employment of the Contractor. At that time the Owner may take possession of the premises and of all materials, tools and appliances on the premises and finish the work by whatever method the Owner may deem expedient. Cause for such action by the Owner includes: if the contractor is adjudged bankrupt, or makes a general assignment for the benefit of its creditors, or if a receiver is appointed due to the Contractor's insolvency, or if the Contractor persistently or repeatedly refuses or fails to provide enough properly skilled workers or proper materials, or if the Contractor fails to make prompt payment to Subcontractors or material or labor suppliers, or if the Contractor persistently disregards laws, ordinances or the instructions of the Architect, or is otherwise found guilty of a substantial violation of a provision of the Contract Documents.

29.2 The Contractor is not entitled, as a consequence of the termination of the employment of the Contractor as described above, to receive any further payment until the Work is finished. If the unpaid balance of the contract amount exceeds the expense of finishing the Work, including compensation for additional architectural, managerial and administrative services, such balance shall be paid to the Contractor. If the expense of finishing the Work exceeds the unpaid balance, the Contractor shall pay the difference to the Owner. The Architect shall certify the expense incurred by the Contractor's default. This obligation for payment shall continue to exist after termination of the contract.

29.3 The Contractor may, if the Work is stopped by order of any court or other public authority for a period of thirty consecutive days, and through no act or fault of the Contractor or of anyone employed by the Contractor, with seven days written notice to the Owner and the Architect, terminate this contract. The Contractor may then recover from the Owner payment for all work executed, any proven loss and reasonable profit and damage.

29.4 The Contractor may, if the Architect fails to issue a certificate for payment within seven days after the Contractor's formal request for payment, through no fault of the Contractor, or if the Owner fails to pay to the Contractor within 30 days after submission of any sum certified by the Architect, with seven days written notice to the Owner and the Architect, stop the Work or terminate this Contract.

30. Delays and Extension of Time

30.1 The completion date of the contract shall be extended if the work is delayed by changes ordered in the work which have approved time extensions, or by an act or neglect of the Owner, the Architect, or the Owner's Contractor, or by strikes, lockouts, fire, flooding, unusual delay in transportation, unavoidable casualties, or by other causes beyond the Contractor's control. The Architect shall determine the status of all claimed causes.

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

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

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

31. Payments to the Contractor

31.1 As noted under *Preconstruction Conference* in this section, the Contractor shall submit a Schedule of Values form, before the first application for payment, for approval by the Owner and Architect. The Architect may direct the Contractor to provide evidence that supports the correctness of the form. The approved Schedule of Values shall be used as a basis for payments.

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

31.3 The Contractor shall submit Requisitions for Payment as the work progresses not more frequently than once each month, unless the Owner approves a more frequent interval due to unusual circumstances. The Requisition for Payment is based on the proportionate quantities of the various classes of work completed or incorporated in the Work, in agreement with the actual progress of the Work and the dollar value indicated in the Schedule of Values.

31.4 The Architect shall verify and certify each Requisition for Payment which appears to be complete and correct prior to payment being made by the Owner. The Architect may certify an appropriate amount for materials not incorporated in the Work which have been delivered and suitably stored at the site. The Contractor shall submit bills of sale, insurance certificates, or other such documents that will adequately protect the Owner's interests prior to payments being certified.

31.5 In the event any materials delivered but not yet incorporated in the Work have been included in a certified Requisition for Payment with payment made, and said materials thereafter are damaged, deteriorated or destroyed, or for any reason whatsoever become unsuitable or unavailable for use

in the Work, the full amount previously allowed shall be deducted from subsequent payments unless the Contractor satisfactorily replaces said material.

31.6 The Contractor may request certification of an appropriate dollar amount for materials not incorporated in the Work which have been delivered and suitably stored away from the site. The Contractor shall submit bills of sale, insurance certificates, right-of-entry documents or other such documents that will adequately protect the Owner's interests. The Architect shall determine if the Contractor's documentation for the materials is complete and specifically designated for the Project. The Owner may allow certification of such payments.

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

31.8 Certified Requisitions for Payment, payments made to the Contractor, or partial or entire occupancy of the project by the Owner shall not constitute an acceptance of any work that does not conform to the Contract Documents. The making and acceptance of the final payment constitutes a waiver of all claims by the Owner, other than those arising from unsettled liens, from faulty work or materials appearing within one year from final payment or from requirements of the Drawings and Specifications, and of all claims by the Contractor, except those previously made and still unsettled.

31.9 The Owner shall retain five percent of each payment due the Contractor as part security for the fulfillment of the contract by the Contractor. The Owner may make payment of a portion of this "retainage" to the Contractor temporarily or permanently during the progress of the Work. The Owner may thereafter withhold further payments until the full amount of the five percent is reestablished. The Contractor may deposit with the Maine State Treasurer certain securities in place of retainage amounts due according to Maine Statute (M.R.S.A. 5, Section 1746).

32. Payments Withheld

32.1 The Architect may withhold or nullify the whole or a portion of any Requisitions for Payment submitted by the Contractor in the amount that may be necessary, in his reasonable opinion, to protect the Owner from loss due to any of the following:

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

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

33. Liens

33.1 The Contractor shall deliver to the Owner a complete release of all liens arising out of this contract before the final payment or any part of the retainage payment is released. The Contractor shall provide with the release of liens an affidavit asserting each release includes all labor and materials for which a lien could be filed. Alternately, the Contractor, in the event any Subcontractor or supplier refuses to furnish a release of lien in full, may furnish a bond satisfactory to the Owner, to indemnify the Owner against any lien.

33.2 In the event any lien remains unsatisfied after all payments to the Contractor are made by the Owner, the Contractor shall refund to the Owner all money that the latter may be compelled to pay in discharging such lien, including all cost and reasonable attorney's fees.

34. Indemnification

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

35. Workmanship

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

35.2 The Contractor shall know local labor conditions for skilled and unskilled labor in order to apply the labor appropriately to the Work. All labor shall be performed by individuals well skilled in their respective trades.

35.3 The Contractor shall perform all cutting, fitting, patching and placing of work in such a manner to allow subsequent work to fit properly, whether that be by the Contractor, the Owner's Contractors or others. The Owner and Architect may advise the Contractor regarding such subsequent work. Notwithstanding the notification or knowledge of such subsequent work, the Contractor may be directed to comply with this standard of compatible construction by the Architect at the Contractor's expense.

35.4 The Contractor shall request clarification or revision of any design work by the Architect, prior to commencing that work, in a circumstance where the Contractor believes the work cannot feasibly be completed at the highest quality, or as indicated in the Contract Documents. The Architect shall respond to such requests in a timely way, providing clarifying information, a feasible revision, or instruction allowing a reduced quality of work. The Contractor shall follow the direction of the Architect regarding the required request for information.

35.5 The Contractor shall guarantee the Work against any defects in workmanship and materials for a period of one year commencing with the date of the Certificate of Substantial Completion, unless specified otherwise for specific elements of the project. The Work may also be subdivided in mutually agreed upon components, each defined by a Certificate of Substantial Completion.

36. Close-out of the Work

36.1 The Contractor shall remove from the premises all waste materials caused by the work. The Contractor shall make the spaces "broom clean" unless a more exactly cleaning is specified. The Contractor shall wash all windows and glass immediately prior to the final inspection, unless otherwise directed.

36.2 The Owner may conduct the cleaning of the premises where the Contractor, duly notified by the Architect, fails to adequately complete the task. The expense of this cleaning may be deducted from the sum due to the Contractor.

36.3 The Contractor shall participate in all final inspections and acknowledge the documentation of unsatisfactory work, generally called the "punch list", to be corrected by the Contractor. The Architect shall document the successful completion of the Work in a dated Certificate of Substantial Completion, to be signed by Owner, Architect, and Contractor.

36.4 The Contractor shall not call for final inspection of any portion of the Work that is not complete and permanent installed. The Contractor may be found liable for the expenses of individuals called to final inspection meetings prematurely.

36.5 The Contractor and all major Subcontractors shall participate in the end-of-warranty-period conference, typically scheduled close to one year after the Substantial Completion date.

37. Date of Completion and Liquidated Damages

37.1 The Contractor may make a written request to the Owner for an extension or reduction of time, if necessary. The request shall include the reasons the Contractor believes justifies the proposed completion date. The Owner may grant the revision of the contract completion date if the Work was delayed due to conditions beyond the control and the responsibility of the Contractor. The Contractor shall not conduct unauthorized accelerated work or file delay claims to recover alleged damages for unauthorized early completion.

37.2 The Contractor shall vigorously pursue the completion of the Work and notify the Owner of any factors that have, may, or will affect the approved Schedule of the Work. The Contractor may be found responsible for expenses of the Owner or Architect if the Contractor fails to make notification of project delays.

37.3 The Project is planned to be done in an orderly fashion which allows for an iterative submittal review process, construction administration including minor changes in the Work and some bad weather. The Contractor shall not file delay claims to recover alleged damages on work the Architect determines has followed the expected rate of progress.

37.4 The Architect shall prepare the Certificate of Substantial Completion which, when signed by the Owner and the Contractor, documents the date of Substantial Completion of the Work or a designated portion of the Work. The Owner shall not consider the issuance of a Certificate of Occupancy by an outside authority a prerequisite for Substantial Completion if the Certificate of Occupancy cannot be obtained due to factors beyond the Contractor's control.

37.5 Liquidated Damages may be deducted from the sum due to the Contractor for each calendar day that the Work remains uncompleted after the completion date specified in the Contract or an approved amended completion date. The dollar amount per day shall be calculated using the Schedule of Liquidated Damages table shown below.

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

38. Dispute Resolution

38.1 Mediation

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

b) Either party may file suit before or during mediation if the party, in good faith, deems it to be necessary to avoid losing the right to sue due to a statute of limitations. If suit is filed before good faith mediation efforts are completed, the party filing suit shall agree to stay all proceedings in the lawsuit pending completion of the mediation process, provided such stay is without prejudice.

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

38.2 Arbitration

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

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

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

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

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Wage Determination Schedule

PART 1- GENERAL

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

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

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

PART 2 - PRODUCTS (not used)

PART 3 - EXECUTION (not used)

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

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

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

Title of Project --------Marquardt Building-Temporary Lab-Renovate Office Space to Convert to Milk and Blood Lab

Location of Project --Augusta, Kennebec County

2016 Fair Minimum Wage Rates
Building 2 Kennebec County
(other than 1 or 2 family homes)

Occupation Title	Minimum Wage	Minimum Benefit	Total	Occupation Title	Minimum Wage	Minimum Benefit	Total
Asbestos/Lead Removal Worker	$13.00	$0.51	$13.51	Insulation Installer	$19.25	$2.33	$21.58
Assembler – Metal Building	$13.63	$3.38	$17.01	Ironworker - Reinforcing	$21.00	$6.80	$27.80
Boom Truck (Truck Crane) Operator	$21.00	$2.85	$23.85	Ironworker - Structural	$23.20	$20.52	$43.72
Bricklayer	$22.00	$2.68	$24.68	Laborers (incl. Helpers & Tenders	$14.00	$0.35	$14.35
Bulldozer Operator	$17.63	$3.24	$20.87	Laborers - Skilled	$16.00	$1.20	$17.20
Carpenter	$21.00	$3.47	$24.47	Loader Operator – Front End	$17.21	$2.66	$19.87
Carpenter - Acoustical	$15.00	$2.68	$17.68	Mechanic - Maintenance	$20.00	$2.79	$22.79
Carpenter - Rough	$18.65	$0.16	$18.81	Mechanic - Refrigeration	$20.00	$3.63	$23.63
Cement Mason/Finisher	$17.75	$2.15	$19.90	Millwright	$23.95	$19.19	$43.14
Communication Equipment Installer	$24.04	$8.00	$32.04	Oil/Fuel Burner Servicer & Installer	$24.43	$6.13	$30.56
Concrete Pump Operator	$24.25	$5.40	$29.65	Painter	$18.75	$0.00	$18.75
Crane Operator <15 Tons	$21.25	$2.58	$23.83	Paperhanger	$17.00	$3.16	$20.16
Crane Operator =>15 Tons	$24.50	$6.61	$31.11	Pipe/Steam/Sprinkler Fitter	$26.25	$13.84	$40.09
Crusher Plant Operator	$15.80	$3.76	$19.56	Pipe Layer	$19.33	$2.37	$21.70
Dry-Wall Applicator	$21.50	$2.63	$24.13	Plasterer	$43.93	$27.43	$71.36
Dry-Wall Taper & Finisher	$25.00	$3.00	$28.00	Plumber (Licensed)	$25.00	$3.16	$28.16
Electrician - Licensed	$25.00	$5.47	$30.47	Plumber Helper/Trainee (Licensed)	$17.59	$2.61	$20.20
Electrician Helper/Cable Puller Licensed	$16.00	$2.31	$18.31	Propane & Natural Gas Service & inst. (Licensed)	$21.00	$3.87	$24.87
Elevator Construction/Installer	$53.30	$33.36	$86.66	Roofer	$15.00	$1.15	$16.15
Excavator Operator	$19.06	$2.44	$21.50	Sheet Metal Worker	$20.59	$4.76	$26.01
Fence Setter	$15.25	$1.32	$16.57	Sider	$22.75	$4.33	$27.08
Flagger	$16.70	$7.95	$24.65	Stone Mason	$17.80	$0.00	$17.80
Floor Layer	$19.50	$4.51	$24.01	Tile Setter	$21.25	$4.76	$26.01
Furniture Installer/Assembler	$13.75	$0.85	$14.60	Truck Driver – Light	$15.00	$0.99	$15.99
Glazier	$20.82	$2.71	$23.53	Truck Driver – Medium	$15.00	$0.10	$15.10
Grader/Scraper Operator	$17.50	$1.04	$18.54	Truck Driver – Heavy	$14.25	$0.83	$15.08
Heating Ventilation Air Conditioning	$24.31	$4.63	$28.94	Truck Driver – Tractor Trailer	$16.24	$3.28	$19.52

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

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

Apprentices - The minimum wage rate for registered apprentices are those set forth in the standards and policies of the Maine State Apprenticeship and Training Council for approved apprenticeship programs.
Posting of Schedule - Posting of this schedule is required in accordance with 26 MRSA §1301 et. seq., by any contractor holding a State contract for construction valued at $50,000 or more and any subcontractors to such a contractor.
Appeal - Any person affected by the determination of these rates may appeal to the Commissioner of Labor by filing a written notice with the Commissioner stating the specific grounds of the objection within ten (10) days from the filing of these rates with the Secretary of State.

Determination No: B2-057-2016
Filing Date: May 6, 2016

Expiration Date: 12-31-2016

A true copy
Attest: Verna Eldridge
Verna Eldridge
Wage & Hour Director
Bureau of Labor Standards

End of Section 00 73 46

SECTION 012600 - CONTRACT MODIFICATION PROCEDURES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section includes administrative and procedural requirements for handling and processing Contract modifications.

B. Related Requirements:

1. Section 012500 "Substitution Procedures" for administrative procedures for handling requests for substitutions made after the Contract award.

1.3 MINOR CHANGES IN THE WORK

A. Architect will issue supplemental instructions authorizing minor changes in the Work, not involving adjustment to the Contract Sum or the Contract Time, on **AIA Document G710, "Architect's Supplemental Instructions."**

1.4 PROPOSAL REQUESTS

A. Owner-Initiated Proposal Requests: **Architect** will issue a detailed description of proposed changes in the Work that may require adjustment to the Contract Sum or the Contract Time. If necessary, the description will include supplemental or revised Drawings and Specifications.

1. Work Change Proposal Requests issued by **Architect** are not instructions either to stop work in progress or to execute the proposed change.
2. Within 7 **days, when not otherwise specified,** after receipt of Proposal Request, submit a quotation estimating cost adjustments to the Contract Sum and the Contract Time necessary to execute the change.

   a. Include a list of quantities of products required or eliminated and unit costs, with total amount of purchases and credits to be made. If requested, furnish survey data to substantiate quantities.
   b. Indicate applicable taxes, delivery charges, equipment rental, and amounts of trade discounts.
   c. Include costs of labor and supervision directly attributable to the change.
   d. Include an updated Contractor's construction schedule that indicates the effect of the change, including, but not limited to, changes in activity duration, start and

finish times, and activity relationship. Use available total float before requesting an extension of the Contract Time.

B. Contractor-Initiated Proposals: If latent or changed conditions require modifications to the Contract, Contractor may initiate a claim by submitting a request for a change to **Architect**.

1. Include a statement outlining reasons for the change and the effect of the change on the Work. Provide a complete description of the proposed change. Indicate the effect of the proposed change on the Contract Sum and the Contract Time.
2. Include a list of quantities of products required or eliminated and unit costs, with total amount of purchases and credits to be made. If requested, furnish survey data to substantiate quantities.
3. Indicate applicable taxes, delivery charges, equipment rental, and amounts of trade discounts.
4. Include costs of labor and supervision directly attributable to the change.
5. Include an updated Contractor's construction schedule that indicates the effect of the change, including, but not limited to, changes in activity duration, start and finish times, and activity relationship. Use available total float before requesting an extension of the Contract Time.
6. Comply with requirements in Section 012500 "Substitution Procedures" if the proposed change requires substitution of one product or system for product or system specified.

1.5 CHANGE ORDER PROCEDURES

A. On Owner's approval of a Work Changes Proposal Request, Architect will issue a Change Order for signatures of Owner and Contractor on AIA Document G701

1.6 CONSTRUCTION CHANGE DIRECTIVE

A. **Construction** Change Directive: **Architect** may issue a **Construction** Change Directive on **AIA Document G714** Change Directive instructs Contractor to proceed with a change in the Work, for subsequent inclusion in a Change Order.

1. **Construction** Change Directive contains a complete description of change in the Work. It also designates method to be followed to determine change in the Contract Sum or the Contract Time.

B. Documentation: Maintain detailed records on a time and material basis of work required by the **Construction** Change Directive.

1. After completion of change, submit an itemized account and supporting data necessary to substantiate cost and time adjustments to the Contract.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION 012600

SECTION 012900 - PAYMENT PROCEDURES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section includes administrative and procedural requirements necessary to prepare and process Applications for Payment.

B. Related Requirements:
   1. Section 012600 "Contract Modification Procedures" for administrative procedures for handling changes to the Contract.

1.3 DEFINITIONS

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

1.4 SCHEDULE OF VALUES

A. Coordination: Coordinate preparation of the schedule of values with preparation of Contractor's construction schedule.

   1. Coordinate line items in the schedule of values with other required administrative forms and schedules, including the following:

      a. Application for Payment forms with continuation sheets.
      b. Submittal schedule.
      c. Items required to be indicated as separate activities in Contractor's construction schedule.

   2. Submit the schedule of values to Architect at earliest possible date, but no later than seven days before the date scheduled for submittal of initial Applications for Payment.

B. Format and Content: Use Project Manual table of contents as a guide to establish line items for the schedule of values. Provide at least one line item for each Specification Section.

   1. Identification: Include the following Project identification on the schedule of values:

      a. Project name and location.

b. Name of Architect.
c. Architect's project number.
d. Contractor's name and address.
e. Date of submittal.

2. Arrange schedule of values consistent with format of AIA Document G703.
3. Arrange the schedule of values in tabular form with separate columns to indicate the following for each item listed:

   a. Related Specification Section or Division.
   b. Description of the Work.
   c. Name of subcontractor.
   d. Name of manufacturer or fabricator.
   e. Name of supplier.
   f. Change Orders (numbers) that affect value.
   g. Dollar value of the following, as a percentage of the Contract Sum to nearest one-hundredth percent, adjusted to total 100 percent.

      1) Labor.
      2) Materials.
      3) Equipment.

4. Provide a breakdown of the Contract Sum in enough detail to facilitate continued evaluation of Applications for Payment and progress reports. Coordinate with Project Manual table of contents. Provide multiple line items for principal subcontract amounts in excess of five percent of the Contract Sum.

5. Round amounts to nearest whole dollar; total shall equal the Contract Sum.
6. Provide a separate line item in the schedule of values for each part of the Work where Applications for Payment may include materials or equipment purchased or fabricated and stored, but not yet installed.

   a. Differentiate between items stored on-site and items stored off-site. If required, include evidence of insurance.

7. Provide separate line items in the schedule of values for initial cost of materials, for each subsequent stage of completion, and for total installed value of that part of the Work.
8. Allowances: Provide a separate line item in the schedule of values for each allowance. Show line-item value of unit-cost allowances, as a product of the unit cost, multiplied by measured quantity. Use information indicated in the Contract Documents to determine quantities.
9. Purchase Contracts: Provide a separate line item in the schedule of values for each purchase contract. Show line-item value of purchase contract. Indicate owner payments or deposits, if any, and balance to be paid by Contractor.
10. Each item in the schedule of values and Applications for Payment shall be complete. Include total cost and proportionate share of general overhead and profit for each item.

    a. Temporary facilities and other major cost items that are not direct cost of actual work-in-place may be shown either as separate line items in the schedule of values or distributed as general overhead expense, at Contractor's option.

11. Schedule Updating: Update and resubmit the schedule of values before the next Applications for Payment when Change Orders or Construction Change Directives result in a change in the Contract Sum.

1.5 APPLICATIONS FOR PAYMENT

A. Each Application for Payment following the initial Application for Payment shall be consistent with previous applications and payments as certified by Architect and paid for by Owner.

1. Initial Application for Payment, Application for Payment at time of Substantial Completion, and final Application for Payment involve additional requirements.

B. Payment Application Times: The date for each progress payment is indicated in the Agreement between Owner and Contractor. The period of construction work covered by each Application for Payment is the period indicated in the Agreement.

C. Application for Payment Forms: Use AIA Document G702 and AIA Document G703 as form for Applications for Payment.

D. Application Preparation: Complete every entry on form. Notarize and execute by a person authorized to sign legal documents on behalf of Contractor. Architect will return incomplete applications without action.

1. Entries shall match data on the schedule of values and Contractor's construction schedule. Use updated schedules if revisions were made.
2. Include amounts for work completed following previous Application for Payment, whether or not payment has been received. Include only amounts for work completed at time of Application for Payment.
3. Include amounts of Change Orders and Construction Change Directives issued before last day of construction period covered by application.
4. Indicate separate amounts for work being carried out under Owner-requested project acceleration.

E. Stored Materials: Include in Application for Payment amounts applied for materials or equipment purchased or fabricated and stored, but not yet installed. Differentiate between items stored on-site and items stored off-site.

1. Provide certificate of insurance, evidence of transfer of title to Owner, and consent of surety to payment, for stored materials.
2. Provide supporting documentation that verifies amount requested, such as paid invoices. Match amount requested with amounts indicated on documentation; do not include overhead and profit on stored materials.
3. Provide summary documentation for stored materials indicating the following:

a. Value of materials previously stored and remaining stored as of date of previous Applications for Payment.
b. Value of previously stored materials put in place after date of previous Application for Payment and on or before date of current Application for Payment.
c. Value of materials stored since date of previous Application for Payment and remaining stored as of date of current Application for Payment.

F. Transmittal: Submit three signed and notarized original copies of each Application for Payment to Architect by a method ensuring receipt. One copy shall include waivers of lien and similar attachments if required.

1. Transmit each copy with a transmittal form listing attachments and recording appropriate information about application.

G. Waivers of Mechanic's Lien: With each Application for Payment, submit waivers of mechanic's lien from entities lawfully entitled to file a mechanic's lien arising out of the Contract and related to the Work covered by the payment.

1. Submit partial waivers on each item for amount requested in previous application, after deduction for retainage, on each item.
2. When an application shows completion of an item, submit conditional final or full waivers.
3. Owner reserves the right to designate which entities involved in the Work must submit waivers.
4. Waiver Forms: Submit executed waivers of lien on forms acceptable to Owner.

H. Initial Application for Payment: Administrative actions and submittals that must precede or coincide with submittal of first Application for Payment include the following:

1. List of subcontractors.
2. Schedule of values.
3. Contractor's construction schedule (preliminary if not final).
4. Combined Contractor's construction schedule (preliminary if not final) incorporating Work of multiple contracts, with indication of acceptance of schedule by each Contractor.
5. Products list (preliminary if not final).
6. Submittal schedule (preliminary if not final).
7. List of Contractor's staff assignments.
8. List of Contractor's principal consultants.
9. Copies of building permits.
10. Copies of authorizations and licenses from authorities having jurisdiction for performance of the Work.
11. Initial progress report.
12. Report of preconstruction conference.
13. Certificates of insurance and insurance policies.
14. Performance and payment bonds.

I. Application for Payment at Substantial Completion: After Architect issues the Certificate of Substantial Completion, submit an Application for Payment showing 100 percent completion for portion of the Work claimed as substantially complete.

1. Include documentation supporting claim that the Work is substantially complete and a statement showing an accounting of changes to the Contract Sum.
2. This application shall reflect Certificate(s) of Substantial Completion issued previously for Owner occupancy of designated portions of the Work.

J. Final Payment Application: After completing Project closeout requirements, submit final Application for Payment with releases and supporting documentation not previously submitted and accepted, including, but not limited, to the following:

1. Evidence of completion of Project closeout requirements.
2. Insurance certificates for products and completed operations where required and proof that taxes, fees, and similar obligations were paid.
3. Updated final statement, accounting for final changes to the Contract Sum.
4. AIA Document G706, "Contractor's Affidavit of Payment of Debts and Claims."
5. AIA Document G706A, "Contractor's Affidavit of Release of Liens."
6. AIA Document G707, "Consent of Surety to Final Payment."
7. Evidence that claims have been settled.
8. Final meter readings for utilities, a measured record of stored fuel, and similar data as of date of Substantial Completion or when Owner took possession of and assumed responsibility for corresponding elements of the Work.
9. Final liquidated damages settlement statement.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION 012900

SECTION 013300 - SUBMITTAL PROCEDURES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section includes requirements for the submittal schedule and administrative and procedural requirements for submitting Shop Drawings, Product Data, Samples, and other submittals.

B. Related Requirements:

1. Section 012900 "Payment Procedures" for submitting Applications for Payment and the schedule of values.

1.3 DEFINITIONS

A. Action Submittals: Written and graphic information and physical samples that require Architect's responsive action. Action submittals are those submittals indicated in individual Specification Sections as "action submittals."

B. File Transfer Protocol (FTP): Communications protocol that enables transfer of files to and from another computer over a network and that serves as the basis for standard Internet protocols. An FTP site is a portion of a network located outside of network firewalls within which internal and external users are able to access files.

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

1.4 ACTION SUBMITTALS

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

1. Coordinate submittal schedule with list of subcontracts, the schedule of values, and Contractor's construction schedule.
2. Initial Submittal: Submit concurrently with startup construction schedule. Include submittals required during the first 60 days of construction. List those submittals

required to maintain orderly progress of the Work and those required early because of long lead time for manufacture or fabrication.

3. Final Submittal: Submit concurrently with the first complete submittal of Contractor's construction schedule.

    a. Submit revised submittal schedule to reflect changes in current status and timing for submittals.

4. Format: Arrange the following information in a tabular format:

    a. Scheduled date for first submittal.
    b. Specification Section number and title.
    c. Submittal category: Action; informational.
    d. Name of subcontractor.
    e. Description of the Work covered.
    f. Scheduled date for Architect's final release or approval.
    g. Scheduled date of fabrication.
    h. Scheduled dates for purchasing.
    i. Scheduled dates for installation.
    j. Activity or event number.

1.5 SUBMITTAL ADMINISTRATIVE REQUIREMENTS

A. Architect's Digital Data Files: Electronic digital data files of the Contract Drawings will be provided by Architect for Contractor's use in preparing submittals.

1. Architect will furnish Contractor one set of digital data drawing files of the Contract Drawings for use in preparing Shop Drawings.

    a. Architect makes no representations as to the accuracy or completeness of digital data drawing files as they relate to the Contract Drawings.
    b. Digital Drawing Software Program: The Contract Drawings are available in DWG format.
    c. Contractor shall execute a data licensing agreement in the form of AIA Document C106, Digital Data Licensing Agreement.
    d. The following digital data files will by furnished for each appropriate discipline:

        1) Floor plans.
        2) Reflected ceiling plans.

B. Coordination: Coordinate preparation and processing of submittals with performance of construction activities.

1. Coordinate each submittal with fabrication, purchasing, testing, delivery, other submittals, and related activities that require sequential activity.
2. Submit all submittal items required for each Specification Section concurrently unless partial submittals for portions of the Work are indicated on approved submittal schedule.
3. Submit action submittals and informational submittals required by the same Specification Section as separate packages under separate transmittals.

4. Coordinate transmittal of different types of submittals for related parts of the Work so processing will not be delayed because of need to review submittals concurrently for coordination.

    a. Architect reserves the right to withhold action on a submittal requiring coordination with other submittals until related submittals are received.

C. Processing Time: Allow time for submittal review, including time for resubmittals, as follows. Time for review shall commence on Architect's receipt of submittal. No extension of the Contract Time will be authorized because of failure to transmit submittals enough in advance of the Work to permit processing, including resubmittals.

1. Initial Review: Allow 7 days for initial review of each submittal. Allow additional time if coordination with subsequent submittals is required. Architect will advise Contractor when a submittal being processed must be delayed for coordination.
2. Intermediate Review: If intermediate submittal is necessary, process it in same manner as initial submittal.
3. Resubmittal Review: Allow 7 days for review of each resubmittal.
4. Sequential Review: Where sequential review of submittals by Architect's consultants, Owner, or other parties is indicated, allow 10 days for initial review of each submittal.

5. Concurrent Consultant Review: Where the Contract Documents indicate that submittals may be transmitted simultaneously to Architect and to Architect's consultants, allow 10 days for review of each submittal. Submittal will be returned to Architect before being returned to Contractor.

D. Paper Submittals: Place a permanent label or title block on each submittal item for identification.

1. Indicate name of firm or entity that prepared each submittal on label or title block.
2. Provide a space on label or beside title block to record Contractor's review and approval markings and action taken by Architect.
3. Include the following information for processing and recording action taken:

    a. Project name.
    b. Date.
    c. Name of Architect.
    d. Name of Construction Manager.
    e. Name of Contractor.
    f. Name of subcontractor.
    g. Name of supplier.
    h. Name of manufacturer.
    i. Submittal number or other unique identifier, including revision identifier.

        1) Submittal number shall use Specification Section number followed by a decimal point and then a sequential number (e.g., 061000.01). Resubmittals shall include an alphabetic suffix after another decimal point (e.g., 061000.01.A).

    j. Number and title of appropriate Specification Section.
    k. Drawing number and detail references, as appropriate.

l. Location(s) where product is to be installed, as appropriate.
m. Other necessary identification.

4. Additional Paper Copies: Unless additional copies are required for final submittal, and unless Architect observes noncompliance with provisions in the Contract Documents, initial submittal may serve as final submittal.

   a. Submit one copy of submittal to concurrent reviewer in addition to specified number of copies to Architect.

5. Transmittal for Paper Submittals: Assemble each submittal individually and appropriately for transmittal and handling. Transmit each submittal using a transmittal form. Architect will return without review submittals received from sources other than Contractor.

   a. Transmittal Form for Paper Submittals: Use AIA Document G810
   b. Transmittal Form for Paper Submittals: Provide locations on form for the following information:

      1) Project name.
      2) Date.
      3) Destination (To:).
      4) Source (From:).
      5) Name and address of Architect.
      6) Name of Construction Manager.
      7) Name of Contractor.
      8) Name of firm or entity that prepared submittal.
      9) Names of subcontractor, manufacturer, and supplier.
      10) Category and type of submittal.
      11) Submittal purpose and description.
      12) Specification Section number and title.
      13) Specification paragraph number or drawing designation and generic name for each of multiple items.
      14) Drawing number and detail references, as appropriate.
      15) Indication of full or partial submittal.
      16) Transmittal number numbered consecutively.
      17) Submittal and transmittal distribution record.
      18) Remarks.
      19) Signature of transmitter.

E. Electronic Submittals: Identify and incorporate information in each electronic submittal file as follows:

1. Assemble complete submittal package into a single indexed file incorporating submittal requirements of a single Specification Section and transmittal form with links enabling navigation to each item.
2. Name file with submittal number or other unique identifier, including revision identifier.

   a. File name shall use project identifier and Specification Section number followed by a decimal point and then a sequential number (e.g., LNHS-061000.01).

Resubmittals shall include an alphabetic suffix after another decimal point (e.g., LNHS-061000.01.A).

3. Provide means for insertion to permanently record Contractor's review and approval markings and action taken by Architect.
4. Transmittal Form for Electronic Submittals: Use software-generated form from electronic project management software acceptable to Owner, containing the following information:

    a. Project name.
    b. Date.
    c. Name and address of Architect.
    d. Name of Construction Manager.
    e. Name of Contractor.
    f. Name of firm or entity that prepared submittal.
    g. Names of subcontractor, manufacturer, and supplier.
    h. Category and type of submittal.
    i. Submittal purpose and description.
    j. Specification Section number and title.
    k. Specification paragraph number or drawing designation and generic name for each of multiple items.
    l. Drawing number and detail references, as appropriate.
    m. Location(s) where product is to be installed, as appropriate.
    n. Related physical samples submitted directly.
    o. Indication of full or partial submittal.
    p. Transmittal number numbered consecutively.
    q. Submittal and transmittal distribution record.
    r. Other necessary identification.
    s. Remarks.

5. Metadata: Include the following information as keywords in the electronic submittal file metadata:

    a. Project name.
    b. Number and title of appropriate Specification Section.
    c. Manufacturer name.
    d. Product name.

F. Options: Identify options requiring selection by Architect.

G. Deviations and Additional Information: On an attached separate sheet, prepared on Contractor's letterhead, record relevant information, requests for data, revisions other than those requested by Architect on previous submittals, and deviations from requirements in the Contract Documents, including minor variations and limitations. Include same identification information as related submittal.

H. Resubmittals: Make resubmittals in same form and number of copies as initial submittal.

1. Note date and content of previous submittal.

2. Note date and content of revision in label or title block and clearly indicate extent of revision.
3. Resubmit submittals until they are marked with approval notation from Architect's action stamp.

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

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

PART 2 - PRODUCTS

2.1 SUBMITTAL PROCEDURES

A. General Submittal Procedure Requirements: Prepare and submit submittals required by individual Specification Sections. Types of submittals are indicated in individual Specification Sections.

1. Submit electronic submittals via email as PDF electronic files.

   a. Architect will return annotated file. Annotate and retain one copy of file as an electronic Project record document file.

2. Action Submittals: Submit three paper copies of each submittal unless otherwise indicated. Architect will return two copies.
3. Certificates and Certifications Submittals: Provide a statement that includes signature of entity responsible for preparing certification. Certificates and certifications shall be signed by an officer or other individual authorized to sign documents on behalf of that entity.

   a. Provide a digital signature with digital certificate on electronically submitted certificates and certifications where indicated.
   b. Provide a notarized statement on original paper copy certificates and certifications where indicated.

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

1. If information must be specially prepared for submittal because standard published data are not suitable for use, submit as Shop Drawings, not as Product Data.
2. Mark each copy of each submittal to show which products and options are applicable.
3. Include the following information, as applicable:

   a. Manufacturer's catalog cuts.
   b. Manufacturer's product specifications.
   c. Standard color charts.
   d. Statement of compliance with specified referenced standards.

e. Testing by recognized testing agency.
f. Application of testing agency labels and seals.
g. Notation of coordination requirements.
h. Availability and delivery time information.

4. For equipment, include the following in addition to the above, as applicable:

a. Wiring diagrams showing factory-installed wiring.
b. Printed performance curves.
c. Operational range diagrams.
d. Clearances required to other construction, if not indicated on accompanying Shop Drawings.

5. Submit Product Data before or concurrent with Samples.
6. Submit Product Data in the following format:

a. PDF electronic file.
b. Three paper copies of Product Data unless otherwise indicated. Architect will return two copies.

C. Shop Drawings: Prepare Project-specific information, drawn accurately to scale. Do not base Shop Drawings on reproductions of the Contract Documents or standard printed data unless submittal based on Architect's digital data drawing files is otherwise permitted.

1. Preparation: Fully illustrate requirements in the Contract Documents. Include the following information, as applicable:

a. Identification of products.
b. Schedules.
c. Compliance with specified standards.
d. Notation of coordination requirements.
e. Notation of dimensions established by field measurement.
f. Relationship and attachment to adjoining construction clearly indicated.
g. Seal and signature of professional engineer if specified.

2. Sheet Size: Except for templates, patterns, and similar full-size drawings, submit Shop Drawings on sheets at least [**8-1/2 by 11 inches (215 by 280 mm), but no larger than 24 by 36 inches**
3. Submit Shop Drawings in the following format:

a. PDF electronic file.
b. Three opaque copies of each submittal. Architect will retain two copies; remainder will be returned.

D. Samples: Submit Samples for review of kind, color, pattern, and texture for a check of these characteristics with other elements and for a comparison of these characteristics between submittal and actual component as delivered and installed.

1. Transmit Samples that contain multiple, related components such as accessories together in one submittal package.
2. Identification: Attach label on unexposed side of Samples that includes the following:

a. Generic description of Sample.
b. Product name and name of manufacturer.
c. Sample source.
d. Number and title of applicable Specification Section.
e. Specification paragraph number and generic name of each item.

3. For projects where electronic submittals are required, provide corresponding electronic submittal of Sample transmittal, digital image file illustrating Sample characteristics, and identification information for record.
4. Disposition: Maintain sets of approved Samples at Project site, available for quality-control comparisons throughout the course of construction activity. Sample sets may be used to determine final acceptance of construction associated with each set.

   a. Samples that may be incorporated into the Work are indicated in individual Specification Sections. Such Samples must be in an undamaged condition at time of use.
   b. Samples not incorporated into the Work, or otherwise designated as Owner's property, are the property of Contractor.

5. Samples for Initial Selection: Submit manufacturer's color charts consisting of units or sections of units showing the full range of colors, textures, and patterns available.

   a. Number of Samples: Submit one full set(s) of available choices where color, pattern, texture, or similar characteristics are required to be selected from manufacturer's product line. Architect will return submittal with options selected.

6. Samples for Verification: Submit full-size units or Samples of size indicated, prepared from same material to be used for the Work, cured and finished in manner specified, and physically identical with material or product proposed for use, and that show full range of color and texture variations expected. Samples include, but are not limited to, the following: partial sections of manufactured or fabricated components; small cuts or containers of materials; complete units of repetitively used materials; swatches showing color, texture, and pattern; color range sets; and components used for independent testing and inspection.

   a. Number of Samples: Submit three sets of Samples. Architect will retain two Sample sets; remainder will be returned.

      1) Submit a single Sample where assembly details, workmanship, fabrication techniques, connections, operation, and other similar characteristics are to be demonstrated.
      2) If variation in color, pattern, texture, or other characteristic is inherent in material or product represented by a Sample, submit at least three sets of paired units that show approximate limits of variations.

E. Product Schedule: As required in individual Specification Sections, prepare a written summary indicating types of products required for the Work and their intended location. Include the following information in tabular form:

1. Type of product. Include unique identifier for each product indicated in the Contract Documents or assigned by Contractor if none is indicated.

2. Manufacturer and product name, and model number if applicable.
3. Number and name of room or space.
4. Location within room or space.
5. Submit product schedule in the following format:

    a. PDF electronic file.

F. Coordination Drawing Submittals: Comply with requirements specified in Section 013100 "Project Management and Coordination."

G. Contractor's Construction Schedule: Comply with requirements specified in Section 013200 "Construction Progress Documentation."

H. Application for Payment and Schedule of Values: Comply with requirements specified in Section 012900 "Payment Procedures."

I. Test and Inspection Reports and Schedule of Tests and Inspections Submittals: Comply with requirements specified in Section 014000 "Quality Requirements."

J. Closeout Submittals and Maintenance Material Submittals: Comply with requirements specified in Section 017700 "Closeout Procedures."

K. Maintenance Data: Comply with requirements specified in Section 017823 "Operation and Maintenance Data."

L. Qualification Data: Prepare written information that demonstrates capabilities and experience of firm or person. Include lists of completed projects with project names and addresses, contact information of architects and owners, and other information specified.

M. Welding Certificates: Prepare written certification that welding procedures and personnel comply with requirements in the Contract Documents. Submit record of Welding Procedure Specification and Procedure Qualification Record on AWS forms. Include names of firms and personnel certified.

N. Installer Certificates: Submit written statements on manufacturer's letterhead certifying that Installer complies with requirements in the Contract Documents and, where required, is authorized by manufacturer for this specific Project.

O. Manufacturer Certificates: Submit written statements on manufacturer's letterhead certifying that manufacturer complies with requirements in the Contract Documents. Include evidence of manufacturing experience where required.

P. Product Certificates: Submit written statements on manufacturer's letterhead certifying that product complies with requirements in the Contract Documents.

Q. Material Certificates: Submit written statements on manufacturer's letterhead certifying that material complies with requirements in the Contract Documents.

R. Material Test Reports: Submit reports written by a qualified testing agency, on testing agency's standard form, indicating and interpreting test results of material for compliance with requirements in the Contract Documents.

S. Product Test Reports: Submit written reports indicating that current product produced by manufacturer complies with requirements in the Contract Documents. Base reports on evaluation of tests performed by manufacturer and witnessed by a qualified testing agency, or on comprehensive tests performed by a qualified testing agency.

T. Research Reports: Submit written evidence, from a model code organization acceptable to authorities having jurisdiction, that product complies with building code in effect for Project. Include the following information:

1. Name of evaluation organization.
2. Date of evaluation.
3. Time period when report is in effect.
4. Product and manufacturers' names.
5. Description of product.
6. Test procedures and results.
7. Limitations of use.

U. Preconstruction Test Reports: Submit reports written by a qualified testing agency, on testing agency's standard form, indicating and interpreting results of tests performed before installation of product, for compliance with performance requirements in the Contract Documents.

V. Compatibility Test Reports: Submit reports written by a qualified testing agency, on testing agency's standard form, indicating and interpreting results of compatibility tests performed before installation of product. Include written recommendations for primers and substrate preparation needed for adhesion.

W. Field Test Reports: Submit written reports indicating and interpreting results of field tests performed either during installation of product or after product is installed in its final location, for compliance with requirements in the Contract Documents.

X. Design Data: Prepare and submit written and graphic information, including, but not limited to, performance and design criteria, list of applicable codes and regulations, and calculations. Include list of assumptions and other performance and design criteria and a summary of loads. Include load diagrams if applicable. Provide name and version of software, if any, used for calculations. Include page numbers.

PART 3 - EXECUTION

3.1 CONTRACTOR'S REVIEW

A. Action and Informational Submittals: Review each submittal and check for coordination with other Work of the Contract and for compliance with the Contract Documents. Note corrections and field dimensions. Mark with approval stamp before submitting to Architect.

B. Project Closeout and Maintenance Material Submittals: See requirements in Section 017700 "Closeout Procedures."

C. Approval Stamp: Stamp each submittal with a uniform, approval stamp. Include Project name and location, submittal number, Specification Section title and number, name of reviewer, date

of Contractor's approval, and statement certifying that submittal has been reviewed, checked, and approved for compliance with the Contract Documents.

3.2 ARCHITECT'S ACTION

A. Action Submittals: Architect will review each submittal, make marks to indicate corrections or revisions required, and return it. Architect will stamp each submittal with an action stamp and will mark stamp appropriately to indicate action.

B. Informational Submittals: Architect will review each submittal and will not return it, or will return it if it does not comply with requirements. Architect will forward each submittal to appropriate party.

C. Partial submittals prepared for a portion of the Work will be reviewed when use of partial submittals has received prior approval from Architect.

D. Incomplete submittals are unacceptable, will be considered nonresponsive, and will be returned for resubmittal without review.

E. Submittals not required by the Contract Documents may be returned by the Architect without action.

END OF SECTION 013300

SECTION 015000 - TEMPORARY FACILITIES AND CONTROLS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section includes requirements for temporary utilities, support facilities, and security and protection facilities.

B. Related Requirements:

1. Section 011000 "Summary" for work restrictions and limitations on utility interruptions.

1.3 USE CHARGES

A. Water and Sewer Service from Existing System: Water from Owner's existing water system is available for use without metering and without payment of use charges. Provide connections and extensions of services as required for construction operations.

B. Electric Power Service from Existing System: Electric power from Owner's existing system is available for use without metering and without payment of use charges. Provide connections and extensions of services as required for construction operations.

1.4 INFORMATIONAL SUBMITTALS

A. Site Plan: Show temporary facilities, utility hookups, staging areas, and parking areas for construction personnel.

B. Moisture-Protection Plan: Describe procedures and controls for protecting materials and construction from water absorption and damage.

1. Describe delivery, handling, and storage provisions for materials subject to water absorption or water damage.
2. Indicate procedures for discarding water-damaged materials, protocols for mitigating water intrusion into completed Work, and replacing water-damaged Work.

C. Dust- and HVAC-Control Plan: Submit coordination drawing and narrative that indicates the dust- and HVAC-control measures proposed for use, proposed locations, and proposed time frame for their operation. Identify further options if proposed measures are later determined to be inadequate. Include the following:

1. Locations of dust-control partitions at each phase of work.
2. HVAC system isolation schematic drawing.
3. Location of proposed air-filtration system discharge.
4. Waste handling procedures.
5. Other dust-control measures.

1.5 PROJECT CONDITIONS

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

PART 2 - PRODUCTS

2.1 MATERIALS

A. Dust-Control Adhesive-Surface Walk-off Mats: Provide mats minimum 36 by 60 inches (914 by 1624 mm).

2.2 TEMPORARY FACILITIES

A. Common-Use Field Office: The Owner will make space available for a Field Office. Area shall be of sufficient size to accommodate needs of Owner, Architect, and construction personnel office activities and to accommodate Project meetings specified in other Division 01 Sections. Keep office clean and orderly. Furnish and equip offices as follows:

1. Furniture required for Project-site documents including file cabinets, plan tables, plan racks, and bookcases.
2. Room of sufficient size to accommodate meetings of five individuals. Furnish room with conference table, chairs, and 4-foot- (1.2-m-) square tack and marker boards.

B. Storage and Fabrication Sheds: Provide sheds sized, furnished, and equipped to accommodate materials and equipment for construction operations.

1. Store combustible materials apart from building.

2.3 EQUIPMENT

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

B. Air-Filtration Units: Primary and secondary HEPA-filter-equipped portable units with four-stage filtration. Provide single switch for emergency shutoff. Configure to run continuously.

PART 3 - EXECUTION

3.1 INSTALLATION, GENERAL

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

B. Provide each facility ready for use when needed to avoid delay. Do not remove until facilities are no longer needed or are replaced by authorized use of completed permanent facilities.

3.2 TEMPORARY UTILITY INSTALLATION

A. General: Install temporary service or connect to existing service.

1. Arrange with utility company, Owner, and existing users for time when service can be interrupted, if necessary, to make connections for temporary services.

B. Sanitary Facilities:
1. Toilets: Use of Owner's existing toilet facilities will be permitted, as long as facilities are cleaned and maintained in a condition acceptable to Owner. At Substantial Completion, restore these facilities to condition existing before initial use.

C. Isolation of Work Areas in Occupied Facilities: Prevent dust, fumes, and odors from entering occupied areas.

1. Prior to commencing work, isolate the HVAC system in area where work is to be performed according to coordination drawings.

a. Disconnect supply and return ductwork in work area from HVAC systems servicing occupied areas.
b. Maintain negative air pressure within work area using HEPA-equipped air-filtration units, starting with commencement of temporary partition construction, and continuing until removal of temporary partitions is complete.

2. Maintain dust partitions during the Work. Use vacuum collection attachments on dust-producing equipment. Isolate limited work within occupied areas using portable dust-containment devices.
3. Perform daily construction cleanup and final cleanup using approved, HEPA-filter-equipped vacuum equipment.

D. Ventilation and Humidity Control: Provide temporary ventilation required by construction activities for curing or drying of completed installations or for protecting installed construction from adverse effects of high humidity. Select equipment that will not have a harmful effect on completed installations or elements being installed. Coordinate ventilation requirements to produce ambient condition required and minimize energy consumption.

1. Provide dehumidification systems when required to reduce substrate moisture levels to level required to allow installation or application of finishes.

E. Electric Power Service: Connect to Owner's existing electric power service. Maintain equipment in a condition acceptable to Owner.

F. Lighting: Provide temporary lighting with local switching that provides adequate illumination for construction operations, observations, inspections, and traffic conditions.

1. Install and operate temporary lighting that fulfills security and protection requirements without operating entire system.

G. Telephone Service: Provide temporary telephone service in common-use facilities for use by all construction personnel. Install one telephone line for each field office.

1. Provide additional telephone lines for the following:

a. Provide a dedicated telephone line for each facsimile machine in each field office.
b. Provide one telephone line for Owner's use.

2. At each telephone, post a list of important telephone numbers.

a. Police and fire departments.
b. Ambulance service.
c. Contractor's home office.
d. Contractor's emergency after-hours telephone number.
e. Architect's office.
f. Engineers' offices.
g. Owner's office.
h. Principal subcontractors' field and home offices.

3. Provide superintendent with cellular telephone for use when away from field office.

H. Electronic Communication Service: Provide a desktop computer in the primary field office adequate for use by Architect and Owner to access Project electronic documents and maintain electronic communications.

3.3 SUPPORT FACILITIES INSTALLATION

A. General: Comply with the following:

1. Provide construction for temporary offices, shops, and sheds located within construction area or within 30 feet (9 m) of building lines that is noncombustible according to ASTM E 136. Comply with NFPA 241.
2. Maintain support facilities until Architect schedules Substantial Completion inspection. Remove before Substantial Completion. Personnel remaining after Substantial Completion will be permitted to use permanent facilities, under conditions acceptable to Owner.

B. Parking: Use designated areas of Owner's existing parking areas for construction personnel.

C. Project Signs: Provide Project signs as indicated. Unauthorized signs are not permitted.
   1. Temporary Signs: Provide other signs as indicated and as required to inform public and individuals seeking entrance to Project.

      a. Provide temporary, directional signs for construction personnel and visitors.

   2. Maintain and touchup signs so they are legible at all times.

D. Waste Disposal Facilities: Provide waste-collection containers in sizes adequate to handle waste from construction operations. Comply with requirements of authorities having jurisdiction. Comply with progress cleaning requirements in Section 017300 "Execution."

E. Existing Stair Usage: Use of Owner's existing stairs will be permitted, provided stairs are cleaned and maintained in a condition acceptable to Owner. At Substantial Completion, restore stairs to condition existing before initial use.

   1. Provide protective coverings, barriers, devices, signs, or other procedures to protect stairs and to maintain means of egress. If stairs become damaged, restore damaged areas so no evidence remains of correction work.

3.4 SECURITY AND PROTECTION FACILITIES INSTALLATION

A. Protection of Existing Facilities: Protect existing vegetation, equipment, structures, utilities, and other improvements at Project site and on adjacent properties, except those indicated to be removed or altered. Repair damage to existing facilities.

B. Environmental Protection: Provide protection, operate temporary facilities, and conduct construction as required to comply with environmental regulations and that minimize possible air, waterway, and subsoil contamination or pollution or other undesirable effects.

   1. Comply with work restrictions specified in Section 011000 "Summary."

C. Security Enclosure and Lockup: Install temporary enclosure around partially completed areas of construction. Provide lockable entrances to prevent unauthorized entrance, vandalism, theft, and similar violations of security. Lock entrances at end of each work day.

D. Barricades, Warning Signs, and Lights: Comply with requirements of authorities having jurisdiction for erecting structurally adequate barricades, including warning signs and lighting.

E. Temporary Egress: Maintain temporary egress from existing occupied facilities as indicated and as required by authorities having jurisdiction.

F. Temporary Enclosures: Provide temporary enclosures for protection of construction, in progress and completed, from exposure, foul weather, other construction operations, and similar activities. Provide temporary weathertight enclosure for building exterior.

G. Temporary Partitions: Provide floor-to-ceiling dustproof partitions to limit dust and dirt migration and to separate areas occupied by Owner from fumes and noise.

1. Construct dustproof partitions with gypsum wallboard with joints taped on occupied side, and fire-retardant-treated plywood on construction operations side.
2. Construct dustproof partitions with two layers of 6-mil (0.14-mm) polyethylene sheet on each side. Cover floor with two layers of 6-mil (0.14-mm) polyethylene sheet, extending sheets 18 inches (460 mm) up the sidewalls. Overlap and tape full length of joints. Cover floor with fire-retardant-treated plywood.

    a. Construct vestibule and airlock at each entrance through temporary partition with not less than 48 inches (1219 mm) between doors. Maintain water-dampened foot mats in vestibule.

3. Where fire-resistance-rated temporary partitions are indicated or are required by authorities having jurisdiction, construct partitions according to the rated assemblies.
4. Insulate partitions to control noise transmission to occupied areas.
5. Seal joints and perimeter. Equip partitions with gasketed dustproof doors and security locks where openings are required.
6. Protect air-handling equipment.
7. Provide walk-off mats at each entrance through temporary partition.

H. Temporary Fire Protection: Install and maintain temporary fire-protection facilities of types needed to protect against reasonably predictable and controllable fire losses. Comply with NFPA 241; manage fire-prevention program.

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

3.5 MOISTURE AND MOLD CONTROL

A. Contractor's Moisture-Protection Plan: Avoid trapping water in finished work. Document visible signs of mold that may appear during construction.

B. Controlled Construction Phase of Construction: After completing and sealing of the building enclosure but prior to the full operation of permanent HVAC systems, maintain as follows:

1. Control moisture and humidity inside building by maintaining effective dry-in conditions.
2. Use permanent HVAC system to control humidity.
3. Comply with manufacturer's written instructions for temperature, relative humidity, and exposure to water limits.

3.6 OPERATION, TERMINATION, AND REMOVAL

A. Supervision: Enforce strict discipline in use of temporary facilities. To minimize waste and abuse, limit availability of temporary facilities to essential and intended uses.

B. Maintenance: Maintain facilities in good operating condition until removal.

1. Maintain operation of temporary enclosures, heating, cooling, humidity control, ventilation, and similar facilities on a 24-hour basis where required to achieve indicated results and to avoid possibility of damage.

C. Temporary Facility Changeover: Do not change over from using temporary security and protection facilities to permanent facilities until Substantial Completion.

D. Termination and Removal: Remove each temporary facility when need for its service has ended, when it has been replaced by authorized use of a permanent facility, or no later than Substantial Completion. Complete or, if necessary, restore permanent construction that may have been delayed because of interference with temporary facility. Repair damaged Work, clean exposed surfaces, and replace construction that cannot be satisfactorily repaired.

1. Materials and facilities that constitute temporary facilities are property of Contractor. Owner reserves right to take possession of Project identification signs.
2. Remove temporary roads and paved areas not intended for or acceptable for integration into permanent construction. Where area is intended for landscape development, remove soil and aggregate fill that do not comply with requirements for fill or subsoil. Remove materials contaminated with road oil, asphalt and other petrochemical compounds, and other substances that might impair growth of plant materials or lawns. Repair or replace street paving, curbs, and sidewalks at temporary entrances, as required by authorities having jurisdiction.
3. At Substantial Completion, repair, renovate, and clean permanent facilities used during construction period. Comply with final cleaning requirements specified in Section 017700 "Closeout Procedures."

END OF SECTION 015000

SECTION 017700 - CLOSEOUT PROCEDURES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section includes administrative and procedural requirements for contract closeout, including, but not limited to, the following:

1. Substantial Completion procedures.
2. Final completion procedures.
3. Warranties.
4. Final cleaning.
5. Repair of the Work.

1.3 ACTION SUBMITTALS

A. Product Data: For cleaning agents.

B. Contractor's List of Incomplete Items: Initial submittal at Substantial Completion.

C. Certified List of Incomplete Items: Final submittal at Final Completion.

1.4 CLOSEOUT SUBMITTALS

A. Certificates of Release: From authorities having jurisdiction.

B. Certificate of Insurance: For continuing coverage.

1.5 MAINTENANCE MATERIAL SUBMITTALS

A. Schedule of Maintenance Material Items: For maintenance material submittal items specified in other Sections.

1.6 SUBSTANTIAL COMPLETION PROCEDURES

A. Contractor's List of Incomplete Items: Prepare and submit a list of items to be completed and corrected (Contractor's punch list), indicating the value of each item on the list and reasons why the Work is incomplete.

B. Submittals Prior to Substantial Completion: Complete the following a minimum of 10 days prior to requesting inspection for determining date of Substantial Completion. List items below that are incomplete at time of request.

1. Certificates of Release: Obtain and submit releases from authorities having jurisdiction permitting Owner unrestricted use of the Work and access to services and utilities. Include occupancy permits, operating certificates, and similar releases.
2. Submit closeout submittals specified in other Division 01 Sections, including project record documents, operation and maintenance manuals, final completion construction photographic documentation, damage or settlement surveys, property surveys, and similar final record information.
3. Submit closeout submittals specified in individual Sections, including specific warranties, workmanship bonds, maintenance service agreements, final certifications, and similar documents.
4. Submit maintenance material submittals specified in individual Sections, including tools, spare parts, extra materials, and similar items, and deliver to location designated by Architect. Label with manufacturer's name and model number where applicable.

    a. Schedule of Maintenance Material Items: Prepare and submit schedule of maintenance material submittal items, including name and quantity of each item and name and number of related Specification Section. Obtain Architect's signature for receipt of submittals.
5. Submit changeover information related to Owner's occupancy, use, operation, and maintenance.

C. Procedures Prior to Substantial Completion: Complete the following a minimum of 10 days prior to requesting inspection for determining date of Substantial Completion. List items below that are incomplete at time of request.

1. Advise Owner of pending insurance changeover requirements.
2. Make final changeover of permanent locks and deliver keys to Owner. Advise Owner's personnel of changeover in security provisions.
3. Complete startup and testing of systems and equipment.
4. Perform preventive maintenance on equipment used prior to Substantial Completion.
5. Instruct Owner's personnel in operation, adjustment, and maintenance of products, equipment, and systems. Submit demonstration and training video recordings specified in Section 017900 "Demonstration and Training."
6. Advise Owner of changeover in heat and other utilities.
7. Participate with Owner in conducting inspection and walkthrough with local emergency responders.
8. Terminate and remove temporary facilities from Project site, along with mockups, construction tools, and similar elements.
9. Complete final cleaning requirements, including touchup painting.
10. Touch up and otherwise repair and restore marred exposed finishes to eliminate visual defects.

D. Inspection: Submit a written request for inspection to determine Substantial Completion a minimum of 10 days prior to date the work will be completed and ready for final inspection and tests. On receipt of request, Architect will either proceed with inspection or notify Contractor of unfulfilled requirements. Architect will prepare the Certificate of Substantial Completion

after inspection or will notify Contractor of items, either on Contractor's list or additional items identified by Architect, that must be completed or corrected before certificate will be issued.

1. Reinspection: Request reinspection when the Work identified in previous inspections as incomplete is completed or corrected.
2. Results of completed inspection will form the basis of requirements for final completion.

1.7 FINAL COMPLETION PROCEDURES

A. Submittals Prior to Final Completion: Before requesting final inspection for determining final completion, complete the following:

1. Submit a final Application for Payment according to Section 012900 "Payment Procedures."
2. Certified List of Incomplete Items: Submit certified copy of Architect's Substantial Completion inspection list of items to be completed or corrected (punch list), endorsed and dated by Architect. Certified copy of the list shall state that each item has been completed or otherwise resolved for acceptance.
3. Certificate of Insurance: Submit evidence of final, continuing insurance coverage complying with insurance requirements.
4. Submit pest-control final inspection report.

B. Inspection: Submit a written request for final inspection to determine acceptance a minimum of 10 days prior to date the work will be completed and ready for final inspection and tests. On receipt of request, Architect will either proceed with inspection or notify Contractor of unfulfilled requirements. Architect will prepare a final Certificate for Payment after inspection or will notify Contractor of construction that must be completed or corrected before certificate will be issued.

1. Reinspection: Request reinspection when the Work identified in previous inspections as incomplete is completed or corrected.

1.8 LIST OF INCOMPLETE ITEMS (PUNCH LIST)

A. Organization of List: Include name and identification of each space and area affected by construction operations for incomplete items and items needing correction including, if necessary, areas disturbed by Contractor that are outside the limits of construction.

1. Organize list of spaces in sequential order, starting with exterior areas first and proceeding from lowest floor to highest floor.
2. Organize items applying to each space by major element, including categories for ceiling, individual walls, floors, equipment, and building systems.
3. Include the following information at the top of each page:

    a. Project name.
    b. Date.
    c. Name of Architect.
    d. Name of Contractor.
    e. Page number.

4. Submit list of incomplete items in the following format:
   a. PDF electronic file. Architect will return annotated file.
   b. Three paper copies. Architect will return two copies.

1.9 SUBMITTAL OF PROJECT WARRANTIES

A. Time of Submittal: Submit written warranties on request of Architect for designated portions of the Work where commencement of warranties other than date of Substantial Completion is indicated, or when delay in submittal of warranties might limit Owner's rights under warranty.

B. Partial Occupancy: Submit properly executed warranties within **15** days of completion of designated portions of the Work that are completed and occupied or used by Owner during construction period by separate agreement with Contractor.

C. Organize warranty documents into an orderly sequence based on the table of contents of Project Manual.

   1. Bind warranties and bonds in heavy-duty, three-ring, vinyl-covered, loose-leaf binders, thickness as necessary to accommodate contents, and sized to receive 8-1/2-by-11-inch (215-by-280-mm) paper.
   2. Provide heavy paper dividers with plastic-covered tabs for each separate warranty. Mark tab to identify the product or installation. Provide a typed description of the product or installation, including the name of the product and the name, address, and telephone number of Installer.
   3. Identify each binder on the front and spine with the typed or printed title "WARRANTIES," Project name, and name of Contractor.
   4. Warranty Electronic File: Scan warranties and bonds and assemble complete warranty and bond submittal package into a single indexed electronic PDF file with links enabling navigation to each item. Provide bookmarked table of contents at beginning of document.

D. Provide additional copies of each warranty to include in operation and maintenance manuals.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Cleaning Agents: Use cleaning materials and agents recommended by manufacturer or fabricator of the surface to be cleaned. Do not use cleaning agents that are potentially hazardous to health or property or that might damage finished surfaces.

PART 3 - EXECUTION

3.1 FINAL CLEANING

A. General: Perform final cleaning. Conduct cleaning and waste-removal operations to comply with local laws and ordinances and Federal and local environmental and antipollution regulations.

B. Cleaning: Employ experienced workers or professional cleaners for final cleaning. Clean each surface or unit to condition expected in an average commercial building cleaning and maintenance program. Comply with manufacturer's written instructions.

1. Complete the following cleaning operations before requesting inspection for certification of Substantial Completion for entire Project or for a designated portion of Project:

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. Rake grounds that are neither planted nor paved to a smooth, even-textured surface.
d. Remove tools, construction equipment, machinery, and surplus material from Project site.
e. Remove snow and ice to provide safe access to building.
f. 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. Restore reflective surfaces to their original condition.
g. Remove debris and surface dust from limited access spaces, including roofs, plenums, shafts, trenches, equipment vaults, manholes, attics, and similar spaces.
h. Sweep concrete floors broom clean in unoccupied spaces.
i. Vacuum carpet and similar soft surfaces, removing debris and excess nap; clean according to manufacturer's recommendations if visible soil or stains remain.
j. Clean transparent materials, including mirrors and glass in doors and windows. Remove glazing compounds and other noticeable, vision-obscuring materials. Polish mirrors and glass, taking care not to scratch surfaces.
k. Remove labels that are not permanent.
l. Wipe surfaces of mechanical and electrical equipment[**, elevator equipment,**] and similar equipment. Remove excess lubrication, paint and mortar droppings, and other foreign substances.
m. Clean plumbing fixtures to a sanitary condition, free of stains, including stains resulting from water exposure.
n. Replace disposable air filters and clean permanent air filters. Clean exposed surfaces of diffusers, registers, and grills.
o. Clean ducts, blowers, and coils if units were operated without filters during construction or that display contamination with particulate matter on inspection.

1) Clean HVAC system in compliance with NADCA Standard 1992-01. Provide written report on completion of cleaning.

p. Clean light fixtures, lamps, globes, and reflectors to function with full efficiency.
q. Leave Project clean and ready for occupancy.

C. Pest Control: Comply with pest control requirements in Section 015000 "Temporary Facilities and Controls." Prepare written report.

D. Construction Waste Disposal: Comply with waste disposal requirements in Section 015000 "Temporary Facilities and Controls."

3.2 REPAIR OF THE WORK

A. Complete repair and restoration operations before requesting inspection for determination of Substantial Completion.

B. Repair or remove and replace defective construction. Repairing includes replacing defective parts, refinishing damaged surfaces, touching up with matching materials, and properly adjusting operating equipment. Where damaged or worn items cannot be repaired or restored, provide replacements. Remove and replace operating components that cannot be repaired. Restore damaged construction and permanent facilities used during construction to specified condition.

1. Remove and replace chipped, scratched, and broken glass, reflective surfaces, and other damaged transparent materials.
2. Touch up and otherwise repair and restore marred or exposed finishes and surfaces. Replace finishes and surfaces that that already show evidence of repair or restoration.

    a. Do not paint over "UL" and other required labels and identification, including mechanical and electrical nameplates. Remove paint applied to required labels and identification.

3. Replace parts subject to operating conditions during construction that may impede operation or reduce longevity.
4. Replace burned-out bulbs, bulbs noticeably dimmed by hours of use, and defective and noisy starters in fluorescent and mercury vapor fixtures to comply with requirements for new fixtures.

END OF SECTION 017700

SECTION 024119 - SELECTIVE STRUCTURE DEMOLITION

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section Includes:

1. Demolition and removal of selected portions of building or structure.
2. Salvage of existing items to be reused or recycled.

B. Related Requirements:

1. Section 011000 "Summary" for restrictions on the use of the premises, Owner-occupancy requirements, and phasing requirements.

1.3 DEFINITIONS

A. Remove: Detach items from existing construction and legally dispose of them off-site unless indicated to be removed and salvaged or removed and reinstalled.

B. Remove and Salvage: Carefully detach from existing construction, in a manner to prevent damage, and deliver to Owner ready for reuse.

C. Remove and Reinstall: Detach items from existing construction, prepare for reuse, and reinstall where indicated.

D. Existing to Remain: Existing items of construction that are not to be permanently removed and that are not otherwise indicated to be removed, removed and salvaged, or removed and reinstalled.

1.4 MATERIALS OWNERSHIP

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

1.5 PREINSTALLATION MEETINGS

A. Pre-demolition Conference: Conduct conference at Project site.

1. Inspect and discuss condition of construction to be selectively demolished.

2. Review and finalize selective demolition schedule and verify availability of materials, demolition personnel, equipment, and facilities needed to make progress and avoid delays.
3. Review requirements of work performed by other trades that rely on substrates exposed by selective demolition operations.
4. Review areas where existing construction is to remain and requires protection.

1.6 CLOSEOUT SUBMITTALS

A. Inventory: Submit a list of items that have been removed and salvaged.

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

1.7 FIELD CONDITIONS

A. Owner will occupy portions of building immediately adjacent to selective demolition area. Conduct selective demolition so Owner's operations will not be disrupted.

B. Conditions existing at time of inspection for bidding purpose will be maintained by Owner as far as practical.

C. Notify Architect of discrepancies between existing conditions and Drawings before proceeding with selective demolition.

D. Hazardous Materials: It is not expected that hazardous materials will be encountered in the Work.

1. Hazardous materials have been removed by Owner before start of the Work.
2. If suspected hazardous materials are encountered, do not disturb; immediately notify Architect and Owner. Hazardous materials will be removed by Owner under a separate contract.

E. Utility Service: Maintain existing utilities indicated to remain in service and protect them against damage during selective demolition operations.

1. Maintain fire-protection facilities in service during selective demolition operations.

PART 2 - PRODUCTS

2.1 PEFORMANCE REQUIREMENTS

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

B. Standards: Comply with ANSI/ASSE A10.6 and NFPA 241.

PART 3 - EXECUTION

3.1 EXAMINATION

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

B. Review record documents of existing construction provided by Owner. Owner does not guarantee that existing conditions are same as those indicated in record documents.

C. Survey existing conditions and correlate with requirements indicated to determine extent of selective demolition required.

D. When unanticipated mechanical, electrical, or structural elements that conflict with intended function or design are encountered, investigate and measure the nature and extent of conflict. Promptly submit a written report to Architect.

3.2 UTILITY SERVICES AND MECHANICAL/ELECTRICAL SYSTEMS

A. Existing Services/Systems to Remain: Maintain services/systems indicated to remain and protect them against damage.

1. Comply with requirements for existing services/systems interruptions specified in Section 011000 "Summary."

B. Existing Services/Systems to Be Removed, Relocated, or Abandoned: Locate, identify, disconnect, and seal or cap off indicated utility services and mechanical/electrical systems serving areas to be selectively demolished.

1. Owner will arrange to shut off indicated services/systems when requested by Contractor.
2. Arrange to shut off indicated utilities with utility companies.
3. If services/systems are required to be removed, relocated, or abandoned, provide temporary services/systems that bypass area of selective demolition and that maintain continuity of services/systems to other parts of building.
4. Disconnect, demolish, and remove fire-suppression systems, plumbing, and HVAC systems, equipment, and components indicated to be removed.
   a. Equipment to Be Removed: Disconnect and cap services and remove equipment.
   b. Equipment to Be Removed and Reinstalled: Disconnect and cap services and remove, clean, and store equipment; when appropriate, reinstall, reconnect, and make equipment operational.
   c. Equipment to Be Removed and Salvaged: Disconnect and cap services and remove equipment and deliver to Owner.
   d. Ducts to Be Removed: Remove portion of ducts indicated to be removed and plug remaining ducts with same or compatible ductwork material.

3.3 PREPARATION

A. Site Access and Temporary Controls: Conduct selective demolition and debris-removal operations to ensure minimum interference with roads, streets, walks, walkways, and other adjacent occupied and used facilities.

1. Comply with requirements for access and protection specified in Section 015000 "Temporary Facilities and Controls."

B. Temporary Facilities: Provide temporary barricades and other protection required to prevent injury to people and damage to adjacent buildings and facilities to remain.

1. Provide protection to ensure safe passage of people around selective demolition area and to and from occupied portions of building.
2. Provide temporary weather protection, during interval between selective demolition of existing construction on exterior surfaces and new construction, to prevent water leakage and damage to structure and interior areas.
3. Protect walls, ceilings, floors, and other existing finish work that are to remain or that are exposed during selective demolition operations.
4. Cover and protect furniture, furnishings, and equipment that have not been removed.
5. Comply with requirements for temporary enclosures, dust control, heating, and cooling specified in Section 015000 "Temporary Facilities and Controls."

C. Temporary Shoring: Provide and maintain shoring, bracing, and structural supports as required to preserve stability and prevent movement, settlement, or collapse of construction and finishes to remain, and to prevent unexpected or uncontrolled movement or collapse of construction being demolished.

1. Strengthen or add new supports when required during progress of selective demolition.

3.4 SELECTIVE DEMOLITION, GENERAL

A. General: Demolish and remove existing construction only to the extent required by new construction and as indicated. Use methods required to complete the Work within limitations of governing regulations and as follows:

1. Proceed with selective demolition systematically, from higher to lower level. Complete selective demolition operations above each floor or tier before disturbing supporting members on the next lower level.
2. Neatly cut openings and holes plumb, square, and true to dimensions required. Use cutting methods least likely to damage construction to remain or adjoining construction. Use hand tools or small power tools designed for sawing or grinding, not hammering and chopping, to minimize disturbance of adjacent surfaces. Temporarily cover openings to remain.
3. Cut or drill from the exposed or finished side into concealed surfaces to avoid marring existing finished surfaces.
4. Do not use cutting torches until work area is cleared of flammable materials. At concealed spaces, such as duct and pipe interiors, verify condition and contents of hidden space before starting flame-cutting operations. Maintain portable fire-suppression devices during flame-cutting operations.
5. Maintain adequate ventilation when using cutting torches.

6. Remove decayed, vermin-infested, or otherwise dangerous or unsuitable materials and promptly dispose of off-site.
7. Remove structural framing members and lower to ground by method suitable to avoid free fall and to prevent ground impact or dust generation.
8. Locate selective demolition equipment and remove debris and materials so as not to impose excessive loads on supporting walls, floors, or framing.
9. Dispose of demolished items and materials promptly.

B. Removed and Salvaged Items (ceiling tiles):

1. Clean salvaged items.
2. Pack or crate items after cleaning. Identify contents of containers.
3. Store items in a secure area until delivery to Owner.
4. Transport items to Owner's storage area designated by Owner.

C. Removed and Reinstalled Items (Light fixtures):

1. Clean and repair items to functional condition adequate for intended reuse.
2. Pack or crate items after cleaning and repairing. Identify contents of containers.
3. Protect items from damage during transport and storage.
4. Reinstall items in locations indicated. Comply with installation requirements for new materials and equipment. Provide connections, supports, and miscellaneous materials necessary to make item functional for use indicated.

D. Existing Items to Remain: Protect construction indicated to remain against damage and soiling during selective demolition. When permitted by Architect, items may be removed to a suitable, protected storage location during selective demolition **and cleaned** and reinstalled in their original locations after selective demolition operations are complete.

3.5 SELECTIVE DEMOLITION PROCEDURES FOR SPECIFIC MATERIALS

A. Masonry: Demolish in small sections. Cut masonry at junctures with construction to remain, using power-driven saw, then remove masonry between saw cuts.

B. Concrete Slabs-on-Grade: Saw-cut perimeter of area to be demolished, then break up and remove.

C. Ceiling and Lights: Remove Light fixtures for re-installation. Remove ceiling tiles for salvage or reuse by owner in other location. Remove ceiling grid but leave ties for re-use in new installation.

3.6 DISPOSAL OF DEMOLISHED MATERIALS

A. General: Except for items or materials indicated to be reused, salvaged, reinstalled, or otherwise indicated to remain Owner's property, remove demolished materials from Project site.

1. Do not allow demolished materials to accumulate on-site.
2. Remove and transport debris in a manner that will prevent spillage on adjacent surfaces and areas.

3. Remove debris from elevated portions of building by chute, hoist, or other device that will convey debris to grade level in a controlled descent.

3.7 CLEANING

A. Clean adjacent structures and improvements of dust, dirt, and debris caused by selective demolition operations. Return adjacent areas to condition existing before selective demolition operations began.

3.8 SELECTIVE DEMOLITION SCHEDULE

A. Existing Construction to Be Removed: Brick masonry, as shown on drawings.

B. Existing Items to Be Removed and Salvaged: Ceiling tiles

C. Existing Items to Be Removed and Reinstalled: Lighting fixtures

END OF SECTION 024119

SECTION 06 10 53 - MISCELLANEOUS ROUGH CARPENTRY

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:
   1. Wood blocking, furring and nailers.
   2. Miscellaneous sheathing.
   3. Plywood backing panels.

1.2 ACTION SUBMITTALS

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

   1. Include data for wood-preservative treatment from chemical treatment manufacturer and certification by treating plant that treated materials comply with requirements. Indicate type of preservative used and net amount of preservative retained.
   2. For products receiving a waterborne treatment, include statement that moisture content of treated materials was reduced to levels specified before shipment to Project site.

B. Testing Agency Qualifications: For testing agency providing classification marking for fire-retardant-treated material, an inspection agency acceptable to authorities having jurisdiction that periodically performs inspections to verify that the material bearing the classification marking is representative of the material tested.

1.3 DELIVERY, STORAGE, AND HANDLING

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

PART 2 - PRODUCTS

2.1 WOOD PRODUCTS, GENERAL

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

   1. Factory mark each piece of lumber with grade stamp of grading agency.
   2. Dress lumber, S4S, unless otherwise indicated.

B. Maximum Moisture Content of Lumber: 15 percent for 2-inch nominal thickness or less, 19 percent for more than 2-inch nominal thickness unless otherwise indicated.

2.2 MISCELLANEOUS LUMBER

A. General: Provide miscellaneous lumber indicated and lumber for support or attachment of other construction, including the following:

1. Blocking.
2. Nailers.

B. For items of dimension lumber size, provide Construction or No. 2 grade lumber and the following species:

1. Hem-fir (north); NLGA.
2. Mixed southern pine; SPIB.
3. Spruce-pine-fir; NLGA.

C. For blocking not used for attachment of other construction, Utility, Stud, or No. 3 grade lumber of any species may be used provided that it is cut and selected to eliminate defects that will interfere with its attachment and purpose.

D. For blocking and nailers used for attachment of other construction, select and cut lumber to eliminate knots and other defects that will interfere with attachment of other work.

E. For furring strips for installing plywood or hardboard paneling, select boards with no knots capable of producing bent-over nails and damage to paneling.

2.3 MISCELLANEOUS SHEATHING

A. Plywood Wall Sheathing: Exposure 1, Structural I (CDX) sheathing.

1. Span Rating: Not less than 24/0 or 32/16.
2. Nominal Thickness: As indicated on the drawings.

2.4 PLYWOOD BACKING PANELS

A. Equipment Backing Panels: DOC PS 1, Exterior, C-C Plugged, fire-retardant treated, in thickness indicated or, if not indicated, not less than 3/4-inch nominal thickness.

2.5 FASTENERS

A. General: Provide fasteners of size and type indicated that comply with requirements specified in this article for material and manufacture.

B. Nails, Brads, and Staples: ASTM F 1667.

C. Screws for Fastening to Metal Framing: ASTM C 1002 or ASTM C 954, length as recommended by screw manufacturer for material being fastened.

D. Power-Driven Fasteners: Fastener systems with an evaluation report acceptable to authorities having jurisdiction, based on ICC-ES AC70.

E. Post-Installed Anchors: Chemical anchor or expansion anchor bolt and sleeve assembly of material indicated below with capability to sustain, without failure, a load equal to 6 times the load imposed when installed in unit masonry assemblies and equal to 4 times the load imposed when installed in concrete as determined by testing per ASTM E 488 conducted by a qualified independent testing and inspecting agency.

1. Material for Interior Locations: Carbon-steel components, zinc plated to comply with ASTM B 633, Class Fe/Zn 5.

PART 3 - EXECUTION

3.1 INSTALLATION, GENERAL

A. Set carpentry to required levels and lines, with members plumb, true to line, cut, and fitted. Fit carpentry accurately to other construction. Locate furring, nailers, blocking and similar supports to comply with requirements for attaching other construction.

B. Install plywood backing panels by fastening to studs; coordinate locations with utilities requiring backing panels. Install fire-retardant-treated plywood backing panels with classification marking of testing agency exposed to view.

C. Do not splice structural members between supports unless otherwise indicated.

D. Provide blocking and framing as indicated and as required to support facing materials, fixtures, specialty items, and trim.

1. Provide metal clips for fastening gypsum board or lath at corners and intersections where framing or blocking does not provide a surface for fastening edges of panels. Space clips not more than 16 inches o.c.

E. Sort and select lumber so that natural characteristics do not interfere with installation or with fastening other materials to lumber. Do not use materials with defects that interfere with function of member or pieces that are too small to use with minimum number of joints or optimum joint arrangement.

F. Securely attach carpentry work to substrate by anchoring and fastening as indicated, complying with the following:

1. Table 2304.9.1, "Fastening Schedule," in ICC's International Building Code.
2. Table R602.3(1), "Fastener Schedule for Structural Members," and Table R602.3(2), "Alternate Attachments," in ICC's International Residential Code for One- and Two-Family Dwellings.
3. ICC-ES evaluation report for fastener.

G. Use steel common nails unless otherwise indicated. Select fasteners of size that will not fully penetrate members where opposite side will be exposed to view or will receive finish materials. Make tight connections between members. Install fasteners without splitting wood. Drive nails snug but do not countersink nail heads unless otherwise indicated.

3.2 WOOD BLOCKING AND NAILER INSTALLATION

A. Install where indicated and where required for attaching other work. Form to shapes indicated and cut as required for true line and level of attached work. Coordinate locations with other work involved.

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

END OF SECTION 06 10 53

SECTION 062023 - INTERIOR FINISH CARPENTRY

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section Includes:

1. Interior trim, including non-fire-rated interior door frames.

B. Related Requirements:
1. Section 099123 "Interior Painting" for priming and back-priming of interior finish carpentry.

1.3 DELIVERY, STORAGE, AND HANDLING

A. Stack lumber, plywood, and other panels flat with spacers between each bundle to provide air circulation. Protect materials from weather by covering with waterproof sheeting, securely anchored. Provide for air circulation around stacks and under coverings.

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

1.4 FIELD CONDITIONS

A. Do not install finish carpentry materials that are wet, moisture damaged, or mold damaged.

1. Indications that materials are wet or moisture damaged include, but are not limited to, discoloration, sagging, or irregular shape.
2. Indications that materials are mold damaged include, but are not limited to, fuzzy or splotchy surface contamination and discoloration.

PART 2 - PRODUCTS

2.1 MATERIALS, GENERAL

A. Lumber: DOC PS 20 and the following grading rules:

1. NeLMA: Northeastern Lumber Manufacturers' Association, "Standard Grading Rules for Northeastern Lumber."

B. Factory mark each piece of lumber with grade stamp of inspection agency indicating grade, species, moisture content at time of surfacing, and mill.

1. For exposed lumber, mark grade stamp on end or back of each piece.

2.2 INTERIOR TRIM

A. Softwood Lumber Trim for Transparent Finish (Stain or Clear Finish):
1. Species and Grade: Southern pine, B & B finish; SPIB.
2. Maximum Moisture Content: 15 percent.
3. Finger Jointing: Not allowed.
4. Face Surface: Smooth
5. Finish: Finish to match adjacent existing wainscot and trim casings.
6. Thickness: ¾” minimum.

2.3 FABRICATION

A. Back out or kerf backs of the following members except those with ends exposed in finished work:

1. Interior standing and running trim except shoe molds.

B. Ease edges of lumber less than 1 inch (25 mm) in nominal thickness to 1/16-inch (1.5-mm) radius and edges of lumber 1 inch (25 mm) or more in nominal thickness to 1/8-inch (3-mm) radius.

PART 3 - EXECUTION

3.1 EXAMINATION

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

B. Examine finish carpentry materials before installation. Reject materials that are wet, moisture damaged, and mold damaged.

C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Clean substrates of projections and substances detrimental to application.

B. Before installing interior finish carpentry, condition materials to average prevailing humidity in installation areas for a minimum of 24 hours.

3.3 INSTALLATION, GENERAL

A. Do not use materials that are unsound, warped, improperly treated or finished, inadequately seasoned, too small to fabricate with proper jointing arrangements, or with defective surfaces, sizes, or patterns.

B. Install interior finish carpentry level, plumb, true, and aligned with adjacent materials. Use concealed shims where necessary for alignment.

1. Scribe and cut interior finish carpentry to fit adjoining work. Refinish and seal cuts as recommended by manufacturer.
2. Where face fastening is unavoidable, countersink fasteners, fill surface flush, and sand unless otherwise indicated.
3. Install to tolerance of 1/8 inch in 96 inches (3 mm in 2438 mm) for level and plumb. Install adjoining interior finish carpentry with 1/32-inch (0.8-mm) maximum offset for flush installation and 1/16-inch (1.5-mm) maximum offset for reveal installation.
4. Install stairs with no more than 3/16-inch (4.7-mm) variation between adjacent treads and risers and with no more than 3/8-inch (9.5-mm) variation between largest and smallest treads and risers within each flight.
5. Coordinate interior finish carpentry with materials and systems in or adjacent to it. Provide cutouts for mechanical and electrical items that penetrate interior finish carpentry.

3.4 STANDING AND RUNNING TRIM INSTALLATION

A. Install with minimum number of joints practical, using full-length pieces from maximum lengths of lumber available. Do not use pieces less than 24 inches (610 mm) long, except where necessary. Stagger joints in adjacent and related standing and running trim. Miter at returns, miter at outside corners, and cope at inside corners to produce tight-fitting joints with full-surface contact throughout length of joint. Use scarf joints for end-to-end joints. Plane backs of casings to provide uniform thickness across joints where necessary for alignment.

1. Match color and grain pattern of trim for transparent finish (stain or clear finish) across joints.
2. Install trim after gypsum-board joint finishing operations are completed.
3. Install without splitting; drill pilot holes before fastening where necessary to prevent splitting. Fasten to prevent movement or warping. Countersink fastener heads on exposed carpentry work and fill holes.

3.5 ADJUSTING

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

3.6 CLEANING

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

3.7 PROTECTION

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

B. Remove and replace finish carpentry materials that are wet, moisture damaged, and mold damaged.

1. Indications that materials are wet or moisture damaged include, but are not limited to, discoloration, sagging, or irregular shape.
2. Indications that materials are mold damaged include, but are not limited to, fuzzy or splotchy surface contamination and discoloration.

END OF SECTION 062023

SECTION 08 14 16 - FLUSH WOOD DOORS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section Includes:

1. Solid-core doors with wood-veneer faces.
2. Factory finishing flush wood doors.
3. Factory fitting flush wood doors to frames and factory machining for hardware.
4. Factory glazing of wood doors.

B. Related Requirements:

1. Section 08 80 00 "Glazing" for glass view panels in flush wood doors.

1.3 ACTION SUBMITTALS

A. Product Data: For each type of door. Include details of core and edge construction and trim for openings. Include factory-finishing specifications.

B. Shop Drawings: Indicate location, size, and hand of each door; elevation of each kind of door; construction details not covered in Product Data; and the following:

1. Dimensions and locations of blocking.
2. Dimensions and locations of mortises and holes for hardware.
3. Dimensions and locations of cutouts.
4. Undercuts.
5. Fire-protection ratings for fire-rated doors.

C. Samples for Verification:

1. Factory finishes applied to actual door face materials, approximately 8 by 10 inches (200 by 250 mm), for each material and finish.

1.4 INFORMATIONAL SUBMITTALS

A. Sample Warranty: For special warranty.

1.5 DELIVERY, STORAGE, AND HANDLING

A. Comply with requirements of referenced standard and manufacturer's written instructions.

B. Package doors individually in plastic bags or cardboard cartons.

C. Mark each door on bottom rail with opening number used on Shop Drawings.

1.6 FIELD CONDITIONS

A. Environmental Limitations: Do not deliver or install doors until spaces are enclosed and weathertight, wet work in spaces is complete and dry, and HVAC system is operating and maintaining ambient temperature and humidity conditions at occupancy levels during remainder of construction period.

1.7 WARRANTY

A. A. Special Warranty: Manufacturer agrees to repair or replace doors that fail in materials or workmanship within specified warranty period.

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

a. Warping (bow, cup, or twist) more than 1/4 inch in a 42-by-84-inch section.
b. Telegraphing of core construction in face veneers exceeding 0.01 inch in a 3-inch span.

2. Warranty shall also include installation and finishing that may be required due to repair or replacement of defective doors.
3. Warranty Period for Solid-Core Interior Doors: Life of installation.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

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

1. Flush Wood Doors:

a. Algoma Hardwoods Inc.
b. Eggers Industries.
c. Graham Wood Doors; an Assa Abloy Group company.
d. Marshfield Door Systems, Inc..
e. VT Industries Inc.

B. Source Limitations: Obtain flush wood doors from single manufacturer.

2.2 FLUSH WOOD DOORS, GENERAL

A. Quality Standard: In addition to requirements specified, comply with WDMA I.S.1-A, "Architectural Wood Flush Doors."

1. Contract Documents contain selections chosen from options in quality standard and additional requirements beyond those of quality standard. Comply with those selections and requirements in addition to quality standard.

B. WDMA I.S.1-A Performance Grade: Extra Heavy Duty.

C. Smoke- and Draft-Control Door Assemblies: Listed and labeled for smoke and draft control, based on testing according to UL 1784.

D. Particleboard-Core Doors:

1. Particleboard: ANSI A208.1, Grade LD-2.
2. Blocking: Provide wood blocking in particleboard-core doors as needed to eliminate through-bolting hardware.

E. Structural-Composite-Lumber-Core Doors:

1. Structural Composite Lumber: WDMA I.S.10.

a. Screw Withdrawal, Face: 700 lbf.
b. Screw Withdrawal, Edge: 400 lbf.

2. Provide doors with structural-composite-lumber cores instead of particleboard cores for the following doors:

a. Doors indicated to receive exit devices.
b. Doors where oversized glass lites exceed more than 40 percent of the door surface area.

2.3 VENEER-FACED DOORS FOR TRANSPARENT FINISH

A. Interior Solid-Core Doors:

1. Grade: Premium, with Grade A faces.
2. Species: Match existing building doors
3. Cut: Match existing building doors.
4. Match between Veneer Leaves: **Pleasing** match.
5. Assembly of Veneer Leaves on Door Faces: Center-balance match.
6. Pair and Set Match: Provide for doors hung in same opening.
7. Exposed Vertical Edges: Same species as faces - edge Type A.
8. Core: Particleboard except where structural composite lumber is required.
9. Construction: Five plies. Stiles and rails are bonded to core, then entire unit is abrasive planed before veneering.

2.4 LIGHT FRAMES

A. Wood Beads for Light Openings in Wood Doors: Provide manufacturer's standard wood beads unless otherwise indicated.

1. Wood Species: Same species as door faces.
2. Profile: Flush rectangular beads.
3. At wood-core doors with 20-minute fire-protection ratings, provide wood beads and metal glazing clips approved for such use.

B. Metal Frames for Light Openings in Fire-Rated Doors: Manufacturer's standard frame formed of 0.048-inch thick, cold-rolled steel sheet; factory primed for paint finish; and approved for use in doors of fire-protection rating indicated.

2.5 FABRICATION

A. Factory fit doors to suit frame-opening sizes indicated. Comply with clearance requirements of referenced quality standard for fitting unless otherwise indicated.

1. Comply with NFPA 80 requirements for fire-rated doors.

B. Factory machine doors for hardware that is not surface applied. Locate hardware to comply with DHI-WDHS-3. Comply with final hardware schedules, door frame Shop Drawings, BHMA-156.115-W, and hardware templates.

1. Coordinate with hardware mortises in metal frames to verify dimensions and alignment before factory machining.

C. Openings: Factory cut and trim openings through doors.

1. Light Openings: Trim openings with moldings of material and profile indicated. Attach wood rectangular glazing beads flush with door face. Apply shims and sealant as required to set glazing.
2. Glazing: Factory install glazing in doors indicated to be factory finished. Comply with applicable requirements in Section 088000 "Glazing."

2.6 FACTORY FINISHING

A. General: Comply with referenced quality standard for factory finishing. Complete fabrication, including fitting doors for openings and machining for hardware that is not surface applied, before finishing.

1. Finish faces, all four edges, edges of cutouts, and mortises. Stains and fillers may be omitted on bottom edges, edges of cutouts, and mortises.

B. Factory finish doors.

C. Transparent Finish:

1. Grade: Premium.
2. Finish: WDMA TR-4 conversion varnish or WDMA TR-6 catalyzed polyurethane.
3. Staining: None required.
4. Sheen: Satin.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine doors and installed door frames, with Installer present, before hanging doors.

1. Verify that installed frames comply with indicated requirements for type, size, location, and swing characteristics and have been installed with level heads and plumb jambs.
2. Reject doors with defects.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

A. Hardware: For installation, see Section 087100 "Door Hardware."

B. Installation Instructions: Install doors to comply with manufacturer's written instructions and referenced quality standard, and as indicated.
1. Install smoke- and draft-control doors according to NFPA 105.

C. Factory-Fitted Doors: Align in frames for uniform clearance at each edge.

D. Factory-Finished Doors: Restore finish before installation if fitting or machining is required at Project site.

3.3 ADJUSTING

A. Operation: Rehang or replace doors that do not swing or operate freely.

B. Finished Doors: Replace doors that are damaged or that do not comply with requirements. Doors may be repaired or refinished if Work complies with requirements and shows no evidence of repair or refinishing.

END OF SECTION 08 14 16

SECTION 087100 - DOOR HARDWARE

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section includes:

1. Mechanical door hardware for the following:

   a. Swinging doors.
2. Electronic Access control

B. Related Sections:
1. Section 081416 "Flush Wood Doors"

1.3 ACTION SUBMITTALS

A. Product Data: For each type of product indicated. Include construction and installation details, material descriptions, dimensions of individual components and profiles, and finishes.

B. Selection: For plastic protective trim units in each finish, color, and texture required for each type of trim unit indicated.

C. Samples for Verification: For exposed door hardware of each type required, in each finish specified, prepared on Samples of size indicated below. Tag Samples with full description for coordination with the door hardware schedule. Submit Samples before, or concurrent with, submission of door hardware schedule.

1. Sample Size: Full-size units or minimum 2-by-4-inch (51-by-102-mm) Samples for sheet and 4-inch (102-mm) long Samples for other products.

   a. Full-size Samples will be returned to Contractor. Units that are acceptable and remain undamaged through submittal, review, and field comparison process may, after final check of operation, be incorporated into the Work, within limitations of keying requirements.

D. Other Action Submittals:

1. Shop drawings shall detail all connected devices, of sufficient detail to adequately communicate that recommended meets requirements, including:

a. System device locations on architectural floor plans.
b. System sequence operation description.

2. Door Hardware Schedule: Prepared by or under the supervision of Installer, detailing fabrication and assembly of door hardware, as well as installation procedures and diagrams. Coordinate final door hardware schedule with doors, frames, and related work to ensure proper size, thickness, hand, function, and finish of door hardware.

   a. Submittal Sequence: Submit door hardware schedule after submissions of Product Data, Samples, and Shop Drawings. Coordinate submission of door hardware schedule with scheduling requirements of other work to facilitate the fabrication of other work that is critical in Project construction schedule.
   b. Format: Comply with scheduling sequence and vertical format in DHI's "Sequence and Format for the Hardware Schedule." Double space entries, and number and date each page.
   c. Content: Include the following information:

      1) Identification number, location, hand, fire rating, size, and material of each door and frame.
      2) Locations of each door hardware set, cross-referenced to Drawings on floor plans and to door and frame schedule.
      3) Complete designations, including name and manufacturer, type, style, function, size, quantity, function, and finish of each door hardware product.
      4) Fastenings and other pertinent information.
      5) Explanation of abbreviations, symbols, and codes contained in schedule.
      6) Mounting locations for door hardware.
      7) List of related door devices specified in other Sections for each door and frame.

3. Keying Schedule: Prepared by or under the supervision of Installer, detailing State of Maine final keying instructions for locks. Include schematic keying diagram and index each key set to unique door designations that are coordinated with the Contract Documents.

1.4 INFORMATIONAL SUBMITTALS

A. Qualification Data: For Installer and Architectural Hardware Consultant.

B. Product Test Reports: For compliance with accessibility requirements, based on evaluation of comprehensive tests performed by manufacturer and witnessed by a qualified testing agency, for door hardware on doors located in accessible routes.

C. Warranty: Special warranty specified in this Section.

1.5 CLOSEOUT SUBMITTALS

A. Maintenance Data: For each type of door hardware to include in maintenance manuals. Include final hardware and keying schedule.

1.6 QUALITY ASSURANCE

A. Installer Qualifications: Supplier of products and an employer of workers trained and approved by product manufacturers and an Architectural Hardware Consultant who is available during the course of the Work to consult with Contractor, Architect, and Owner about door hardware and keying.

1. Warehousing Facilities: In Project's vicinity.
2. Scheduling Responsibility: Preparation of door hardware and keying schedules.
3. Engineering Responsibility: Preparation of data for electrified door hardware, including Shop Drawings, based on testing and engineering analysis of manufacturer's standard units in assemblies similar to those indicated for this Project.

B. Architectural Hardware Consultant Qualifications: A person who is experienced in providing consulting services for door hardware installations that are comparable in material, design, and extent to that indicated for this Project and who is currently certified by DHI as follows:

1. For door hardware, an Architectural Hardware Consultant (AHC)

C. Source Limitations: Obtain each type of door hardware from a single manufacturer.

1. Provide electrified door hardware from same manufacturer as mechanical door hardware, unless otherwise indicated. Manufacturers that perform electrical modifications and that are listed by a testing and inspecting agency acceptable to authorities having jurisdiction are acceptable.

D. Smoke- and Draft-Control Door Assemblies: Where smoke- and draft-control door assemblies are required, provide door hardware that meet requirements of assemblies tested according to UL 1784 and installed in compliance with NFPA 105.

1. Air Leakage Rate: Maximum air leakage of0.3 cfm/sq. ft. (3 cu. m per minute/sq. m) at the tested pressure differential of 0.3-inch wg (75 Pa) of water.

E. Means of Egress Doors: Latches do not require more than 15 lbf (67 N) to release the latch. Locks do not require use of a key, tool, or special knowledge for operation.

F. Accessibility Requirements: For door hardware on doors in an accessible route, comply with the U.S. Architectural & Transportation Barriers Compliance Board's ADA-ABA Accessibility Guidelines

1. Do not require tight grasping, pinching, or twisting of the wrist and that operate with a force of not more than 5 lbf (22.2 N).
2. Comply with the following maximum opening-force requirements:

a. Interior, Non-Fire-Rated Hinged Doors: 5 lbf (22.2 N) applied perpendicular to door.

3. Adjust door closer sweep periods so that, from an open position of 70 degrees, the door will take at least 3 seconds to move to a point 3 inches (75 mm) from the latch, measured to the leading edge of the door.

G. Keying Conference: Conduct conference at Project site to comply with requirements in Section 013100 "Project Management and Coordination." In addition to Owner**,** conference participants shall also include Installer's Architectural Hardware Consultant. Incorporate keying conference decisions into final keying schedule after reviewing door hardware keying system including, but not limited to, the following:

1. Function of building, flow of traffic, purpose of each area, degree of security required, and plans for future expansion.
2. Preliminary key system schematic diagram.
3. Requirements for key control system.
4. Address for delivery of keys.

1.7 DELIVERY, STORAGE, AND HANDLING

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

B. Tag each item or package separately with identification coordinated with the final door hardware schedule, and include installation instructions, templates, and necessary fasteners with each item or package.

C. Deliver keys to manufacturer of key control system for subsequent delivery to Owner.

D. Deliver keys and permanent cores to Owner by registered mail or overnight package service.

1.8 COORDINATION

A. Coordinate layout and installation of floor-recessed door hardware with floor construction. Cast anchoring inserts into concrete.

B. Installation Templates: Distribute for doors, frames, and other work specified to be factory prepared. Check Shop Drawings of other work to confirm that adequate provisions are made for locating and installing door hardware to comply with indicated requirements.

C. Existing Openings: Where hardware components are scheduled for application to existing construction or where modifications to existing door hardware are required, field verify existing conditions and coordinate installation of door hardware to suit opening conditions and to provide proper door operation.

1.9 WARRANTY

A. Special Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace components of door hardware that fail in materials or workmanship within specified warranty period.

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

a. Structural failures including excessive deflection, cracking, or breakage.
b. Faulty operation of doors and door hardware.
c. Deterioration of metals, metal finishes, and other materials beyond normal weathering and use.

2. Warranty Period: Three years from date of Substantial Completion, unless otherwise indicated.
a. Exit Devices: Two years from date of Substantial Completion.
b. Manual Closers: Ten years from date of Substantial Completion.

1.10 MAINTENANCE SERVICE

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

B. Maintenance Service: Beginning at Substantial Completion, provide six months' full maintenance by skilled employees of door hardware Installer. Include quarterly preventive maintenance, repair or replacement of worn or defective components, lubrication, cleaning, and adjusting as required for proper door and door hardware operation. Provide parts and supplies that are the same as those used in the manufacture and installation of original products.

PART 2 - PRODUCTS

2.1 SCHEDULED DOOR HARDWARE

A. Provide door hardware for each door as scheduled in Part 3 "Door Hardware Schedule" to comply with requirements in this Section.

1. Door Hardware Sets: Provide quantity, item, size, finish or color indicated, and products complying with BHMA designations referenced.

B. Designations: Requirements for design, grade, function, finish, size, and other distinctive qualities of each type of door hardware are indicated in Part 3 "Door Hardware Schedule" Article. Products are identified by using door hardware designations, as follows:

1. Named Manufacturers' Products: Manufacturer and product designation are listed for each door hardware type required for the purpose of establishing minimum requirements. Manufacturers' names are abbreviated in Part 3 "Door Hardware Schedule" Article.

2. References to BHMA Designations: Provide products complying with these designations and requirements for description, quality, and function.

2.2 HINGES

A. Hinges: Electrified Hinges: Provide template-produced hinges for hinges installed on hollow-metal frames.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
   a. Marray TEF2+4C-626-4.5x4.5.
   b. Or equal

2.3 ELECTRONIC LOCKS AND LATCHES

A. Lock Functions: As indicated in door hardware schedule.

B. Lock Throw: Comply with testing requirements for length of bolts required for labeled fire doors, and as follows:
   1. Mortise Locks: Minimum 3/4-inch (19-mm) latchbolt throw.
   2. Deadbolts: Minimum 1-inch (25-mm) throw.

C. Lock Backset: 2-3/4 inches (70 mm), unless otherwise indicated.

D. Lock Trim:

   1. Description: ADA compliant lever action knobs.
   2. Levers:

      a. Schlage L9080-BD-06A-626 to match existing building

   3. Knobs: Cast.
   4. Escutcheons (Roses): Cast.
   5. Finish: 626
   6. Dummy Trim: Match lever lock trim and escutcheons.
   7. Operating Device: Lever with escutcheons (roses).

E. Strikes: Provide manufacturer's electrified strike for each lock bolt or latchbolt complying with requirements indicated for applicable lock or latch and with strike box and curved lip extended to protect frame; finished to match lock or latch.
   1. Von Duprin 6400 series 24VDC Fail-locked
   2. Or equal.

2.4 LOCK CYLINDERS

A. Lock Cylinders: Tumbler type, constructed from brass or bronze, stainless steel, or nickel silver.
   a. by PMD Lock shop to match existing building.

B. Construction Master Keys: Provide cylinders with feature that permits voiding of construction keys without cylinder removal. Provide 6 construction master keys.

C. Construction Cores: Provide construction cores that are replaceable by permanent cores. Provide 10 construction master keys.

2.5 KEYING

A. Keying System: Factory registered, complying with guidelines in BHMA A156.28, Appendix A. Incorporate decisions made in keying conference.
   1. Master Key System: Change keys and a master key operate cylinders.

2.6 ACCESSORIES FOR PAIRS OF DOORS

A. Coordinators: BHMA A156.3; consisting of active-leaf, hold-open lever and inactive-leaf release trigger; fabricated from steel with nylon-coated strike plates; with built-in, adjustable safety release.

2.7 SURFACE CLOSERS

A. Surface Closers: BHMA A156.4; rack-and-pinion hydraulic type with adjustable sweep and latch speeds controlled by key-operated valves and forged-steel main arm. Comply with manufacturer's written recommendations for size of door closers depending on size of door, exposure to weather, and anticipated frequency of use. Provide factory-sized closers, adjustable to meet field conditions and requirements for opening force.

   1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
      a. LCN Closers; an Ingersoll-Rand company. – to match existing building

2.8 MECHANICAL STOPS AND HOLDERS

A. Wall- and Floor-Mounted Stops: BHMA A156.16; aluminum base metal.

   1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
      a. Door Controls International, Inc.
      b. Hager Companies.
      c. IVES Hardware; an Ingersoll-Rand company.
      d. Rockwood Manufacturing Company.
      e. Stanley Commercial Hardware; Div. of The Stanley Works.
      f. Trimco.

2.9 DOOR GASKETING

A. Door Gasketing: BHMA A156.22; air leakage not to exceed 0.50 cfm per foot (0.000774 cu. m/s per m) of crack length for gasketing other than for smoke control, as tested according to

ASTM E 283; with resilient or flexible seal strips that are easily replaceable and readily available from stocks maintained by manufacturer.

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

2.
   a. National Guard Products.
   b. Pemko Manufacturing Co.; an ASSA ABLOY Group company.
   c. Reese Enterprises, Inc.
   d. Zero International.

2.10 FABRICATION

A. Manufacturer's Nameplate: Do not provide products that have manufacturer's name or trade name displayed in a visible location except in conjunction with required fire-rated labels and as otherwise approved by Architect.

   1. Manufacturer's identification is permitted on rim of lock cylinders only.

B. Base Metals: Produce door hardware units of base metal indicated, fabricated by forming method indicated, using manufacturer's standard metal alloy, composition, temper, and hardness. Furnish metals of a quality equal to or greater than that of specified door hardware units and BHMA A156.18.

C. Fasteners: Provide door hardware manufactured to comply with published templates prepared for machine, wood, and sheet metal screws. Provide screws that comply with commercially recognized industry standards for application intended, except aluminum fasteners are not permitted. Provide Phillips flat-head screws with finished heads to match surface of door hardware, unless otherwise indicated.

   1. Concealed Fasteners: For door hardware units that are exposed when door is closed, except for units already specified with concealed fasteners. Do not use through bolts for installation where bolt head or nut on opposite face is exposed unless it is the only means of securely attaching the door hardware. Where through bolts are used on hollow door and frame construction, provide sleeves for each through bolt.
   2. Fire-Rated Applications:

      a. Wood or Machine Screws: For the following:

         1) Hinges mortised to doors or frames
         2) Strike plates to frames.
         3) Closers to doors and frames.

      b. Steel Through Bolts: For the following unless door blocking is provided:

         1) Surface hinges to doors.
         2) Closers to doors and frames.
         3) Surface-mounted exit devices.

3. Spacers or Sex Bolts: For through bolting of hollow-metal doors.
4. Gasketing Fasteners: Provide noncorrosive fasteners for exterior applications and elsewhere as indicated.

2.11 FINISHES

A. Provide finishes complying with BHMA A156.18 as indicated in door hardware schedule.

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

C. Appearance of Finished Work: Variations in appearance of abutting or adjacent pieces are acceptable if they are within one-half of the range of approved Samples. Noticeable variations in the same piece are not acceptable. Variations in appearance of other components are acceptable if they are within the range of approved Samples and are assembled or installed to minimize contrast.

PART 3 - EXECUTION

3.1 EXAMINATION

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

B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

A. Mounting Heights: Mount door hardware units at heights to comply with the following unless otherwise indicated or required to comply with governing regulations.

1. Standard Steel Doors and Frames: ANSI/SDI A250.8.

B. Install each door hardware item to comply with manufacturer's written instructions. Where cutting and fitting are required to install door hardware onto or into surfaces that are later to be painted or finished in another way, coordinate removal, storage, and reinstallation of surface protective trim units with finishing. Do not install surface-mounted items until finishes have been completed on substrates involved.

1. Set units level, plumb, and true to line and location. Adjust and reinforce attachment substrates as necessary for proper installation and operation.
2. Drill and countersink units that are not factory prepared for anchorage fasteners. Space fasteners and anchors according to industry standards.

C. Hinges: Install types and in quantities indicated in door hardware schedule but not fewer than the number recommended by manufacturer for application indicated or one hinge for every 30

inches (750 mm) of door height, whichever is more stringent, unless other equivalent means of support for door, such as spring hinges or pivots, are provided.

D. Lock Cylinders: Install construction cores to secure building and areas during construction period.

1. Replace construction cores with permanent cores as directed by Owner. Furnish permanent cores to Owner for installation.

E. Thresholds: Set thresholds for exterior doors and other doors indicated in full bed of sealant complying with requirements specified in Section 079200 "Joint Sealants."

F. Stops: Provide floor stops for doors unless wall or other type stops are indicated in door hardware schedule. Do not mount floor stops where they will impede traffic.

G. Perimeter Gasketing: Apply to head and jamb, forming seal between door and frame.

3.3 FIELD QUALITY CONTROL

A. Independent Architectural Hardware Consultant: Owner will engage a qualified independent Architectural Hardware Consultant to perform inspections and to prepare inspection reports.

1. Independent Architectural Hardware Consultant will inspect door hardware and state in each report whether installed work complies with or deviates from requirements, including whether door hardware is properly installed and adjusted.

3.4 ADJUSTING

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

1. Spring Hinges: Adjust to achieve positive latching when door is allowed to close freely from an open position of 30 degrees.
2. Electric Strikes: Adjust horizontal and vertical alignment of keeper to properly engage lock bolt.
3. Door Closers: Adjust sweep period to comply with accessibility requirements and requirements of authorities having jurisdiction.

B. Occupancy Adjustment: Approximately three months after date of Substantial Completion, Installer's Architectural Hardware Consultant shall examine and readjust each item of door hardware, including adjusting operating forces, as necessary to ensure function of doors, door hardware, and electrified door hardware.

3.5 CLEANING AND PROTECTION

A. Clean adjacent surfaces soiled by door hardware installation.

B. Clean operating items as necessary to restore proper function and finish.

C. Provide final protection and maintain conditions that ensure that door hardware is without damage or deterioration at time of Substantial Completion.

3.6 DEMONSTRATION

A. Engage a factory-authorized service representative to train Owner's maintenance personnel to adjust, operate, and maintain door hardware and door hardware finishes. Refer to Section 017900 "Demonstration and Training."

3.7 DOOR HARDWARE SCHEDULE

HW Set #1: Doors 1, 2	Lever Mortise Lock, Closer, Hinges, Threshold, Gasket, Floor Stop Function 13*

END OF SECTION 087100

SECTION 09 51 13 - ACOUSTICAL PANEL CEILINGS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section includes acoustical panels and exposed suspension systems for ceilings.

B. Products furnished, but not installed under this Section, include anchors, clips, and other ceiling attachment devices.

1.3 PREINSTALLATION MEETINGS

A. Preinstallation Conference: Conduct conference at Project site.

1.4 ACTION SUBMITTALS

A. Product Data: For each type of product.

B. Samples for Verification: For each component indicated and for each exposed finish required, prepared on Samples of size indicated below.

1. Acoustical Panel: Set of 6-inch-square Samples of each type, color, pattern, and texture.
2. Exposed Suspension-System Members, Moldings, and Trim: Set of 6-inch-long Samples of each type, finish, and color.

1.5 INFORMATIONAL SUBMITTALS

A. Qualification Data: For testing agency.

B. Product Test Reports: For each acoustical panel ceiling, for tests performed by manufacturer and witnessed by a qualified testing agency or a qualified testing agency.

C. Evaluation Reports: For each acoustical panel ceiling suspension system and anchor and fastener type, from ICC-ES.

1.6 CLOSEOUT SUBMITTALS

A. Maintenance Data: For finishes to include in maintenance manuals.

1.7 MAINTENANCE MATERIAL SUBMITTALS

A. Furnish extra materials that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.

1. Acoustical Ceiling Panels (ACP-1 only): Full-size panels equal to 2 percent of quantity installed.

1.8 QUALITY ASSURANCE

A. Testing Agency Qualifications: Qualified according to NVLAP for testing indicated.

1.9 DELIVERY, STORAGE, AND HANDLING

A. Deliver acoustical panels, suspension-system components, and accessories to Project site in original, unopened packages and store them in a fully enclosed, conditioned space where they will be protected against damage from moisture, humidity, temperature extremes, direct sunlight, surface contamination, and other causes.

B. Before installing acoustical panels, permit them to reach room temperature and a stabilized moisture content.

C. Handle acoustical panels carefully to avoid chipping edges or damaging units in any way.

1.10 FIELD CONDITIONS

A. Environmental Limitations: Do not install acoustical panel ceilings until spaces are enclosed and weatherproof, wet work in spaces is complete and dry, work above ceilings is complete, and ambient temperature and humidity conditions are maintained at the levels indicated for Project when occupied for its intended use.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. Seismic Performance: Acoustical ceiling shall withstand the effects of earthquake motions determined according to ASCE/SEI 7.

B. Surface-Burning Characteristics: Comply with ASTM E 84; testing by a qualified testing agency. Identify products with appropriate markings of applicable testing agency.

1. Flame-Spread Index: Comply with ASTM E 1264 for Class A materials.
2. Smoke-Developed Index: 50 or less.

C. Fire-Resistance Ratings: Comply with ASTM E 119; testing by a qualified testing agency. Identify products with appropriate markings of applicable testing agency.

1. Indicate design designations from UL's "Fire Resistance Directory" or from the listings of another qualified testing agency.

2.2 ACOUSTICAL PANELS, GENERAL

A. Source Limitations:

1. Acoustical Ceiling Panel: Obtain each type from single source from single manufacturer.
2. Suspension System: Obtain each type from single source from single manufacturer.

B. Source Limitations: Obtain each type of acoustical ceiling panel and supporting suspension system from single source from single manufacturer.

C. Acoustical Panel Standard: Provide manufacturer's standard panels of configuration indicated that comply with ASTM E 1264 classifications as designated by types, patterns, acoustical ratings, and light reflectances unless otherwise indicated.

1. Mounting Method for Measuring NRC: Type E-400; plenum mounting in which face of test specimen is 15-3/4 inches away from test surface according to ASTM E 795.

D. Acoustical Panel Colors and Patterns: Match appearance characteristics indicated for each product type.

1. Where appearance characteristics of acoustical panels are indicated by referencing pattern designations in ASTM E 1264 and not manufacturers' proprietary product designations, provide products selected by Architect from each manufacturer's full range that comply with requirements indicated for type, pattern, color, light reflectance, acoustical performance, edge detail, and size.

2.3 ACOUSTICAL PANELS FOR ACOUSTICAL PANEL CEILING – ACP-1

A. Available Products: Subject to compliance with requirements, products that may be incorporated into the Work include, but are not limited to, the following:

1. Armstrong World Industries, Inc.; Optima Health zone 3216.
2. Or Equal.

B. Classification: Provide panels complying with ASTM E 1264 for type, form, and pattern as follows:

1. Type and Form: Type XII, mineral base with painted finish; Form 2
2. Pattern: E

C. Color: White.

D. LR: Not less than 0.90.

E. NRC: Not less than 0.86.

F. Edge/Joint Detail: Square tegular.

G. Thickness: 1 inch.

H. Modular Size: 24 by 24 inches.

I. Antimicrobial Treatment: Broad spectrum fungicide and bactericide based.

2.4 METAL SUSPENSION SYSTEMS, GENERAL

A. Metal Suspension-System Standard: Provide manufacturer's standard direct-hung metal suspension systems of types, structural classifications, and finishes indicated that comply with applicable requirements in ASTM C 635/C 635M.

1. High-Humidity Finish: Comply with ASTM C 635/C 635M requirements for "Coating Classification for Severe Environment Performance" where high-humidity finishes are indicated.

B. Attachment
1. Devices: Reuse existing hangers wherever possible.
2. Size for five times the design load indicated in ASTM C 635/C 635M, Table 1, "Direct Hung," unless otherwise indicated. Comply with seismic design requirements.

3. Anchors in Concrete: Anchors of type and material indicated below, with holes or loops for attaching hangers of type indicated and with capability to sustain, without failure, a load equal to five times that imposed by ceiling construction, as determined by testing according to ASTM E 488 or ASTM E 1512 as applicable, conducted by a qualified testing and inspecting agency.

a. Type: Postinstalled expansion or postinstalled bonded anchors.
b. Corrosion Protection: Carbon-steel components zinc plated to comply with ASTM B 633, Class Fe/Zn 5 (0.005 mm) for Class SC 1 service condition.
c. Corrosion Protection: Stainless-steel components complying with ASTM F 593 and ASTM F 594, Group 1 Alloy 304 or 316 for bolts; Alloy 304 or 316 for anchor.
d. Corrosion Protection: Components fabricated from nickel-copper-alloy rods complying with ASTM B 164 for UNS No. N04400 alloy.

4. Power-Actuated Fasteners in Concrete: Fastener system of type suitable for application indicated, fabricated from corrosion-resistant materials, with clips or other accessory devices for attaching hangers of type indicated and with capability to sustain, without failure, a load equal to 10 times that imposed by ceiling construction, as determined by testing according to ASTM E 1190, conducted by a qualified testing and inspecting agency.

C. Wire Hangers, Braces, and Ties: Provide wires complying with the following requirements:

1. Zinc-Coated, Carbon-Steel Wire: ASTM A 641/A 641M, Class 1 zinc coating, soft temper.
2. Size: Select wire diameter so its stress at three times hanger design load (ASTM C 635/C 635M, Table 1, "Direct Hung") will be less than yield stress of wire, but provide not less than 0.106-inch- diameter wire.

D. Hanger Rods and Flat Hangers: Mild steel, zinc coated or protected with rust-inhibitive paint.

E. Angle Hangers: Angles with legs not less than 7/8 inch wide; formed with 0.04-inch-thick, galvanized-steel sheet complying with ASTM A 653/A 653M, G90 coating designation; with bolted connections and 5/16-inch-diameter bolts.

F. Seismic Stabilizer Bars: Manufacturer's standard perimeter stabilizers designed to accommodate seismic forces.

G. Seismic Struts: Manufacturer's standard compression struts designed to accommodate seismic forces.

H. Hold-Down Clips: Where indicated, provide manufacturer's standard hold-down clips spaced 24 inches o.c. on all cross tees.

1. Available Products: UHDC by Armstrong or L15 by USG.

2.5 METAL SUSPENSION SYSTEM

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

1. Armstrong World Industries, Inc.; Prelude 15/16" Exposed Tee System (7300 Series).
2. CertainTeed Corporation; S11 System.
3. Chicago Metallic Corporation; 1200 System.
4. United States Gypsum Company; DX 24 System.

B. Wide-Face, Capped, Double-Web, Steel Suspension System: Main and cross runners roll formed from cold-rolled steel sheet, prepainted, electrolytically zinc coated, or hot-dip galvanized according to ASTM A 653/A 653M, not less than G30 coating designation, with prefinished 15/16-inch- wide metal caps on flanges.

1. Structural Classification: Intermediate-duty system.
2. End Condition of Cross Runners: Override (stepped) or butt-edge type, as standard with manufacturer.
3. Face Design: Flat, flush.
4. Cap Material: Steel cold-rolled sheet.
5. Cap Finish: Painted white.

2.6 METAL EDGE MOLDINGS AND TRIM

A. Roll-Formed, Sheet-Metal Edge Moldings and Trim: Type and profile indicated or, if not indicated, manufacturer's standard moldings for edges and penetrations that comply with seismic design requirements; formed from sheet metal of same material, finish, and color as that used for exposed flanges of suspension-system runners.

1. Provide manufacturer's standard edge moldings that fit acoustical panel edge details and suspension systems indicated and that match width and configuration of exposed runners unless otherwise indicated.

2. For circular penetrations of ceiling, provide edge moldings fabricated to diameter required to fit penetration exactly.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates, areas, and conditions, including structural framing to which acoustical panel ceilings attach or abut, with Installer present, for compliance with requirements specified in this and other Sections that affect ceiling installation and anchorage and with requirements for installation tolerances and other conditions affecting performance of acoustical panel ceilings.

B. Examine acoustical panels before installation. Reject acoustical panels that are wet, moisture damaged, or mold damaged.

C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Measure each ceiling area and establish layout of acoustical panels to balance border widths at opposite edges of each ceiling. Avoid using less-than-half-width panels at borders, and comply with layout shown on reflected ceiling plans.

3.3 INSTALLATION

A. General: Install acoustical panel ceilings to comply with ASTM C 636/C 636M and seismic design requirements indicated, according to manufacturer's written instructions and CISCA's "Ceiling Systems Handbook."

B. Suspend ceiling hangers from building's structural members and as follows:

1. Hangers shall be single lengths of wire without splices; coordinate lengths in deep ceiling cavities.
2. Install hangers plumb and free from contact with insulation or other objects within ceiling plenum that are not part of supporting structure or of ceiling suspension system.
3. Splay hangers only where required and, if permitted with fire-resistance-rated ceilings, to miss obstructions; offset resulting horizontal forces by bracing, countersplaying, or other equally effective means.
4. Where width of ducts and other construction within ceiling plenum produces hanger spacings that interfere with location of hangers at spacings required to support standard suspension-system members, install supplemental suspension members and hangers in form of trapezes or equivalent devices.
5. Secure wire hangers to ceiling-suspension members and to supports above with a minimum of three tight turns. Connect hangers directly either to structures or to inserts, eye screws, or other devices that are secure and appropriate for substrate and that will not deteriorate or otherwise fail due to age, corrosion, or elevated temperatures.

6. Secure flat, angle, channel, and rod hangers to structure, including intermediate framing members, by attaching to inserts, eye screws, or other devices that are secure and appropriate for both the structure to which hangers are attached and the type of hanger involved. Install hangers in a manner that will not cause them to deteriorate or fail due to age, corrosion, or elevated temperatures.
7. Do not support ceilings directly from permanent metal forms or floor deck. Fasten hangers to cast-in-place hanger inserts, postinstalled mechanical or adhesive anchors, or power-actuated fasteners that extend through forms into concrete.
8. When steel framing does not permit installation of hanger wires at spacing required, install carrying channels or other supplemental support for attachment of hanger wires.
9. Do not attach hangers to steel deck tabs.
10. Do not attach hangers to steel roof deck. Attach hangers to structural members.
11. Space hangers not more than 48 inches o.c. along each member supported directly from hangers unless otherwise indicated; provide hangers not more than 8 inches from ends of each member.
12. Size supplemental suspension members and hangers to support ceiling loads within performance limits established by referenced standards and publications.

C. Secure bracing wires to ceiling suspension members and to supports with a minimum of four tight turns. Suspend bracing from building's structural members as required for hangers, without attaching to permanent metal forms, steel deck, or steel deck tabs. Fasten bracing wires into concrete with cast-in-place or postinstalled anchors.

D. Suspension system shall be reinforced to support diffusers, light fixtures and any additional members. Install hanger wires to grid at each corner of light fixtures. Coordinate location with electrical and other trades.

1. Each individual fixture and attachment with combined weight of 56 pounds or less shall have two 12-gage wire hangers attached at diagonal corners of the fixture. These wires shall be slack. Fixtures and attachments with a combined weight of greater than 56 pounds shall be independently supported from the structure at all four corners.

E. Install edge moldings and trim of type indicated at perimeter of acoustical ceiling area and where necessary to conceal edges of acoustical panels.

1. Attach moldings to substrate at intervals not more than 16 inches o.c. and not more than 3 inches from ends, leveling with ceiling suspension system to a tolerance of 1/8 inch in 12 feet. Miter corners accurately and connect securely.
2. Do not use exposed fasteners, including pop rivets, on moldings and trim.

F. Install suspension-system runners so they are square and securely interlocked with one another. Remove and replace dented, bent, or kinked members.

G. Install acoustical panels with undamaged edges and fit accurately into suspension-system runners and edge moldings. Scribe and cut panels at borders and penetrations to provide a neat, precise fit.

1. Arrange directionally patterned acoustical panels as follows:

a. As indicated on reflected ceiling plans.
b. Install panels with pattern running in one direction parallel to long axis of space.

2. For square-edged panels, install panels with edges fully hidden from view by flanges of suspension-system runners and moldings.
3. For reveal-edged panels on suspension-system runners, install panels with bottom of reveal in firm contact with top surface of runner flanges.
4. Paint cut edges of panel remaining exposed after installation; match color of exposed panel surfaces using coating recommended in writing for this purpose by acoustical panel manufacturer.
5. Install hold-down clips in areas within 10 feet of exterior doors or vestibule doors; space as recommended by panel manufacturer's written instructions, unless otherwise indicated or required.

3.4 FIELD QUALITY CONTROL

A. Above-Ceiling Observation: Before Contractor installs acoustical panel ceilings, conduct an above-ceiling observation and report deficiencies in the Work observed. Do not proceed with installation of acoustical panels until deficiencies have been corrected.

1. Complete the following in areas to receive gypsum board ceilings:

   a. Installation of 80 percent of lighting fixtures, powered for operation.
   b. Installation, insulation, and leak and pressure testing of water piping systems.
   c. Installation of air-duct systems.
   d. Installation of air devices.
   e. Installation of mechanical system control-air tubing.
   f. Installation of Penetration Firestopping and Fire-Resistive Joint Systems.

3.5 CLEANING

A. Clean exposed surfaces of acoustical panel ceilings, including trim, edge moldings, and suspension-system members. Comply with manufacturer's written instructions for cleaning and touchup of minor finish damage. Remove and replace ceiling components that cannot be successfully cleaned and repaired to permanently eliminate evidence of damage.

3.6 SCHEDULE

A. ACP-1: Provide in all areas unless indicated otherwise.

END OF SECTION 09 51 13

SECTION 09 65 13 - RESILIENT BASE AND ACCESSORIES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section Includes:

1. Resilient base.
2. Resilient molding accessories.

1.3 ACTION SUBMITTALS

A. Product Data: For each type of product.

B. Samples: For each exposed product and for each color and texture specified, not less than 12 inches long.

C. Samples for Initial Selection: For each type of product indicated.

D. Samples for Verification: For each type of product indicated and for each color, texture, and pattern required in manufacturer's standard-size Samples, but not less than 12 inches long.

E. Product Schedule: For resilient base and accessory products. Use same designations indicated on Drawings.

1.4 MAINTENANCE MATERIAL SUBMITTALS

A. Furnish extra materials that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.

1. Furnish not less than 10 linear feet for every 500 linear feet or fraction thereof, of each type, color, pattern, and size of resilient product installed.

1.5 DELIVERY, STORAGE, AND HANDLING

A. Store resilient products and installation materials in dry spaces protected from the weather, with ambient temperatures maintained within range recommended by manufacturer, but not less than 50 deg F or more than 90 deg F.

1.6 FIELD CONDITIONS

A. Maintain ambient temperatures within range recommended by manufacturer, but not less than 70 deg F or more than 95 deg F, in spaces to receive resilient products during the following time periods:

1. 48 hours before installation.
2. During installation.
3. 48 hours after installation.

B. After installation and until Substantial Completion, maintain ambient temperatures within range recommended by manufacturer, but not less than 55 deg F or more than 95 deg F.

C. Install resilient products after other finishing operations, including painting, have been completed.

PART 2 - PRODUCTS

2.1 THERMOPLASTIC-RUBBER BASE

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

1. Johnsonite; A Tarkett Company
2. Armstrong World Industries, Inc.
3. Burke Mercer Flooring Products, Division of Burke Industries Inc.
4. Flexco.
5. Nora Systems, Inc.
6. Roppe Corporation, USA.

B. Product Standard: ASTM F 1861, Type TP (rubber, thermoplastic).

1. Group: I (solid, homogeneous).
2. Style and Location:

a. Style B, Cove: Provide in areas with resilient flooring.

C. Thickness: 0.125 inch.

D. Height: 4 inches.

E. Lengths: Coils in manufacturer's standard length.

F. Outside Corners: Job formed or preformed.

G. Inside Corners: Job formed or preformed.

H. Colors: As selected by Architect from full range of industry colors.

2.2 VINYL MOLDING ACCESSORY

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

1. Armstrong World Industries, Inc.
2. Burke Mercer Flooring Products, Division of Burke Industries Inc.
3. Flexco.
4. Johnsonite; A Tarkett Company.
5. Musson Rubber Company.
6. Roppe Corporation, USA.

B. Profile and Dimensions:

1. Reducer Strip between Carpet and VCT: RRS-XX-C by Johnsonite or approved substitute.

C. Colors and Patterns: As selected by Architect from full range of industry colors.

2.3 INSTALLATION MATERIALS

A. Trowelable Leveling and Patching Compounds: Latex-modified, portland cement based or blended hydraulic-cement-based formulation provided or approved by resilient-product manufacturer for applications indicated.

B. Adhesives: Water-resistant type recommended by resilient-product manufacturer for resilient products and substrate conditions indicated.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates, with Installer present, for compliance with requirements for maximum moisture content and other conditions affecting performance of the Work.

1. Verify that finishes of substrates comply with tolerances and other requirements specified in other Sections and that substrates are free of cracks, ridges, depressions, scale, and foreign deposits that might interfere with adhesion of resilient products.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

1. Installation of resilient products indicates acceptance of surfaces and conditions.

3.2 PREPARATION

A. Prepare substrates according to manufacturer's written instructions to ensure adhesion of resilient products.

B. Fill cracks, holes, and depressions in substrates with trowelable leveling and patching compound; remove bumps and ridges to produce a uniform and smooth substrate.

C. Do not install resilient products until they are the same temperature as the space where they are to be installed.

1. At least 48 hours in advance of installation, move resilient products and installation materials into spaces where they will be installed.

D. Immediately before installation, sweep and vacuum clean substrates to be covered by resilient products.

3.3 RESILIENT BASE INSTALLATION

A. Comply with manufacturer's written instructions for installing resilient base.

B. Apply resilient base to walls, columns, pilasters, casework and cabinets in toe spaces, and other permanent fixtures in rooms and areas where base is required.

C. Install resilient base in lengths as long as practical without gaps at seams and with tops of adjacent pieces aligned.

D. Tightly adhere resilient base to substrate throughout length of each piece, with base in continuous contact with horizontal and vertical substrates.

E. Do not stretch resilient base during installation.

F. On masonry surfaces or other similar irregular substrates, fill voids along top edge of resilient base with manufacturer's recommended adhesive filler material.

G. Preformed Corners: Install preformed corners before installing straight pieces.

H. Job-Formed Corners:

1. Outside Corners: Use straight pieces of maximum lengths possible and form with returns not less than 3 inches in length.

a. Form without producing discoloration (whitening) at bends.

2. Inside Corners: Use straight pieces of maximum lengths possible and form with returns not less than 3 inches in length.

a. Miter or cope corners to minimize open joints.

3.4 RESILIENT ACCESSORY INSTALLATION

A. Comply with manufacturer's written instructions for installing resilient accessories.

B. Resilient Molding Accessories: Butt to adjacent materials and tightly adhere to substrates throughout length of each piece. Install reducer strips at edges of floor covering that would otherwise be exposed.

3.5 CLEANING AND PROTECTION

A. Comply with manufacturer's written instructions for cleaning and protecting resilient products.

B. Perform the following operations immediately after completing resilient-product installation:

1. Remove adhesive and other blemishes from exposed surfaces.
2. Sweep and vacuum horizontal surfaces thoroughly.
3. Damp-mop horizontal surfaces to remove marks and soil.

C. Protect resilient products from mars, marks, indentations, and other damage from construction operations and placement of equipment and fixtures during remainder of construction period.

D. Cover resilient products subject to wear and foot traffic until Substantial Completion.

END OF SECTION 09 65 13

SECTION 09 65 19 - RESILIENT TILE FLOORING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section Includes:

1. Solid vinyl floor tile.

1.3 ACTION SUBMITTALS

A. Product Data: For each type of product.

B. Samples for Initial Selection: For each type of floor tile indicated.

C. Samples for Verification: Full-size units of each color and pattern of floor tile required.

D. Product Schedule: For floor tile. Use same designations indicated on Drawings.

1.4 INFORMATIONAL SUBMITTALS

A. Qualification Data: For Installer.

1.5 CLOSEOUT SUBMITTALS

A. Maintenance Data: For each type of floor tile to include in maintenance manuals.

1.6 MAINTENANCE MATERIAL SUBMITTALS

A. Furnish extra materials that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.

1. Floor Tile: Furnish one box for every 50 boxes or fraction thereof, of each type, color, and pattern of floor tile installed.

1.7 DELIVERY, STORAGE, AND HANDLING

A. Store floor tile and installation materials in dry spaces protected from the weather, with ambient temperatures maintained within range recommended by manufacturer, but not less than 50 deg F or more than 90 deg F. Store floor tiles on flat surfaces.

1.8 FIELD CONDITIONS

A. Maintain ambient temperatures within range recommended by manufacturer, but not less than 70 deg F or more than 95 deg F, in spaces to receive floor tile during the following time periods:

1. 48 hours before installation.
2. During installation.
3. 48 hours after installation.

B. After installation and until Substantial Completion, maintain ambient temperatures within range recommended by manufacturer, but not less than 55 deg F or more than 95 deg F.

C. Close spaces to traffic during floor tile installation.

D. Close spaces to traffic for 48 hours after floor tile installation.

E. Install floor tile after other finishing operations, including painting, have been completed.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. Fire-Test-Response Characteristics: For resilient tile flooring, as determined by testing identical products according to ASTM E 648 or NFPA 253 by a qualified testing agency.

1. Critical Radiant Flux Classification: Class I, not less than 0.45 W/sq. cm.

2.2 SOLID VINYL FLOOR TILE

A. Products: Subject to compliance with requirements, provide one the following:

1. iQ Granit Micro Floor Tile as manufactured by Johnsonite/Tarkett

2. or equal

B. Tile Standard: ASTM F 1700.

1. Class: Class I, Type A.
2. Type: Type B, embossed surface.

C. Wear layer/Overall thickness: .080" (2.0 mm).

D. Size:

1. Tile size: 24" X 24" (61 X 61 cm).

E. Colors and Patterns: 3 colors in pattern as indicated on drawings:
1. 356 Tusk
2. 354 Guster
355 Spano

2.3 INSTALLATION MATERIALS

A. Trowelable Leveling and Patching Compounds: Latex-modified, portland cement based or blended hydraulic-cement-based formulation provided or approved by floor tile manufacturer for applications indicated.

B. Floor Polish: Provide protective, liquid floor-polish products recommended by floor tile manufacturer.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates, with Installer present, for compliance with requirements for maximum moisture content and other conditions affecting performance of the Work.

1. Verify that finishes of substrates comply with tolerances and other requirements specified in other Sections and that substrates are free of cracks, ridges, depressions, scale, and foreign deposits that might interfere with adhesion of floor tile.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 SUBSTRATE TESTING

A. General: Conduct testing using an independent agency with a minimum of five years' experience in moisture emission testing or as pre-approved by the manufacturer of the flooring material.

B. Moisture Emission Testing: Conduct moisture emission testing of concrete slabs-on-grade and elevated slabs to receive floor coverings or coatings by the calcium chloride test method. Perform tests in accordance with ASTM F-1869.

1. Conduct a minimum of three tests for the first 1,000 sq. ft. and one additional test for each additional 1,000 sq. ft.
2. Ambient test environment shall conform to ASTM-1869 and be reflective of the building's normal operational environment.
3. Conduct tests on bare concrete, free of surface contaminants, adhesives, curing compounds or sealers.

4. Locate test locations a minimum of five feet from exterior walls or interior walls that penetrate the floor. Do not conduct tests over random cracks or within five feet of control or construction joints.
5. Proceed with installation only after substrates have maximum moisture-vapor-emission rate of 3 lb of water/1000 sq. ft. in 24 hours.

C. Internal Relative Humidity Testing: Conduct internal relative humidity testing of concrete slabs-on-grade and elevated slabs to receive floor coverings or coatings in accordance with ASTM F-2170.

1. Proceed with installation only after substrates have a maximum 75 percent relative humidity level measurement.

D. Surface Alkalinity Testing: Conduct alkalinity testing of the concrete surface at all moisture emission test locations in accordance with ASTM F710 5.3.1.

E. Submit all test results to the Architect, flooring installer and manufacturer of the flooring materials before installation of the flooring materials.

3.3 PREPARATION

A. Prepare substrates according to floor tile manufacturer's written instructions to ensure adhesion of resilient products.

B. Concrete Substrates: Prepare according to ASTM F 710.

1. Verify that substrates are dry and free of curing compounds, sealers, and hardeners.
2. Remove substrate coatings and other substances that are incompatible with adhesives and that contain soap, wax, oil, or silicone, using mechanical methods recommended by floor tile manufacturer. Do not use solvents.

C. Fill cracks, holes, and depressions in substrates with trowelable leveling and patching compound; remove bumps and ridges to produce a uniform and smooth substrate.

D. Do not install floor tiles until they are the same temperature as the space where they are to be installed.

1. At least 48 hours in advance of installation, move resilient floor tile and installation materials into spaces where they will be installed.

E. Immediately before installation, sweep and vacuum clean substrates to be covered by resilient floor tile.

3.4 FLOOR TILE INSTALLATION

A. Comply with manufacturer's written instructions for installing floor tile.

B. Lay out floor tiles from center marks established with principal walls, discounting minor offsets, so tiles at opposite edges of room are of equal width. Adjust as necessary to avoid using cut widths that equal less than one-half tile at perimeter.

1. Lay tiles square with room axis.

C. Match floor tiles for color and pattern by selecting tiles from cartons in the same sequence as manufactured and packaged, if so numbered. Discard broken, cracked, chipped, or deformed tiles.

1. Lay tiles with grain running in one direction in direction and pattern as indicated by the Architect.

D. Scribe, cut, and fit floor tiles to butt neatly with 1/4 inch clearance to vertical surfaces and permanent fixtures including built-in furniture, cabinets, pipes, outlets, and door frames. After resilient base in installed, fill all exposed joints with sealant matching color of flooring.

E. Extend floor tiles into toe spaces, door reveals, closets, and similar openings. Extend floor tiles to center of door openings.

F. Maintain reference markers, holes, and openings that are in place or marked for future cutting by repeating on floor tiles as marked on substrates. Use chalk or other nonpermanent marking device.

3.5 CLEANING AND PROTECTION

A. Comply with manufacturer's written instructions for cleaning and protecting floor tile.

B. Perform the following operations immediately after completing floor tile installation:

1. Remove adhesive and other blemishes from exposed surfaces.
2. Sweep and vacuum surfaces thoroughly.
3. Damp-mop surfaces to remove marks and soil.

C. Protect floor tile from mars, marks, indentations, and other damage from construction operations and placement of equipment and fixtures during remainder of construction period.

D. Floor Polish: Remove soil, adhesive, and blemishes from floor tile surfaces before applying liquid floor polish.

1. Apply one coat.

E. Cover floor tile until Substantial Completion.

END OF SECTION 09 65 19

SECTION 09 91 23 - INTERIOR PAINTING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section includes surface preparation and the application of paint systems on the following interior substrates:
   1. Steel and galvanized metal.
   2. Wood.
   3. Gypsum board.

1.3 DEFINITIONS

A. MPI Gloss Level 1: Not more than five units at 60 degrees and 10 units at 85 degrees, according to ASTM D 523.

B. MPI Gloss Level 2: Not more than 10 units at 60 degrees and 10 to 35 units at 85 degrees, according to ASTM D 523.

C. MPI Gloss Level 3: 10 to 25 units at 60 degrees and 10 to 35 units at 85 degrees, according to ASTM D 523.

D. MPI Gloss Level 4: 20 to 35 units at 60 degrees and not less than 35 units at 85 degrees, according to ASTM D 523.

E. MPI Gloss Level 5: 35 to 70 units at 60 degrees, according to ASTM D 523.

F. MPI Gloss Level 6: 70 to 85 units at 60 degrees, according to ASTM D 523.

G. MPI Gloss Level 7: More than 85 units at 60 degrees, according to ASTM D 523.

1.4 ACTION SUBMITTALS

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

   1. Indicate VOC content.

B. Samples for Initial Selection: For each type of topcoat product.

C. Samples for Verification: For each type of paint system and in each color and gloss of topcoat.

1. Submit Samples on rigid backing, 8 inches square.
2. Apply coats on Samples in steps to show each coat required for system.
3. Label each coat of each Sample.
4. Label each Sample for location and application area.

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

1.5 MAINTENANCE MATERIAL SUBMITTALS

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

1.6 QUALITY ASSURANCE

A. Applicator Qualifications: Engage an experienced Applicator who has completed painting system applications similar in material, design, and extent to those indicated for this Project, whose work has resulted in applications with a record of successful in-service performance.

B. Source Limitations: Obtain block fillers, primers and undercoat materials for each coating system from the same manufacturer as the finish coats.

1.7 DELIVERY, STORAGE, AND HANDLING

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

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

1.8 FIELD CONDITIONS

A. Apply paints only when temperature of surfaces to be painted and ambient air temperatures are between 50 and 95 deg F.

B. Do not apply paints when relative humidity exceeds 85 percent; at temperatures less than 5 deg F above the dew point; or to damp or wet surfaces.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

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

1. Benjamin Moore & Co.
2. California Paints.
3. PPG Architectural Finishes, Inc. (Pittsburgh Paints, Glidden Professional, Flood Stains)
4. Sherwin-Williams Company (The).

B. Products: Subject to compliance with requirements, provide one of the products listed in the Interior Painting Schedule for the paint category indicated.

2.2 PAINT, GENERAL

A. Material Compatibility:

1. Materials for use within each paint system shall be compatible with one another and substrates indicated, under conditions of service and application as demonstrated by manufacturer, based on testing and field experience.
2. For each coat in a paint system, products shall be recommended in writing by topcoat manufacturers for use in paint system and on substrate indicated.

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

1. Allow for up to 3 different color selections.

2.3 PRIMERS/SEALERS

A. Low-VOC Latex Primer/Sealer:

1. Cal: Envirotech Zero VOC Interior Latex Primer/Sealer, 64600.
2. Moore: Pristine Eco Spec Interior Latex Primer Sealer, No. 231
3. Glidden Professional: 9116-1200 LifeMaster No VOC Interior Primer. (0 g/L)
4. PPG: Pure Performance Interior Latex Primer, 9-900 Series. (0 g/L)
5. SW: ProMar 200 Zero VOC Interior Latex Primer B28W02600 Series. (0 g/L)]

B. High-Build Primer/Sealer:

1. Cal: Hide-A-Spray, 91-20. (VOC 76 g/L)
2. Glidden Professional: 1040-1200, High Build Surfacer Interior Primer Sealer. (100g/L)
3. PPG: 6-1 Speedhide Interior MaxBuild High Build Surfacer. (<50 g/L)
4. SW: PrepRite High Build Interior Latex Primer/Surfacer B28W601 (VOC 74 g/L).
5. Moore: Super Spec Satin-Fil 172 (VOC 31g/L)

2.4 METAL PRIMERS

A. Rust-Inhibitive Primer (Water Based):

1. Cal: Rust Stop DTM 100% Acrylic Semi-Gloss, 10XX.
2. Devoe Coatings: 4020-1000 Devflex 4020PF DTM Primer & Flat Finish. (91 g/L)
3. Moore: IMC Acrylic Metal Primer M04. (51 g/L)
4. Pittsburgh Paints; 90-712 Pitt-Tech One Pack Interior/Exterior Primer Finish DTM Industrial Enamel. (123 g/L)
5. S-W: IMC Pro-Cryl Universal Primer, B66-310 Series. (100 g/L)

2.5 WOOD PRIMERS

A. Latex-Based Wood Primer:

1. Cal: ASAP "30" 50300.
2. Glidden Professional: 3210-1200 Gripper Interior/Exterior Primer Sealer. (100 g/L)
3. Moore: Super Spec Latex Enamel Undercoater & Primer Sealer #253.
4. PPG: Seal Grip Interior Primer/Finish, 17-951. (45 g/L)
5. S-W: PrepRite Classic Latex Primer B28W101 Series.

B. Wood-Knot Sealer: Sealer recommended in writing by topcoat manufacturer for use in paint systems indicated.

2.6 LATEX PAINTS

A. Low-VOC Latex (Low Luster):

1. California Paints: Envirotech Zero VOC 100% Acrylic Eggshell, 631XX.
2. Glidden Professional: 1411-XXXX Ultra-hide No VOC Interior Eggshell Paint (0 g/L)
3. Moore: Pristine Eco Spec Interior Latex Eggshell, No. 223
4. PPG: 6-4310XI Series, Speedhide zero Interior Zero VOC Latex Eggshell Interior. (0 g/L)
5. SW: ProMar 200 Zero VOC Interior Latex Eg-Shell B20-2600 Series. (0 g/L)]

B. Low-VOC Latex (Semi-gloss):

1. California Paints: Envirotech Zero VOC 100% Acrylic Semi-Gloss, 663XX.
2. Glidden Professional: 1415-XXXXN Ultra-hide No VOC Interior Semi-Gloss Paint (0 g/L)
3. Moore: Pristine Acrylic Semi-Gloss, No. 214
4. PPG: 6-4510XI Series, Speedhide zero Interior Zero VOC Latex Semi-Gloss. (0 g/L)
5. SW: ProMar 200 Zero VOC Interior Latex Semi-Gloss B31-2600 Series. (0 g/L)]

2.7 HIGH PERFORMANCE EPOXY PAINTS

A. Waterborne Epoxy Finish:

1. Moore: Moorcraft Super Spec Acrylic Epoxy Coating No. 256.
2. PPG: 98-1 Aquapon WB Water Base Epoxy (250 g/L)
3. S-W: IMC Water Based Catalyzed Epoxy Gloss, B70 Series. (200 g/L)

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates and conditions, with Applicator present, for compliance with requirements for maximum moisture content and other conditions affecting performance of the Work.

B. Maximum Moisture Content of Substrates: When measured with an electronic moisture meter as follows:

1. Masonry (Clay and CMUs): 12 percent.
2. Wood: 15 percent.
3. Gypsum Board: 12 percent.

C. Gypsum Board Substrates: Verify that finishing compound is sanded smooth.

D. Verify suitability of substrates, including surface conditions and compatibility, with existing finishes and primers.

E. Proceed with coating application only after unsatisfactory conditions have been corrected.

1. Application of coating indicates acceptance of surfaces and conditions.

3.2 PREPARATION

A. Comply with manufacturer's written instructions and recommendations in "MPI Architectural Painting Specification Manual" applicable to substrates and paint systems indicated.

B. Remove hardware, covers, plates, and similar items already in place that are removable and are not to be painted. If removal is impractical or impossible because of size or weight of item, provide surface-applied protection before surface preparation and painting.

1. After completing painting operations, use workers skilled in the trades involved to reinstall items that were removed. Remove surface-applied protection if any.

C. Clean substrates of substances that could impair bond of paints, including dust, dirt, oil, grease, and incompatible paints and encapsulants.

1. Remove incompatible primers and reprime substrate with compatible primers or apply tie coat as required to produce paint systems indicated.

D. Masonry Substrates: Remove efflorescence and chalk. Do not paint surfaces if moisture content or alkalinity of surfaces or mortar joints exceeds that permitted in manufacturer's written instructions.

E. Steel Substrates: Remove rust, loose mill scale, and shop primer, if any. Clean using methods recommended in writing by paint manufacturer.

F. Shop-Primed Steel Substrates: Clean field welds, bolted connections, and areas where shop paint is abraded. Paint exposed areas with the same material as used for shop priming to comply with SSPC-PA 1 for touching up shop-primed surfaces.

G. Galvanized-Metal Substrates: Remove grease and oil residue from galvanized sheet metal by mechanical methods to produce clean, lightly etched surfaces that promote adhesion of subsequently applied paints. Uniformly abrade galvanized surfaces with a palm sander and 60 grit aluminum oxide so surface is free of oil and surface contaminants.

H. Wood Substrates:

1. Scrape and clean knots, and apply coat of knot sealer before applying primer.
2. Sand surfaces that will be exposed to view, and dust off.
3. Prime edges, ends, faces, undersides, and backsides of wood.
4. After priming, fill holes and imperfections in the finish surfaces with putty or plastic wood filler. Sand smooth when dried.

3.3 APPLICATION

A. Apply paints according to manufacturer's written instructions and to recommendations in "MPI Manual."

1. Use applicators and techniques suited for paint and substrate indicated.
2. Paint surfaces behind movable equipment and furniture same as similar exposed surfaces. Before final installation, paint surfaces behind permanently fixed equipment or furniture with prime coat only.
3. Paint front and backsides of access panels, removable or hinged covers, and similar hinged items to match exposed surfaces.
4. Do not paint over labels of independent testing agencies or equipment name, identification, performance rating, or nomenclature plates.
5. Primers specified in painting schedules may be omitted on items that are factory primed or factory finished if acceptable to topcoat manufacturers.

B. Tinting: Tint primer of colors such as reds, yellows, and oranges with a gray basecoat system designed to help provide color coverage.

1. Do not tint prime or base coat for multi-colored finishes.

C. If undercoats or other conditions show through topcoat, apply additional coats until cured film has a uniform paint finish, color, and appearance. Give special attention to ensure edges, corners, crevices, welds, and exposed fasteners receive a dry film thickness equivalent to that of flat surfaces. When using colors such as red, yellow or orange, an extra coat of finish may be necessary. Notify Architect when additional coats do not fix the problem.

D. Apply paints to produce surface films without cloudiness, spotting, holidays, laps, brush marks, roller tracking, runs, sags, ropiness, or other surface imperfections. Cut in sharp lines and color breaks.

E. Painting Fire Suppression, Plumbing, HVAC, Electrical, Communication, and Electronic Safety and Security Work:

1. Paint the following work where exposed in equipment rooms: Not applicable.

2. Paint the following work where exposed in occupied spaces:

a. Equipment, including panelboards.
b. Uninsulated metal piping.
c. Uninsulated plastic piping.
d. Pipe hangers and supports.
e. Metal conduit.
f. Plastic conduit.
g. Duct, equipment, and pipe insulation having cotton or canvas insulation covering or other paintable jacket material.
h. Other items as directed by Architect.

3. Paint portions of internal surfaces of metal ducts, without liner, behind air inlets and outlets that are visible from occupied spaces.

3.4 CLEANING AND PROTECTION

A. At end of each workday, remove rubbish, empty cans, rags, and other discarded materials from Project site.

B. After completing paint application, clean spattered surfaces. Remove spattered paints by washing, scraping, or other methods. Do not scratch or damage adjacent finished surfaces.

C. Protect work of other trades against damage from paint application. Correct damage to work of other trades by cleaning, repairing, replacing, and refinishing, as approved by Architect, and leave in an undamaged condition.

D. At completion of construction activities of other trades, touch up and restore damaged or defaced painted surfaces.

3.5 INTERIOR PAINTING SCHEDULE

A. CMU Substrates:

1. Low-Odor/VOC Latex System:

a. Block Filler: Block filler, latex, interior/exterior.
b. Intermediate Coat: Latex, interior, low odor/VOC, matching topcoat.
c. Topcoat: Latex, interior, low odor/VOC, semi-gloss (MPI Gloss Level 5).

B. Steel and Galvanized Metal Substrates:

1. Low-Odor/VOC Latex System:

a. Prime Coat: Primer, rust inhibitive, water based.

b. Intermediate Coat: Latex, interior, low odor/VOC, matching topcoat.
c. Topcoat: Latex, interior, low odor/VOC, semi-gloss (MPI Gloss Level 5).

C. Wood Substrates: Wood trim and interior sashes of Windows.

1. Low-Odor/VOC Latex System:

a. Prime Coat: Primer, latex, for interior wood.
b. Intermediate Coat: Latex, interior, low odor/VOC, matching topcoat.
c. Topcoat: Latex, interior, low odor/VOC, semi-gloss (MPI Gloss Level 5).

D. Gypsum Board Substrates:

1. Low-Odor/VOC Latex System:

a. Prime Coat: Primer sealer, interior, low odor/VOC.
b. Intermediate Coat: Latex, interior, institutional low odor/VOC, matching topcoat.
c. Topcoat: Latex, interior, institutional low odor/VOC, flat (MPI Gloss Level 1) for ceilings and soffits.
d. Topcoat: Latex, interior, institutional low odor/VOC satin (MPI Gloss Level 4) for walls.

2. High-Performance Epoxy System:

a. Prime Coat: Primer sealer, interior, low odor/VOC.
b. Intermediate Coat: Interior, high performance epoxy, matching topcoat.
c. Topcoat: Interior, high performance epoxy, semi-gloss (MPI Gloss Level 5).

END OF SECTION 09 91 23

SECTION 12 35 53 - LABORATORY CASEWORK

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Plastic Laminate Casework
2. Metal Tables
3. Shelving.
4. Cabinet hardware and accessories.
5. Laboratory work surfaces.
6. Laboratory sinks.
7. Casework accessories.
8. Water, laboratory gas, safety and electrical service fittings.

B. Related Sections:

1. Division 04 Section “Unit Masonry” for installing anchors in masonry construction.
2. Division 06 Section “Rough Carpentry” for wood blocking for anchoring laboratory casework.
3. Division 09 Section “Gypsum Board Assemblies” for reinforcements in metal-framed gypsum board partitions for anchoring laboratory casework.
4. Division 09 Sections for wall base material applied to laboratory casework.
5. Division 12 Section “Laboratory Accessories” for miscellaneous laboratory accessories.
6. Division 22, 23, 26 and 27 Sections for installing service fittings specified in this Section, including connecting service utilities.

1.2 PERFORMANCE REQUIREMENTS

A. System Structural Performance: Laboratory casework and support framing system shall withstand the effects of the following gravity loads and stresses without permanent deformation, excessive deflection, or binding of drawers and doors:

1. Suspended Base Cabinets (Internal Load): 160 lb/ft. (240 kg/m).

1.3 SUBMITTALS

A. Submit complete submittal package of product data, shop drawings, samples and informational submittals. Incomplete submittals are not acceptable, will be considered non-responsive, and will be returned without review.

1. Partial shop drawing submittal, prepared for a portion of the Work, will be reviewed when use of partial submittal has received prior written approval from Architect.

B. Action Submittals:

1. Product Data: Manufacturers published information for each type of cabinet and table, shelving, hardware, countertop, sink, casework accessory, and service fitting.

   a. Include cabinet styles and dimensions, component dimensions, standard construction details, and joint details.
   b. Show compliance with specified reference standards, testing by recognized agencies, and application of testing agency labels.
   c. Include service fitting manufacturer’s product cut-sheets for each fitting type and finish. Use same designation as indicated on Drawings.
   d. Manufacturers generic guide specifications will not be reviewed.

2. Shop Drawings: For laboratory casework. Show location of each item, dimensioned plans and elevations, large scale sections and details, and attachments to other work.

a. Detail assemblies and indicate dimensions, weights, loads, required clearances, method of field assembly, components, and location and size of each field connection.
b. Product Schedule: For laboratory casework types. Use same designations indicated on Drawings.
c. Indicated details of anchoring casework to permanent building construction including locations of blocking, reinforcements and other supports required for installation of laboratory casework.
d. Include locations of and clearances from adjacent walls, doors, windows, other building components.
e. Include coordinated dimensions for laboratory casework, countertops, shelving supports, fixtures, and power accessories.
f. Indicate duct, piping and electrical connections, and locations of access panels.
g. Wiring Diagrams: For power, signal, and control wiring.

3. Samples: For each exposed product and for each color and texture specified.

a. Each type of cabinet material, finish and color.
b. Each type of countertop and sink material, finish and color.
c. Each type of hardware drawer and door pull and hinge.
d. Other materials requiring color selection.

C. Informational Submittals:

1. Product Certificates: For laboratory casework, from casework manufacturer, certifying that products furnished comply with requirements.
2. Casework Product Test Reports: Based on evaluation of comprehensive tests performed by a qualified testing agency, indicating compliance of laboratory casework with requirements of specified product standard. Submit full documentation of test results with detailed description of test units and procedures, witnesses' results and appropriate drawings or photographs of test unit and procedures.
3. Work Surface Material Product Test Reports: Based on evaluation of comprehensive tests performed by a qualified testing agency, indicating epoxy work surface materials comply with product standards and material performance requirements specified.

D. Close-Out Informational Submittals: Submit the following with project close-out documentation.

1. Maintenance data.
2. Operation and maintenance data.

1.4 QUALITY ASSURANCE

A. Manufacturer Qualifications: A qualified manufacturer that produces casework of types indicated for this Project that has been tested for compliance with SEFA-8.
B. Source Limitations: Obtain all components in this specification from a single source. Additionally, obtain all laboratory casework from a single manufacturer.
C. Casework Product Standard: Comply with SEFA-8 "Recommended Practices for Laboratory Grade Furniture, Casework, Shelving and Tables" for cabinet materials specified.

1. All Plastic Laminate Casework shall comply with SEFA 8 PL, "Laboratory Grade Plastic Laminate Casework."

D. Work Surface Product Standard: Comply with SEFA-3 "Recommended Practices for Laboratory Work Surfaces."
E. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.
F. Keying Conference: Conduct conference with Owner at Project site. Incorporate keying conference decisions into final keying requirements.

1.5 DELIVERY, STORAGE, AND HANDLING

A. Schedule delivery of laboratory casework so that spaces are sufficiently complete that material can be installed immediately following delivery.
B. Protect finished surfaces during handling and installation with protective covering of polyethylene film or other suitable material.

1.6 PROJECT CONDITIONS

A. Overhead soffits and ceiling grid shall be in place prior to casework installation.
B. Flooring required to be installed under laboratory casework shall be installed prior to casework delivery.

1. Flooring materials shall extend into knee-space areas, equipment areas and base cabinets without cabinet floor/bottom.

1.7 COORDINATION

A. Coordinate layout and installation of framing and reinforcements for support of laboratory casework.
B. Coordinate installation of laboratory casework with installation of laboratory equipment.

1.8 EXTRA MATERIALS

A. Furnish extra materials that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.

1. Cabinet Mounting Clips and Related Hardware: Quantity equal to 5 percent of amount installed, but no fewer than 20 of each type.
2. Pegboard Pegs and Hole Covers: Quantity equal to 5 percent of the amount installed, but no fewer than 10 of each type/size.
3. Adjustable Shelves: Provide 3 of each type and size.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Laboratory Casework, Shelving and Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. Kewaunee Scientific Corporation.
2. Mott Manufacturing Ltd.
3. Stevens Industries, Inc. (Techline)

B. Epoxy Resin Manufacturer: Subject to compliance with requirements, provide products by one of the following:

1. Durcon, Inc.
2. Kewaunee Scientific Corporation.
3. Prime Industries, Inc.

C. Chemical Resistant Plastic Laminate Manufacturer: Subject to compliance with requirements, provide products by one of the following:

1. Formica Corporation.
2. Panolam Industries International Incorporated; Pionite Chemguard.
3. Wilsonart International, Div. of Premark International, Inc.; Chemsurf.
4. Stevens Industries, Inc. (Techline)

D. Water, Laboratory Gas and Electrical Service Fittings Basis-of-Design Products: Subject to compliance with requirements, provide Water Saver Faucet Co. products indicated on Drawings or comparable product by one of the following:

1. Broen, Inc.
2. Chicago Faucet, a Geberit Company.

2.2 MATERIALS

A. Steel Materials:

1. Recycled Content of Steel Products: Provide products with average recycled content of steel products such that post-consumer recycled content plus one-half of pre-consumer recycled content is not less than 25-percent.
2. Steel Sheet: Cold-rolled, commercial steel (CS) sheet, complying with ASTM A 1008/A 1008M; matte finish; suitable for exposed applications.

B. Epoxy Materials: Factory-molded, modified epoxy-resin formulation with smooth, nonspecular finish.

1. Physical Properties:

a. Flexural Strength: Not less than 10,000 psi (70 MPa).
b. Modulus of Elasticity: Not less than 2,000,000 psi (1400 MPa).
c. Hardness (Rockwell M): Not less than 100.
d. Water Absorption (24 Hours): Not more than 0.02 percent.
e. Heat Distortion Point: Not less than 260 deg F (127 deg C).

2. Chemical Resistance: Epoxy-resin material in specified color, when tested with reagents according to SEFA-3 Work Surfaces Chemical/Stain Resistance Test, shall have no more than four Level-3 conditions.
3. Color: As selected by Architect from manufacturer's full range of light gray to black colors.

C. Chemical Resistant Plastic Laminate Materials: High-pressure decorative laminate, NEMA LD 3, grades as indicated.

1. Chemical Resistance: Chemical-Resistant Plastic Laminate material in specified color, when tested with reagents according to SEFA-8 Cabinet Surface Finish Test, shall have no more than four Level-3 conditions.
2. Edgebanding for Plastic Laminate: PVC extrusions, through color or pattern to match plastic laminate with satin finish, 3 mm thick.
3. Colors and Patterns: Wood-look; final color/pattern as selected by Architect from manufacturer's full range.
4. Exposed Materials:

a. Plastic-Laminate Grade: HGS & VGS.
b. Horizontal surfaces to be Wilsonart Chemsurf or equivalent.

5. Semi-exposed Materials:

a. Plastic Laminate: Grade VGS unless otherwise indicated. Provide plastic laminate for semi-exposed surfaces unless otherwise indicated.

D. Auxiliary Materials:

1. Furring, Blocking, Shims, and Hanging Strips: Softwood or hardwood lumber, kiln-dried to less than 15 percent moisture content.
2. Sealants:

a. Sealant Joints and Penetrations in Work Surface Materials: Silicon sealant recommended by work surface manufacturer.

3. Glass for Glazed Doors: Clear tempered glass complying with ASTM C 1048, Kind FT, Condition A, Type I, Class 1, Quality-Q3; not less than 5.0 mm thick.
4. Steel Plates, Shapes, and Bars: ASTM A 36/A 36M.
5. Steel Tubing: ASTM A 500, cold-formed steel tubing.
6. Steel Pipe: ASTM A 53/A 53M, standard weight (Schedule 40) unless otherwise indicated.
7. Utility-Space Framing: Steel framing units consisting of 2 steel slotted channels complying with MFMA-4, not less than 1-5/8 inches square by 0.105 inch/12 gage (2.7mm) nominal thickness, and connected at top and bottom by U-shaped brackets

made from 1-1/4-by-1/4 inch steel flat bars. Framing units may be made by welding specified channel material into rectangular frames instead of using U-shaped brackets.

8. Slotted Channel Framing: Cold formed metal box channels (struts) complying with MFMA-4.

   a. Structural Support Material: Cold-rolled steel, ASTM A 1001/A 1001M; structural steel, Grade 33; 0.105-inch/12 gage (2.7-mm) minimum thickness; coated with rust-inhibitive, baked-on acrylic enamel.
   b. Channel Size: 1-5/8 inch square, except 7/8 inch by 1-5/8 inch units for miscellaneous pipe supports where indicated.

2.3 PLASTIC-LAMINATE CABINET FABRICATION

A. Design:

   1. Flush overlay.

B. Removable Backs: Provide backs that can be removed from within cabinets at utility spaces.
C. Filler and Closure Panels: Provide where indicated and as needed to close spaces between cabinets and walls, ceilings, and indicated equipment. Fabricate from same material and with same finish as adjacent exposed cabinet surfaces unless otherwise indicated.
D. Suspended Casework: Type and size as indicated on Drawings.
E. Tall Cabinets:

   1. Caster: 4 inch (100 mm) heavy-duty rubber tire, swivel, locking type, where indicated

2.4 METAL TABLE FABRICATION

A. Tables: Welded tubing legs, not less than 2 inches (50 mm) square with channel aprons/frames, reinforcing cross-rails, and stretchers. Legs welded or bolted to table apron/frame with heavy-duty corner brackets; weld or bolt reinforcing cross-rails to front and back table apron/frame. Weld or bolt stretchers to legs and cross-stretchers, and bolt legs to table aprons. Provide leveling device welded to bottom of each leg, unless otherwise indicated.

   1. Table Design: As indicated on Drawings.
   2. Leg Rails and Stretchers: Where indicated. Channel leg rails welded or bolted to table legs; channel stretcher welded or bolted to leg rails with mounting location to accommodate an individual seated on one long side of table.
   3. Leg Shoes: 2-1/2 inch (64 mm) high, black vinyl or rubber; open-bottom, slip-on type at table with leveling devices. Leg shoe shall be adjustable to conceal leveling devices and hold-down clips.
   4. Leveling Devices: Adjustable height type with non-marring, non-metallic glides; minimum 1 inch (25 mm) diameter with minimum 5/8 inch (16 mm) height adjustment.
   5. Adjustable Height Tables: Provide four-leg adjustable height tables where indicated.

      a. Height Adjustment: Nominal 30 inch to 40 inch at no greater than 2-inch increments.

   6. Table Load Ratings: Work surface plus 300 pounds minimum, unless otherwise indicated. Table load rating is in addition to the weight of the table assembly and work surface material.

2.5 SHELVING

A. Bench-Top Upright System: Manufacturer's integrated system that includes support structure and overhead storage components mounted on top of fixed casework countertops.

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

      a. Kewaunee Scientific Corporation; Product - .Alpha System, Fixed Furniture Upper Carriers.
      b. Mott Manufacturing Ltd.; Product – Sigma Flex, Countertop Uprights.

c. Stevens Industries, Inc.

2. System Assembly: Island and/or wall upright systems with independently cantilevered overhead storage components as indicated on Drawings.

a. Structural components consisting of vertical uprights, top rail, base plates for attachment to countertop and under-counter support bracing/struts.

1) Uprights: Steel components with provisions for adjustment of suspended storage components, nominal 1 inch increments.
2) Base Plates: Steel components welded to uprights; pre-drilled for fastener and utility services.
3) Top Rail/Shelf: Designed to connect and brace top of uprights.
4) Bracing/Struts: Steel components of size and shape required by manufacturer for under-counter installation, designed for system loads, configuration, uprights and countertop indicated.

b. Module Size and Configuration: As indicated on Drawings.
c. Fasteners: Type required by manufacturer for materials and assemblies being fastened.
d. End Caps: Plastic, color to match support structure.
e. Filler Panels: Provide metal filler panels to close space between pairs of island uprights where indicated on Drawings.
f. Adjustable Shelving Units: Shelving material, number, size and configuration as indicated on Drawings. Provide inner and outer shelves; provide fixed inner shelves where indicated.
g. Island Upright Load Capacity: Minimum 1,080 lbs total load rating, evenly distributed both sides.

B. Adjustable Metal Shelving Units: Cold rolled steel, minimum 0.0478-inch/18 gage (1.21 mm) shelving units consisting of formed and welded sheet steel shelf units, intermediate stiffeners, and shelf brackets.

1. Shelf Brackets: Cold rolled steel, bookend type with up-turned bracket welded to shelf to form integral unit; provide down-turned bracket for inverted top shelf where indicated on Drawings. Shelf bracket hooks to be compatible with slotted support system of bench-top upright system, wall rail system and mobile workstations; 1 inch (25 mm) adjustment.
2. Load Capacity: 180 lb. for shelf units up to 12 inch deep; 130 lb. for shelf units up to 18 inch deep; 100 lb. for shelf units up to 24 inch deep.
3. Shelf Edge Retainer Bar: Top of bar 1/2-inch (12 mm) above top of shelf.

a. Provide welded retainer bar at front of shelf units.
b. Provide welded retainer bar at ends of inverted top shelf units.
c. Provide removable retainer bar at back of shelf units, except at back-to-back shelf units.

4. Shelf Edge Retainer Rod: Nominal 1/4-inch (6 mm) diameter stainless steel rod with radius outside corners, counter-sunk into top of shelf; top of rod nominal 1-inch above top of shelf.

a. Provide retainer rod at front of shelf units.
b. Provide retainer rod at ends of inverted top shelf units.
c. Provide retainer rod at back of shelf units, except at back-to-back shelf units.
d. Shelf Length 30 Inches and Less: One retainer rod per shelf edge.
e. Shelf Length Greater than 30 Inches to 48 Inches: Two retainer rods per shelf edge.
f. Shelf Length Greater than 48 Inches to 72 Inches: Three retainer rods per shelf edge.

2.6 METAL FINISH

A. Prepare, treat and finish welded assemblies after assembling. Prepare, treat and finish , components that are assembled with mechanical fasteners before assembling. Prepare, treat and finish concealed surfaces same as exposed surfaces.

B. Chemical-Resistant Finish: Laboratory casework manufacturer's standard two-coat, chemical-resistant, baked-on finish consisting of prime coat and thermosetting topcoat. Comply with coating manufacturer's written instructions for applying and baking to achieve a minimum dry film thickness of 1.5 mil average and 1.2 mil minimum on exterior and interior surfaces exposed to view; 1.2 mil average on backs of cabinets and other surfaces not exposed to view.

1. Ends of cabinets, including those installed directly against walls or other cabinets are defined as “exposed.”
2. Chemical and Physical Resistance of Finish System: Finish shall comply with acceptance levels of cabinet surface finish tests in SEFA 8-M. Acceptance level for chemical spot test shall be no more than four Level 3 conditions, and results shall be within the range indicated for each chemical reagent.
3. Colors for Metal Laboratory Casework Finish: As selected by Architect from manufacturer's full range.

2.7 CABINET HARDWARE AND ACCESSORIES

A. General: Provide laboratory casework manufacturer's standard, commercial-quality, heavy-duty hardware complying with requirements indicated for each type.

B. Hinges: Stainless-steel, 5-knuckle hinges with antifriction bearings and rounded tips. Provide 2 for doors 48 inches (1200 mm) high or less and 3 for doors more than 48 inches (1200 mm) high.

C. Hinged Door and Drawer Pulls: Provide back-mounted pulls with lock washers.

1. Brushed aluminum rectangular loop pulls with rounded corners; nominal 1 by 4-1/2 inches (25 by 114 mm).
2. Provide two pulls on drawers more than 24 inches (600 mm) wide.
3. Mount drawer pulls horizontally; door pulls vertically.

D. Door Catches: Nylon-roller spring catches.

1. Base Cabinets: Attach to top of base cabinet doors.
2. Wall and Upper Cabinets: Attach to bottom of wall cabinet doors.
3. Tall Cabinets: Attach at top and bottom of doors.

E. Elbow Catches: Spring type, zinc plated steel, with strike of suitable design.

1. Provide at left-hand door of cabinets with pair of doors and lock.
2. Provide at fixed center shelf of left-hand door of tall cabinets with pair of doors and lock.

F. Drawer Slides: Side/rail mounted; full extension slides; zinc plated steel with steel ball bearings; designed to prevent rebound when drawers are closed.

1. Pull Boards: Casework manufacturer’s standard pull board suspension with minimum 75 pound dynamic load capacity and hold open feature.
2. Box Drawers and Pull-out Shelves: Medium Duty slides, minimum 100 lbs capacity.
3. File Drawers: Heavy-Duty slides, minimum 150 lbs. capacity.

G. Label Holders: Stainless steel or aluminum; sized to receive standard label cards approximately 1-1/4 by 2 inches (32 by 50 mm), attached with adhesive/double-sided tape.

1. Provide on each drawer and flush panel door.
2. Drawers: Locate in upper left corner of drawer front.
3. Base Cabinet Doors: Locate in upper corner on hinge side of door.
4. Wall and Upper Cabinet Doors: Locate in lower corner on hinge side of door.
5. Tall Cabinet Doors: Locate adjacent to door pull.

H. Locks for Plastic-Laminate Cabinets: Cam type with 5-pin tumbler, brass with chrome-plated finish; complying with BHMA A156.11, Type E07281. Confirm locations, numbers and types of keys, keying and master key system with Owner.

I. Sliding-Door Hardware Sets: Laboratory casework manufacturer's standard, to suit type and size of sliding-door units.

J. Adjustable Shelf Supports for Plastic-Laminate Cabinets: L-shaped shelf support with hole and metal pin; fasten shelf support to shelf thru hole to underside of shelf.

K. Hanging File Frame: Adjustable hanging file frame for Pendeflex type file folders. Provide where Casework Type indicates file drawer.

L. Grommets: Provide grommets through countertops and other locations, where indicated:

1. Round Plastic Grommets: Doug Mocket & Company, Inc.; Products – Round Plastic Grommets, Model EDP3 – 2 ½" Grommet Sleeve and Flip-Top Cap Set, typical unless otherwise indicated, below, or comparable product:
2. Finish Color: As selected by Architect from manufacturer's full range.

2.8 LABORATORY WORK SURFACES

A. Work Surfaces, General: Provide units with smooth surfaces in uniform plane free of defects. Make exposed edges and corners straight and uniform. Provide front and end overhang of 1 inch (25 mm) unless otherwise indicated.

1. Seal joint between curbs and adjoining construction.
2. Seal joint between different work surface materials.

B. Epoxy Countertops and Table Tops: Fabricate with factory cutouts for sinks, holes for service fittings and accessories, and with butt joints assembled with epoxy adhesive and concealed metal splines.

1. Tops: Flat, 1 inch (25 mm) thick, with beveled or rounded edge and corners, with drip groove on underside 1/2-inch (13-mm) from edge.

a. Raised (marine) edge at sinks, 1-inch (25-mm) thick at raised edge.
b. Provide drain-board grooves in countertops adjoining sinks, where indicated on Drawings.

2. Curbs: Supply loose for field application in same thickness as top. Configuration as indicated on Drawings.

a. Height: 4 inch (100 mm) high, unless otherwise indicated on Drawings.
b. Provide where tops abut partitions and other adjoining above counter elements.

2.9 LABORATORY SINKS

A. Sinks, General: Provide sizes indicated or manufacturer's closest standard size of equal or greater volume, as approved by Architect.

1. Outlets: Provide with strainers and tailpieces, NPS 1-1/2 (DN 40), unless otherwise indicated.
2. Overflows: For each sink except cup sinks, provide overflow of standard beehive or open-top design with separate strainer. Height 2 inches (50 mm) less than sink depth. Provide in same material as strainer.

B. Epoxy Sinks:

1. Sink Fabrication: Molded in 1 piece with smooth surfaces, coved corners, and bottom sloped to outlet; 1/2-inch (13-mm) minimum thickness.

a. Provide with epoxy or polypropylene strainers and tailpieces.
b. Provide integral sinks in epoxy countertops, bonded to countertops with invisible joint line.
c. Provide manufacturer's recommended adjustable support system for table- and cabinet-type installations.

2.10 CASEWORK ACCESSORIES

A. Pegboards (Drying Racks):

1. Pegboards: Polypropylene, epoxy, or phenolic-composite pegboards with removable polypropylene pegs and stainless-steel drip troughs with drain outlet. Pegboard size as indicated on Drawings.
2. Pegboard Accessories:

a. Pegs: White polypropylene pegs; product standard peg length and quantity for pegboard size, unless otherwise indicated on Drawings.
b. Peg Hole Covers: White polypropylene hole covers where pegs not used.
c. Pegboard Mounting:

1) Wall Mount Assembly: Wall bracket to allow removal and replacement of entire pegboard unit without need for tools.
2) Free Standing Assembly Brackets: Painted steel brackets anchored to countertop with stainless steel fasteners.
3) Raised Top Assembly: Stainless steel tube frame anchored to countertop.
4) Wall Standard Mount: Stainless steel mounting clips welded to back of stainless steel pegboard for attachment to stainless steel slotted wall standard.

d. Drain Shelf: Stainless steel, 12 inch long shelf unit with support pegs for installation, where indicated.
e. Drain Basket: Stainless steel, 12 inch long basket unit with support pegs for installation, where indicated.
f. Paper Towel Dispenser: Stainless steel dispenser, nominal 11 inch long by 8 inch high by 4 inch deep, with capacity to hold up to 150 c-fold or multi-fold paper towels.

A. Laboratory Coat Hooks and Shelf

1. Basis-of-Design Product: Wall Mounted Wall Rack, Model 400SA-24 by Glaro Products, Inc.. Products of the following other manufacturers, provided they are considered “equal” as determined by the architect, will be considered acceptable:

a. American Specialties, Inc.
b. Bradley Corporation.
c. Substitutions are permitted subject to Division 1

B. Umbilicals:

1. Metal Umbilical: Fabricate umbilical from minimum 18 gage sheet metal to form vertical service chase from ceiling to countertop. Umbilical shall have removable sections for easy access to piping and conduits. Exposed fasteners are not acceptable. Removal of umbilical panel shall not disturb ceiling or countertop/curb.

a. Removable Panel: Fabricate with minimum of 3-hanger clips each side for attachment to fixed panel. Reinforce face of panel with steel hat-channels for stiffness.
b. Fixed Panel: Fabricate wall condition with c-shape for anchoring flange at wall and return face at front slotted to receive hanger clips for removable panel. Provide vertical angle anchored to partition at corner conditions for support of removable panel; slot angle to receive hanger clips. Fabricate island conditions with one-piece sides and back, with front return to slotted to receive hanger clips. Anchor top of panels to ceiling collar; anchor bottom of panels to top of countertop curb.
c. Ceiling Collar: Collar at top of umbilical chase that project up through finished ceiling; secure collar to fixed panel. Anchor collar to partition at wall and corner conditions; suspend collar from slot-channel framing anchored to structure above at island conditions. Ceiling collar shall not rely on ceiling for support or bracing.

d. Pipe Support: At wall and corner conditions, provide slot-channel framing pipe support anchored to partition. At island conditions, spot weld slot-channel framing pipe support to fixed back of umbilical. Limit depth of pipe support to 7/8-inch maximum.
e. Equipment Support: Provide slot-channel framing ladder with shelf for support of umbilical mounted equipment where indicated on Drawings. Suspended slot-channel framing ladder from structure above; slot-channel framing ladder shall not rely on umbilical sections for support or bracing.
f. Finish: Color as selected by Architect from manufacturer's full range.

C. Under-Cabinet Task Light Fixtures: LED fixtures with on/off rocker switch and grounded convenience outlet; UL listed:

1. Finish: Baked enamel, white.
2. Diffusers: Acrylic with high resistance to yellowing and other changes due to aging, heat, and UV radiation.
3. Ballast Sound Rating: A.
4. Fixture Type-A: Type with heavy-duty 2-poll, 3-wire grounded cord and plug. Fixture width,32 inches, unless otherwise indicated.
5. Fixture Mounting: Mechanically attached to wall cabinets and shelves, except provide units with magnetic attachment to metal cabinets and shelves.
6. Provide wire management to conceal all cords.

2.11 WATER AND LABORATORY GAS SERVICE FITTINGS

A. Basis-of-Design Products: Subject to compliance with requirements, provide products by WaterSaver Faucet Co.

HCW-1	Deck mounted laboratory mixing faucet with 8" swing vacuum breaker gooseneck, aerator and 4" wrist blade handles. L2222-8VB-55-BH
PW-1	Pure Water Faucet, Polypropylene-Lined, Deck Mounted. L-7833VB
EW-1	Deck mounted. Handicapped accessible, AutoFlow™ eyewash . Swingdown assembly to permit access by wheelchair user. ADA compliance is dependent on 27" knee clearance under counter and 34" maximum counter height. Spray heads swing down from storage to operational position, activating water flow. EWBF-849 with TMV
EW-2	Deck mounted, dual purpose eye wash / drench hose unit with two GS plus soft stream heads angled at 45 degrees and squeeze valve with locking clip and integral in-line vacuum breaker. Provide 8' long high pressure hose with flange and handle guide for mounting eyewash through casework. EW-1022 with TMV

B. Acceptable alternate manufacturers:

1. Broen A/S.
2. Chicago Faucet Company (The); a Geberit company.

C. Service Fittings: Provide units that comply with SEFA 7, "Laboratory and Hospital Fixtures - Recommended Practices." Provide fittings complete with washers, locknuts, nipples, and other

installation accessories. Include wall and deck flanges, escutcheons, handle extension rods, and similar items.

D. Materials: Fabricated from cast or forged brass unless otherwise indicated.

1. Reagent-Grade Water Service Fittings: Polypropylene for parts in contact with water.

E. Finish:

1. Polished chromium plated finish.

F. Water Valves and Faucets: Provide units complying with ASME A112.18.1, with renewable seats, designed for working pressure up to 80 psig (550 kPa).

1. Vacuum Breakers: Provide ASSE 1035 or 1001 vacuum breakers, as required by authorities having jurisdiction, for potable water fittings.
2. Aerators: Provide aerators in addition to serrated outlets on hot/cold water fittings; install aerators in lieu of serrated outlets where directed by Owner. Turn over un-used aerators and serrated outlets to Owner.
3. Renewable Seat/Unit: Provide compression valve design with an integral adjustable volume control device. Unit shall be capable of converting from compression to self-closing control without disturbing the faucet body.

a. Volume Control Setting: Verify setting with Owner.

4. Self-Closing Valves: Provide self-closing valves where indicated.
5. Foot Operated Valves: Provide floor mounted, foot operated valves where indicated. Provide self-closing valves, forged brass pedals mounted on hinged bracket. Polished chrome plated finish, unless otherwise indicated.

G. Ball Valves: Chrome-plated ball and PTFE seals. Handle requires no more than 5 lbf (22 N) to operate. Provide units designed for working pressure up to 75 psig (520 kPa), with serrated outlets unless otherwise indicated.

H. Hand of Fittings: Furnish right-hand fittings unless fitting designation is followed by "L."

I. Handles: Provide three- or four-arm, forged-brass handles for valves unless otherwise indicated.

1. Provide blade handles at water faucets, unless otherwise indicated.
2. Provide lever-type handles for ball valves unless otherwise indicated. Lever handle aligns with outlet when valve is closed and is perpendicular to outlet when valve is fully open.
3. Provide knurled, molded plastic handles for pure water valves and pressure regulators.

J. Service-Outlet Identification: Provide color-coded plastic discs with embossed identification, secured to each service-fitting handle to be tamper resistant. Comply with SEFA 7 for colors and embossed identification.

1. Where colored handles are indicated, provide neutral color disk with contrasting color embossed identification.

2.12 ELECTRICAL SERVICE FITTINGS

A. Service Fittings, General: Provide UL listed units with metal housings, accessories, and gaskets required for mounting on laboratory casework. Receptacles, data outlets, switches, pilot lights, device plates, and accessories are specified in Division 26 and 27 Sections.

1. Switch and Receptacle Colors: Refer to Division 26 Sections.
2. Cover Plate Identification: Refer to Division 26 and 27 Sections.
3. Provide pilot light type switch with neon-light handle, illuminated when switch is “ON”, where indicated.

B. Line-Type Fittings: Provide with cast-metal boxes with threaded holes for mounting on rigid steel conduit. Provide cover plates same size as boxes.

C. Recessed-Type Fittings: Provide with galvanized-steel boxes.

D. Finishes for Service-Fitting Components: Provide housings or boxes for pedestal- and line-type fittings with manufacturer's standard baked-on, chemical-resistant enamel in color as selected by Architect from manufacturer's full range.

2.13 EXAMINATION

A. Examine areas, with Installer present, for compliance with requirements for installation tolerances, location of reinforcements, and other conditions affecting performance of laboratory casework.
B. Proceed with installation only after unsatisfactory conditions have been corrected.

2.14 INSTALLATION OF CASEWORK

A. Comply with installation requirements in SEFA 2. Install level, plumb, and true; shim as required, using concealed shims. Where laboratory casework abuts other finished work, apply filler strips and scribe for accurate fit, with fasteners concealed where practical. Do not exceed the following tolerances:

1. Variation of Tops of Base Cabinets from Level: 1/16 inch in 10 feet (1.5 mm in 3 m).
2. Variation of Bottoms of Upper Cabinets from Level: 1/8 inch in 10 feet (3 mm in 3 m).
3. Variation of Faces of Cabinets from a True Plane: 1/8 inch in 10 feet (3 mm in 3 m).
4. Variation of Adjacent Surfaces from a True Plane (Lippage): 1/32 inch (0.8 mm).
5. Variation in Alignment of Adjacent Door and Drawer Edges: 1/16 inch (1.5 mm).

B. Utility-Space Framing: Secure to floor with two fasteners at each frame. Fasten to partition framing, wood blocking, or metal reinforcements in partitions and to base cabinets.
C. Base Cabinets: Fasten cabinets to utility-space framing, partition framing, wood blocking, or reinforcements in partitions with fasteners spaced not more than 24 inches (600 mm) o.c. Bolt adjacent cabinets together with joints flush, tight, and uniform.

1. Where base cabinets are installed away from walls, fasten to floor at toe space at not more than 24 inches (600 mm) o.c. and at sides of cabinets with not less than 2 fasteners per side.

D. Tall, Upper and Wall Cabinets: Fasten to hanging strips, masonry, partition framing, blocking, or reinforcements in partitions. Fasten each cabinet through back, near top, at not less than 24 inches (600 mm) o.c.
E. Install shelving systems plumb and at heights to align shelf brackets for level shelves. Install shelving level and straight, closely fitted to other work where indicated.
F. Install hardware uniformly and precisely. Set hinges snug and flat in mortises.
G. Adjust laboratory casework and hardware so doors and drawers align and operate smoothly without warp or bind and contact points meet accurately. Lubricate operating hardware as recommended by manufacturer.

2.15 INSTALLATION OF COUNTERTOPS

A. Comply with installation requirements in SEFA 2. Abut top and edge surfaces in one true plane with flush hairline joints and with internal supports placed to prevent deflection. Locate joints only where shown on Shop Drawings.
B. Field Jointing: Where possible, make in same manner as shop-made joints using dowels, splines, fasteners, adhesives, and sealants recommended by manufacturer. Prepare edges in shop for field-made joints.

1. Use concealed clamping devices for field-made joints in plastic-laminate countertops. Locate clamping devices within 6 inches (150 mm) of front and back edges and at intervals not exceeding 24 inches (600 mm). Tighten according to manufacturer's written instructions to exert a uniform heavy pressure at joints.

C. Fastening:

1. Secure countertops, except for epoxy countertops, to cabinets with Z-type fasteners or equivalent, using two or more fasteners at each cabinet front, end, and back.

2. Secure epoxy countertops to cabinets with epoxy cement, applied at each corner and along perimeter edges at not more than 48 inches (1200 mm) o.c.
3. Where necessary to penetrate countertops with fasteners, countersink heads approximately 1/8 inch (3 mm) and plug hole flush with material equal to countertop in chemical resistance, hardness, and appearance.
4. At utility chases behind base cabinets, provide utiity space framing material, wood blocking, cleats or other reinforcement to support edge of countertop at adjoining construction.

D. Provide required holes and cutouts for service fittings.
E. Provide scribe moldings for closures at junctures of countertop, curb, and splash with walls as recommended by manufacturer for materials involved. Match materials and finish to adjacent laboratory casework. Use chemical-resistant, permanently elastic sealing compound where recommended by manufacturer.
F. Carefully dress joints smooth, remove surface scratches, and clean entire surface.

2.16 INSTALLATION OF SINKS

A. Comply with installation requirements in SEFA 2.
B. Underside Installation of Epoxy Sinks: Use laboratory casework manufacturer's recommended adjustable support system for table- and cabinet-type installations. Set top edge of sink unit in sink and countertop manufacturers' recommended chemical-resistant sealing compound or adhesive and firmly secure to produce a tight and fully leakproof joint.
C. Special Drop-in Installation of Epoxy Sinks: Rout groove in countertop to receive sink rim if not prepared in shop. Set sink in adhesive and fill remainder of groove with sealant or adhesive. Sink to be lush with adjacent counter. Use procedures and products recommended by sink and countertop manufacturers.

2.17 INSTALLATION OF CASEWORK ACCESSORIES

A. Install accessories according to Shop Drawings, installation requirements in SEFA 2, and manufacturer's written instructions.
B. Securely fasten adjustable shelving supports, stainless-steel shelves, and pegboards to partition framing, wood blocking, or reinforcements in partitions.
C. Securely fasten umbilicals to countertop curbs and above ceiling supports, straight and plumb. Provide slot-channel framing to support ceiling shroud, independent of suspended ceiling.
D. Install shelf standards plumb and at heights to align shelf brackets for level shelves. Install shelving level and straight, closely fitted to other work where indicated.
E. Securely fasten pegboards to umbilicals, partition framing, wood blocking, or reinforcements in partitions.

2.18 INSTALLATION OF SERVICE FITTINGS

A. Comply with requirements in Divisions 22, 26 and 27 Sections for installing water and laboratory gas service fittings, electrical and data devices.
B. Install fittings according to Shop Drawings, installation requirements in SEFA 2, and manufacturer's written instructions. Set bases and flanges of sink- and countertop-mounted fittings in sealant recommended by manufacturer of sink or countertop material. Securely anchor fittings to laboratory casework unless otherwise indicated.

2.19 CLEANING AND PROTECTING

A. Clean finished surfaces, touch up as required, and remove or refinish damaged or soiled areas to match original factory finish, as approved by Architect.
B. Protect countertop surfaces during construction with 6-mil (0.15-mm) plastic or other suitable water-resistant covering. Tape to underside of countertop at a minimum of 48 inches (1200 mm) o.c.

END OF SECTION 12 3553

SECTION 22 00 10– BASIC PLUMBING REQUIREMENTS

PART 1 - GENERAL

1.1 SUMMARY OF PLUMBING WORK

A. The Work includes, but is not limited to, the following:
   1. Furnish all labor, materials, equipment, transportation and perform all operations as required to install a complete plumbing system in accordance with these specifications and applicable drawings.
   2. Furnish all labor, materials, equipment, transportation and perform all operations as required to install a complete plumbing system in accordance with these specifications and applicable Drawings.
   3. Study the drawings and specifications and coordinate Mechanical and Plumbing work with that of Architectural and other trades. Report all discrepancies to the Engineer prior to submitting a bid.
   4. Other work as required to provide complete and operating mechanical and plumbing systems.

1.2 RELATED DOCUMENTS

A. Drawings, Division 00, including General and Supplementary Conditions and Division 01 Specification Sections, apply to Division 22 and all its Sections.

1.3 RELATED WORK DESCRIBED ELSEWHERE

A. Provide under the appropriate Section, all cutting, patching, trenching, plastering, chases, slots, furring, grounds, masonry foundations, excavation, backfilling, pads, conduits, etc., incidental to the installation of plumbing apparatus. Execute the work by qualified trades as shown on the Drawings and under the direction of this Section.

B. Electrical work: Plumbing work shall include the installation of all motors, temperature controls, limit switches, etc., as herein specified. Work by the electrical sub-contractor (EC) shall include all other switches, pilot lights, fused and non-fused disconnect switches, outlets, motor starters, except as herein specified, and all necessary wiring and fuses to properly connect all mechanical/electrical equipment.

C. The following work shall be provided under the designated Sections:
   1. Cutting and patching: By the General Contractor.
   2. Division 01, General Requirements: Temporary toilets.
   3. Division 26, Electric Work.

1.4 ALTERNATES

A. There are no plumbing alternates on the project.

1.5 ENGINEER/ARCHITECT

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

1.6 WORK SEQUENCE & COORDINATION

A. Provide on a timely basis the proper trade with all locations and details as required.

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

C. Coordinate in advance with other trades the shape, size and position of all necessary openings, sleeves, supports and related to avoid conflicts. In the event of unavoidable conflicts, consult Engineer for resolution.

D. Refer to Division 26 specifications for electrical work required for mechanical. Verify that the electrical characteristics of the mechanical equipment being provided is compatible with the project electric power circuits available; if in doubt consult Engineer.

1.7 STANDARDS OF MATERIALS

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

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

1. Underwriters Laboratories, Inc. (UL).
2. American National Standards Association (ANSI).
3. National Fire Protection Association (NFPA).
4. Occupational Safety and Health Administration (OSHA).
5. Standards of local Building Codes
6. American Society of Heating Refrigeration and Air Conditioning Engineers (ASHRAE)

1.8 SUBSTITUTIONS

A. Any proposal for a substitution shall be made in writing by the Contractor, who shall submit full details for consideration and obtain written acceptance of the Engineer.

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

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

D. Any additional cost, by this or other trades, resulting from the substitution of equipment shall be paid by this Contractor.

E. Any cost savings resulting from a substitution shall be deducted from the contract amount.

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

1.9 SUBMITTALS

A. Submit under procedures given in Division 01.

B. Shop Drawings: Before any materials are purchased or released for production, submit to the Engineer an electronic set of shop drawings showing all the plumbing materials proposed to be furnished and installed.

C. Record Drawings: During progress of the Work, maintain an accurate record of all changes made in the system installation from the layout and materials shown on the approved shop drawings. At the completion of the project, transfer all information onto a set of new blue-line prints and submit them to the Engineer.

D. Owner's Manual: Upon completion of this portion of the Work, and as a condition of its acceptance, deliver to the Engineer for the Owner two copies of a manual describing the system:
   1. Provide manuals in durable plastic ring binders, nominal 8½ x 11" size.
   2. Identification on, or readable through, the front cover stating general nature of the manual.
   3. A copy of all reviewed submittals and shop drawings.
   4. Complete instructions regarding operation and maintenance of all equipment involved.
   5. Complete name and address of nearest vendor of replaceable parts.
   6. Copy of all guarantees and warranties issued.
   7. Where contents of manuals include manufacturer's catalog pages, clearly indicate the precise items included in this installation.

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

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

G. Submittals shall be reviewed by, and carry the approval stamp of, the subcontractor and be initialed and dated by the reviewer.

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

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

1.10 PROJECT/SITE CONDITIONS

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

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

C. Inspection:
   1. Prior to commencing the work of this Section, carefully inspect the installed work of all other trades to verify that the work is complete to the point where this installation may properly commence.
   2. Verify that plumbing work may be installed in strict accordance with all pertinent codes and regulations and the approved Shop Drawings.

D. Discrepancies
   1. In the event of discrepancy, immediately notify the Engineer.
   2. Do not proceed with installation in areas of discrepancy until the discrepancies have been fully resolved.

1.11 DEMOLITION

A. The plumbing contractor shall be responsible for removal and/or relocation of existing fixtures and equipment and the removal and/or capping of associated waste, vent, hot, cold and gas lines.

B. Removed equipment shall be turned over to the owner or properly disposed of by the contractor as directed by the owner.

1.12 DEFINITIONS

A. In this Section, the word “furnish” means to supply and deliver to the site ready for installation. The word “install” means to unload and place in proper position at the site and perform all operations necessary for secure mounting and correct operation ready for the intended service or use. The word “provide” means to furnish and install.

1.13 WORKMANSHIP

A. Qualifications of Workmen: Use sufficient qualified workmen and competent supervisors in the execution of the work to ensure proper and adequate installation of system throughout and to comply with the project schedule.

B. Codes: Work and/or mechanical equipment shall conform with all Local and State Rules and Regulations as well as the most recent versions of the National Fire Protection Association and the Building Officials and Code Administrators (BOCA), Maine Uniform Building and Energy Code, Maine State Plumbing Code, Ventilation Standard ASHRAE 62.1 and the Maine State Energy Code (ASHRAE 90.1). These codes are considered a part of these specifications.

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

D. Qualification of Workmen: Use sufficient journeyman plumbers and competent supervisors in the execution of this portion of the work to ensure proper and adequate installation of plumbing throughout.

1.14 PRODUCT HANDLING

A. Protection: Protect all materials before, during and after installation and protect the installed work and materials of all other trades.

B. Replacements: In the event of damage, immediately make all repairs and replacements necessary to the acceptance of the Engineer at no additional cost to the Owner.

1.15 DEVIATIONS AND DISCREPANCIES

A. The Drawings are intended to indicate only diagrammatically the extent, general character, and approximate locations of the mechanical work and exact locations shall be determined in the field subject to approval by the Engineer. Work indicated, but having minor details obviously omitted such as pipe and duct rise, drop and/or fittings, shall be furnished complete to perform the functions intended without additional cost to the Owner. Follow the architectural, structural, and electrical drawings so that work under this section is properly installed and coordinated with other sections.

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

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

1.16 INSURANCE

A. The Contractor shall purchase and maintain all Workers' Compensation Insurance, Public Liability and Property Damage Insurance during the progress of the Work and until completion and acceptance of the entire project by the Owner in the amounts as specified in the GENERAL CONDITIONS and SUPPLEMENTARY CONDITIONS.

1.17 SAFETY REGULATIONS

A. All work shall be performed and/or installed to conform to all requirements of the Occupational Safety and Health Act and all amendments thereto.

1.18 TEMPORARY HEAT

A. The Mechanical Contractor shall comply with the requirements for temporary heat as specified in Division 01.

B. The use of electric heaters for temporary heating is prohibited.

1.19 CHANGE ORDERS

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

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

1.20 PERMITS

A. Apply for, obtain and pay for all permits and inspections required by law and notify proper authorities in ample time for inspections to be made prior to completion of the Work.

1.21 ASBESTOS ABATEMENT

A. If during the course of the work, the existence of asbestos or asbestos containing materials is encountered or suspected in the structure or building, promptly notify the Owner and Engineer. The Owner shall be responsible for all asbestos related activities that may be required including: site surveys, sampling, testing, removal specifications and removal.

B. Do not perform any work prior to receipt of written instructions from the Owner.

1.22 CLOSING IN UNINSPECTED WORK

A. General: Do not cover up or enclose work until it has been properly and completely inspected and approved.

B. Noncompliance: Should any of the work be covered up or enclosed prior to all required inspections and approvals, uncover the work as required, and after it has been completely inspected and approved, make all repairs and replacements with such materials as are necessary to the approval of the Engineer and at no additional cost to the Owner.

1.23 CONTRACT CLOSEOUT

A. Final Cleaning:

1. Prior to acceptance of the buildings, thoroughly clean all exposed portions of the plumbing installation, removing all labels and all traces of foreign substance.
2. Execute final cleaning prior to final inspection.
3. Clean interior and exterior surfaces. Vacuum carpeted and soft surfaces.
4. Clean debris from site, roofs, gutters, downspouts, and drainage systems.
5. Clean all strainers and floor drains.

B. Project Record Documents: Submit the following

1. Record Documents and Shop Drawings: Legibly mark each item to record actual construction.
2. Submit documents to Engineer prior to claim for final application for payment.

C. Final Adjustment: Provide necessary mechanics and/or engineers as necessary to make final adjustment of operation of the systems so that the systems are turned over to the Owner in first class operating condition.

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

E. Warranties: Warrant all work and materials for a period of one year commencing with the acceptance by the Owner of the completed installation in accordance with the Contract Documents. Replace any work, materials, equipment, or system, which develops defects within the warranty period, without cost to the Owner. Specific equipment may require a warranty greater than one year and shall be complied with as noted within the equipment specification.

END OF SECTION

SECTION 22 05 00 – COMMON WORK RESULTS FOR PLUMBING

PART 1 - GENERAL

1.1 SECTION INCLUDES

A. The work of this section includes, but is not limited to the following:

1. Interior Pipe Sleeves and Escutcheons.
2. Firestopping.
3. Hangers and Supports.
4. Valves.
5. Backflow Prevention.
6. Mixing Valves.
7. Equipment Identification.
8. Electric Motor Efficiency Requirements.

1.2 RELATED SECTIONS

1. Section 22 00 10, Basic Plumbing Requirements.

1.3 SUBMITTALS

A. Submit in accordance with Section 22 00 10.

B. Product Data: Provide catalog data for the following:
1. All equipment included in this section.

PART 2 - PRODUCTS

2.1 INTERIOR PIPE SLEEVES AND ESCUTCHEONS

A. Masonry and/or fire rated wall and floor penetrations: Steel Pipe, ASTM A 53, Type E, Grade B, Schedule 40, galvanized, non-threaded ends.

B. Non-masonry wall penetrations: Schedule 40 PVC with non-threaded ends, or #24 gauge galvanized steel tubes with wired or hemmed ends.

C. Sealing:
1. Caulk spaces between sleeves and pipes with a modular mechanical type seal consisting of interlocking synthetic rubber links shaped to continuously fill the annular space between the object and sleeve, connected with bolts and pressure plates causing rubber sealing elements to expand when tightened to make smoke and watertight. Thunderline Link-Seal or equal.

D. Escutcheons: Two piece nickel plated steel floor and ceiling plates.

2.2 FIRESTOPPING

A. Refer to Section 23 05 00, Common Work Results for HVAC for firestopping at all fire rated penetrations.

2.3 HANGERS AND SUPPORTS

A. General
1. All hangers and supports shall be specially manufactured for that purpose and shall be the pattern, design and capacity required for the location of use.
2. Piping specified herein shall not be supported from piping or equipment of other trades.
3. Hangers shall be heavy duty steel adjustable band type; plain for steel and cast iron pipe, and copper plated for copper tubing.
4. Exposed vertical risers 3/4" and smaller shall be supported at the mid-point between each floor with split-ring type hangers; copper plated for copper tubing.
5. Provide insulation saddles for all cold water and roof leader piping.

B. Hanger Rods
1. Hanger rods shall be all-thread rod in concealed areas, and rods threaded on ends of rod only in finished areas and the Boiler Room. Rod size shall be 3/8" for piping 2" and under; ½" for 2½" to 6"; 5/8" over 6".
2. Provide lag points with rod couplings for fastening to wood, toggle bolts in concrete blocks or structural slabs and compound anchor shields and bolts in poured concrete.
3. Supports: Provide structural iron supports, as required.

2.4 VALVES

A. Provide valves by a single manufacturer by one of the following: Jenkins, Nibco, Crane, Fairbanks, Stockham, or approved equal.
1. Gate Valves - Shall be 125# WSP bronze, soldered ends, Nibco S-121 Disc, Jenkins 1242, Crane 1334.
2. Globe Valves - 2" and under shall be 125# WSP bronze, solder ends, with renewable composition disc, Nibco S-235 (Y) Crane 1310.
3. Check Valves - 300# WOG bronze swing check, regrinding bronze disc, screw-in cap, Nibco S-413 (BWY), Jenkins 1222, Crane 1342.
4. Drain Valves - Shall be 125# WSP hose-end boiler drains. Nibco No. 72 or equivalent.
5. Hose Bibbs (Interior) - Chrome plated solid flange compression faucets with loose keys and male hose ends, Nibco #663, Kohler #K-8980, Wolverine #664-½. Provide a non-removable backflow preventer on each faucet hose end. Watts No. 8A or equal.
6. Frost-proof Sillcock - Red bronze body with heavy nickel plated finish, brass-rod stem with Teflon impregnated asbestos packing, Buna-N seat disc, 3/4" Nibco 95-C with lockshield and Aluminal Lockshield handwheel. Provide chamber length as required by wall construction.
7. Ball Valves - Acceptable in lieu of gate and globe valves, in sizes ½" to 2". 400 lb. WOG bronze body, screwed or solder ends, bronze ball, Buna stem seals, Buna-N or equal resilient seats, lever handle. Equal to Nibco T-580.

B. Isolation valves: Provide isolation valves at the base of all hot and cold water risers supplying two or more floors.

2.5 BACKFLOW PREVENTION

A. General: Install backflow preventers at all cross connections to prevent the backflow of contaminated water into the potable water supply in accordance with the local and state plumbing codes. Units shall be of bronze construction with bronze strainer and stainless steel internal parts and tight seating rubber check valve assemblies. The device (specified or indicated on the plans) shall meet the requirements of A.S.S.E. Standard 1013.

B. Reduced Pressure Zone Type: A reduced pressure backflow preventer shall be a complete assembly including tight-closing shut-off valves before and after the device and also be protected by a strainer. The design shall include test cocks, a pressure-differential relief valve located between two positive seating check valves. The device, (specified or indicated on plans) shall meet the requirements of A.S.S.E. Standard 1013 and AWWA-C511-92. It shall be suitable for supply pressure up to 175 psi and temperatures up to 140°F, Watts Regulator Company 909, Febco 825Y or Wilkens 575.

C. Double Check Valve Type
   1. ½ and 3/4" sizes: Watts No.9D backflow preventer with intermediate atmospheric vent shall be used to prevent flow of polluted water into the potable water system. Unit shall be suitable for supply pressures up to 175 psi and supply temperatures up to 210°F constant and 250°F intermittent. The device shall meet the requirements of ASSE standard 1012. Unit may be installed vertically or horizontally and is suitable for use under continuous pressure, Febco 815.
   2. 3/4" and larger: Watts No. 007/700 has bronze body construction and is standardly equipped with a strainer, gate valves and ball type test cocks that may be installed either horizontally or vertically. Sizes: 3/4", 1", 1½" and 2". The device shall meet the requirements of ASSE standard 1015 and AWWA - C510-92. Suitable for supply pressures up to 175 lbs. and for supply water temperatures up to 140°F. Febco 805, Wilkens 550.

D. Vacuum Breakers
   1. Pressure Type Vacuum Breakers: Watts No. 800 are suitable for working temperatures from 33°F. to 210°F. and pressures from 15 psi to 150 psi. Unit includes test cocks and tight seating gate valves. Units are suitable for continuous supply pressure.
   2. Atmospheric Vacuum Breakers: Watts No. 288A are suitable for working pressures up to 125 psi and maximum temperatures to 210°F. Unit No. 8 series shall be used to prevent backflow of polluted water at hose connections.

E. Schedule
   1. All laboratory faucets - Type N-LF9.
   2. Water purification system - Series 700.

2.6 MIXING VALVES

A. Emergency Eyewash Mixing Valve: Thermostatic Water Mixing to meet mandated flow and temperature requirements for Eye/Face Wash. Locked temperature setting of 85° F (29° C). Integral supply checkstops, wall supports. Outlet piping with dial thermometer (range 0° to 140° F, -10° to 60° C). Built in cold water by-pass to allow cold water to flow in case of hot water failure.

1. Provide optional temperature override protection with secondary thermostatic valve to open cold water upon temperature rise over the set point.
2. Capacity - As noted on the plans.
3. Makes - Leonard Model TA-350, Powers, Symmons, Guardian G3800 or equal.

2.7 ELECTRIC MOTOR EFFICIENCY RATINGS

A. Motors 1/3 hp and smaller shall be wired for 120 volt, 1 phase, 60 hz; motors ½ hp and larger shall be wired for 3 phase, 60 Hz, unless specifically shown otherwise. Motors 1 Hp and larger shall be NEMA Premium Efficiency Motors in accordance with The NEMA Premium™ efficiency levels are contained in NEMA Standards Publication MG 1- 2006, in Tables 12-12 and12-13, respectively. Additionally, all mechanical equipment shall comply with efficiency requirements as outlined in ASHRAE 90.1 2007 or MUBEC (Maine Uniform Building and Energy Code).

PART 3 - EXECUTION

3.1 GENERAL

A. Inspection
1. Prior to all work of this section, carefully inspect the installed work of all other trades and verify that all such work is complete to the point where this installation may properly commence.
2. Verify that plumbing can be installed in strict accordance with all pertinent codes and regulations and the approved Shop Drawings.

B. Discrepancies
1. In the event of discrepancy, immediately notify the Architect/Engineer.

C. Do not proceed with installation in areas of discrepancy until all such discrepancies have been fully resolved.

3.2 CLEANING

A. Prior to acceptance of the building, thoroughly clean all exposed portions of the plumbing installation, remove all labels and all traces of foreign substance, using only a cleaning solution approved by the manufacturer of the plumbing item and being careful to avoid all damage to finished surfaces.

B. Clean debris from site, roofs, gutters, downspouts, and drainage systems.

C. Clean all strainers and floor drains.

D. Fill all traps.

3.3 EQUIPMENT IDENTIFICATION

A. Valves shall be provided with brass tags and chains securely attached to the stem or body. They shall be suitably identified by number or name to indicate the service. A framed and glazed directory of these items shall be prepared to show the location and function of each item. The directory shall be mounted in the mechanical room and will be incorporated as part of the Operating and Maintenance Instructions.

B. All mechanical equipment shall be neatly stenciled in a conspicuous place indicating the service or equipment number.

C. All pipes shall be identified and provided with flow arrows in accordance with the Maine State Plumbing Code.

END OF SECTION

SECTION 22 07 00 – PLUMBING INSULATION

PART 1 - GENERAL

1.1 SECTION INCLUDES

A. The work of this section includes mechanical insulation for the following:
   1. Cold water lines.
   2. Hot water lines.
   3. Piping below handicapped sinks

1.2 RELATED SECTIONS

   1. Section 22 00 10, Basic Plumbing Requirements.
   2. Section 22 11 16, Domestic Water Piping
   3. Section 22 13 19, Sanitary Waste & Vent Piping

1.3 SUBMITTALS

A. Submit in accordance with Section 22 00 10.

B. Product Data: Provide catalog data for the following:
   1. All equipment included in this section including thickness and application.

1.4 QUALITY ASSURANCE

A. Manufacturer: A company specializing in the manufacture of mechanical insulation with a minimum of five years experience.

PART 2 - PRODUCTS

2.1 GENERAL

A. Insulation systems shall have a flame spread rating per ASTM E 84 of 25 or less and a smoke developed and fuel contributed rating of 50 or less.

2.2 PIPING INSULATION

A. Glass Fiber Insulation: Provide manufacturer's standard product by one of the following acceptable manufacturers:
   1. CertainTeed
   2. Knauf Fiberglass
   3. Owens-Corning
   4. Schuller International, Inc.
   5. Approved equal.

B. Minimum pipe insulation thickness (inches), based on minimum thermal resistance (R) of 4.0 per inch of thickness on a flat surface at a mean temperature of 75°F: Unit to be fiberglass heavy density sectional pipe insulation system having a factory applied vapor barrier laminate all-service jacket.

Piping System Type	Fluid Temp Range, °F	Runouts	Size 0<1”	Size 1” to <1 1/2”	Size 1 1/2” to <4”	Size 4” to 8”	Size 8” and Larger
Domestic cold water		1/2	1/2	1/2	1	1	1
Domestic hot water	105+	1	1	1	1	1	1
Recirculation water	105+	1	1	1	1	1	1

Piping System Type	Fluid Temp Range, °F	Size 0≤ 1 1/2”	Size >1 1/2" to <4”	Size 4” to 8”	Size 8” and Larger
Process or safe system		1/2	1/2	1	1
Heating, hi pres/temp	350+/-	2 1/2	3	4	4
Heating, med pres/temp	251 – 350	1 1/2	3	3	3
Heating, low pres/temp	201 - 250	1 1/2	3	3	3
Heating, low temp	141 - 200 105 - 140	1 1/2	2	2	2
Cooling, chilled water, brine, Refrigerant	40 – 60 <40	1 1/2	1 1/2	1 1/2	1 1/2

2.3 PIPING BELOW HANDICAPPED LAVATORIES AND SINKS:

A. Handicapped lavatory P-Trap and angle valve assemblies shall be insulated with the fully molded, Truebro, Handi Lav-Guard insulation kit, Model #102, light gray color with three-piece interlocking trap assembly and two-piece interlocking angle valve assemblies. Fasteners shall be nylon-type supplied with kit.

PART 3 - EXECUTION

3.1 PIPING

A. Cold Water: Insulate all cold water piping above grade with fiberglass heavy density sectional pipe insulation system having a factory applied vapor barrier laminate all-service jacket. Entire insulation jacket lap, butt closure strips, exposed butt ends, and fitting covers to be sealed with white vapor barrier adhesive. Provide additional sealing of jacket with flare type staples to eliminate "fishmouths." Staples shall not penetrate more than ½ the insulation thickness.

B. Hot Water: Insulate all hot water and hot circulation piping with fiberglass heavy density sectional pipe insulation system with all-service jacket. Longitudinal jacket flaps to be secured with flare type staples to eliminate "fishmouths." Cut insulation to include hangers.

C. Wrap all fittings with fiberglass insulation and cover with a one piece PVC fitting cover secured with flare type staples. Cover joints with 4" insulation straps over.

D. Finish the ends of insulation on exposed pipes at valves, flanges, unions, etc., neat with covering to match jacket and secured with mastic.

E. Do not insulate valves, flanges and unions.

END OF SECTION

SECTION 22 11 16 – DOMESTIC WATER PIPING

PART 1 - GENERAL

1.1 SECTION INCLUDES

A. The work of this section includes, but is not limited to the following:
   1. Interior and exterior water piping service and distribution

1.2 RELATED SECTIONS
   1. Section 22 00 10, Basic Plumbing Requirements.
   2. Section 22 05 00, Common Work Results for Plumbing.
   3. Section 22 07 00, Plumbing Insulation.

1.3 SUBMITTALS

A. Submit in accordance with Section 22 00 10 for the following:
   1. Pipe and fittings for all types of piping utilized.

PART 2 - PRODUCTS

2.1 PIPE

A. Domestic Water Piping
   1. All hot and cold water piping shall be hard drawn copper tube with wrought or cast brass copper fittings and made up with 95-5 tin antimony solder.
   2. Below grade and below slab piping shall be type "K" soft temper; all other copper piping shall be type "L".
   3. Lead solder or flux with more than .2% lead content is prohibited.

B. Purified Water Piping
   1. Pipe: Orion Whiteline Pipe Schedule 80 Pipe will be manufactured to Schedule 80 iron pipe dimensions from virgin unpigmented Type I homopolymer polypropylene, meeting ASTM D4101, using no plasticizers or antioxidants. Pipe will be furnished in 10' lengths, grooved and capped. Pipe will meet the dimensional tolerances of ASTM D2447.
   2. Fittings: Orion Whiteline Riontite No-Hub/Plain End Fittings will be manufactured to Schedule 80 wall thickness from virgin unpigmented Type I hompolymer polypropylene, meeting ASTM D4101, using no plasticizers or antioxidants. Fittings will be manufactured to be joined by the Riontite No-Hub/Plain End method, conforming to ASTM D2657. All fittings test to 150 psi @ 73o F. Each fitting will be individually bagged.
   3. Ball Valves: Orion Whiteline Riontite No-Hub/Plain End Ball valves will be manufactured from virgin unpigmented Type I homopolymer polypropylene to be fully compatible with the Orion high purity Whiteline system. All valves will test to 150 psi @ 73oF. Each ball valve will be individually bagged.

4. Ball Check Valves: Orion Whiteline Riontite No-Hub/Plain End Ball check valves will be manufactured from virgin unpigmented Type I homopolymer polypropylene to be
5. fully compatible with the Orion high purity Whiteline system. All valves will test to 150 psi @ 73oF. Each ball valve will be individually bagged.
6. Needle Valves: Needle valves will be manufactured from virgin unpigmented Polypropylene resin meeting ASTM D4101 to be fully compatible with the Orion high purity system. Each valve shall be individually packaged and sealed.
7. Diaphragm Valves: Diaphragm valves will be manufactured from virgin unpigmented Polypropylene resin meeting ASTM D4101 to be fully compatible with the Orion high purity Polypropylene system. All diaphragm valves shall test

PART 3 - EXECUTION

3.1 INSTALLATION OF PIPING AND EQUIPMENT

A. General

1. Install all piping promptly, capping or plugging all open ends and making pipe generally level and plumb, free from traps, and in a manner to conserve space for other work.
2. Provide uniform pitch of 1/4" per foot wherever possible but never less than 1/8" per foot or as shown on DRAWINGS for all horizontal waste and drainage piping within the building; pitch all vents for proper drainage; install vent piping with each bend 45° minimum from the horizontal wherever structural conditions will permit.
3. Inspect each piece of pipe, tubing, fittings, and equipment for defects and obstructions; promptly remove all defective material from the job site.
4. Install pipes to clear all beams and obstructions; do not cut into or reduce the size of load-carrying structural members without the approval of the Architect/Engineer.
5. Back vent all fixtures where required by the Plumbing Code.
6. All risers and off-sets shall be substantially supported.
7. Maximum Hanger Spacing:
   a. Copper - ½ to 1": 6 ' on run; 2' from offset
   b. Copper - 1 1/4" up: 10' on run; 4' from offset
   c. Steel - All sizes: 10' on run; 6' from offset
   d. Cast Iron - All: 5' on run; and at hubs
   e. Plastic - All: 6' on run; no sags permitted
8. Arrange all piping to maintain required grade and pitch to lines and to prevent vibration. Provide expansion loops and anchors where shown on DRAWINGS.
9. Make all changes in pipe size with reducing fittings.
10. Provide drains at all low points in water piping with ½" gate valve with hose nipple, or hose-end boiler drain.
11. No piping shall be installed in such a manner as to permit back siphonage or reverse flow of any liquid in water piping under any conditions.

B. Joints and Connections

1. Smoothly ream all cut pipe; cut all threads straight and true; apply best quality Teflon tape to all male pipe threads but not to inside of fittings; use graphite on all cleanout plugs.
2. Pack all joints in cast iron soil and waste pipe and fittings, using oakum and securing with one inch deep lead caulking, fully and properly caulked and smoothly finished, or install "push-on" or "no-hub" joints per manufacturer's requirements.

C. Make all joints in copper pressure pipe with a 95-5 tin-antimony solder applied in strict accordance with the manufacturer's recommendations, except underground water to be silver soldered. Make joints in non-pressure copper tube with 50-50 tin-lead solder.

3.2 STERILIZATION OF WATER PIPES

A. General: Purge new or repaired potable water systems of deleterious matter and disinfect prior to use. Follow the method prescribed by the health authority having jurisdiction, or, if a method is not prescribed by that authority, then follow the procedure described in either AWWA C601 or AWWA D105, or as described below. This requirement shall apply to "on-site" or "in-plant" fabrication of a system or a modular portion of a system.

1. Flush the pipe system with clean, potable water until dirty water does not appear at the points of outlet.
2. The system or part thereof shall be filled with a water/chlorine solution containing at least 50 parts per million of chlorine, and the system or part thereof shall be valved off and allowed to stand for 24 hours.
3. The system or part thereof shall be filled with a water/chlorine solution containing at least 200 parts per million of chlorine and allowed to stand for three hours.
4. Following the allowed standing time, flush the system with clean potable water until chlorine does not remain in the water coming from the system.
5. Repeat the procedure if it is shown by a bacteriological examination made by the authority that contamination is still present in the system.
6. Provide all labor, equipment, materials, and test kits for chlorine application and tests.
7. Chlorinate only when the building is unoccupied.

B. Submit letter to Engineer certifying that sterilization has been performed and tested according to the above requirements.

3.3 TESTING

A. General

1. Test all parts of the plumbing installation as specified, as required by applicable codes, and where and as directed by the Engineer. Make tests before work is covered by earth fill, building construction, or pipe covering. All testing, test gauges and equipment by the Contractor at no additional cost to Owner.

B. Piping Tests

1. Hot and cold water piping shall be subjected to a hydrostatic pressure test of 100 psi for two hours with no pressure loss. Locate and repair leaks and repeat tests until work is tight.

END OF SECTION

SECTION 22 13 19 – SANITARY WASTE & VENT PIPING

PART 1 - GENERAL

1.1 SECTION INCLUDES

A. The work of this section includes, but is not limited to the following:
   1. Sanitary waste and vent piping and associated fittings.
   2. Cleanouts

1.2 RELATED SECTIONS
   1. Section 22 00 10, Basic Plumbing Requirements.
   2. Section 22 05 00, Common Work Results for Plumbing.
   3. Section 22 07 00, Plumbing Insulation.

1.3 SUBMITTALS

A. Submit in accordance with Section 22 00 10 for the following:

B. Product Data: Provide catalog data for the following:
   1. All equipment included in this section.
   2. Submittal sheets to include all sizes and dimensions.

PART 2 - PRODUCTS

2.1 GENERAL

A. Provide basic materials as specified in Section 22 00 10, and as additionally required by this Section.

2.2 PIPE

A. Sanitary Soil, Waste, Vents, and Roof Drainage (Choice of following)
   1. Service weight cast iron soil pipe and fittings with B&S "push-on" gasket joints or "No-Hub" sleeve couplings CISPI Standard 301-72.
   2. Type "DWV" copper tubing and solder type drainage fittings, 50/50 solder. (Type "K" copper on urinal wastes.)
   3. Schedule 40 polyvinyl-chloride "PVC-DWV" pipe and solvent cemented socket drainage fittings.

B. Vents through roof shall be black "ABS-DWV" pipe.

2.3 CLEANOUTS

A. Provide cleanouts for soil, waste and storm piping at base of all stacks, where shown on the Drawings and as required by code.

1. Floor Cleanouts: Flush with floor, round adjustable tops, bronze plug and lead seal, scoriated secured nickel bronze top, flashing flange with flashing device, inside caulk. Units shall be Josam 58000(-25) (-41); Smith Fig. 4026F-C or equal by Zurn, Watts or Wade.
2. Wall Cleanouts: "T" fittings with bronze slotted plug and lead seal, stainless steel wall cover; Josam 58790 Smith Fig. 4531 or 4551 or equal by Zurn, Watts or Wade.

PART 3 - EXECUTION

3.1 GENERAL

A. Provide pipe insulation according to Section 22 07 00.

B. Roof Leaders and Roof Drains: Insulate all horizontal rain water conductor lines above floor with 1" thick insulation. Provide insulation saddles for all hangers.

3.2 INSTALLATION OF PIPING

A. General:
1. Install piping according to Section 15050 and as further required by this Section.
2. Provide uniform pitch of 1/4" per foot wherever possible but never less than 1/8" per foot or as shown on Drawings for all horizontal waste and drainage piping within the building; pitch all vents for proper drainage; install vent piping with each bend 45° minimum from the horizontal wherever structural conditions will permit.
3. Back vent all fixtures where required by the Plumbing Code.
4. All risers and offsets shall be substantially supported.
5. Maximum Hanger Spacing: According to Section 22 05 00.

B. Joints and Connections:
1. Smoothly ream all cut pipe; cut all threads straight and true; apply best quality Teflon tape to all male pipe threads but not to inside of fittings; use graphite on all cleanout plugs.
2. For cast iron soil and waste pipe and fittings, pack all joints with oakum and secure with one inch deep lead caulking, fully and properly caulked and smoothly finished, or install "push-on" or "no-hub" joints per manufacturer's requirements.
3. Make all joints in copper pressure pipe with a 95-5 tin-antimony solder applied in strict accordance with the manufacturer's recommendations, except underground water to be silver soldered. Make joints in non-pressure copper tube with 50-50 tin-lead solder.

3.3 TESTING

A. Test all parts of the plumbing installation as specified, as required by applicable codes, and where and as directed by the Engineer. Make tests before work is covered by earth fill, building construction, or pipe covering. All testing, test gauges and equipment by the Contractor at no additional cost to Owner.

B. Piping Tests: Plug all openings except at the highest point above the roof, and fill the entire system with water to the point of overflow. Water level shall hold constant for two (2) hours.

Inspect each joint for visible leaks. All leaks shall be repaired. Doping of pinholes in soil pipe or fittings is not permitted.

3.4 CLEANING

A. Prior to acceptance of the building, thoroughly clean all exposed portions of the plumbing installation, remove all labels and all traces of foreign substance, using only a cleaning solution approved by the manufacturer of the plumbing item and being careful to avoid all damage to finished surfaces.

B. Clean all floor drains and traps. Fill all traps. Clean all strainers and faucet aerators.

END OF SECTION

SECTION 22 40 00 – PLUMBING FIXTURES & EQUIPMENT

PART 1 - GENERAL

1.1 SECTION INCLUDES

A. The work of this section includes, but is not limited to the following:
   1. Plumbing fixtures.

1.2 WORK NOT INCLUDED

A. The work of this section does not include the following
   1. Lab sinks and faucets will be provided by others. The plumbing contractor shall provide all hot, cold, waste and vent piping to the units as well as disposal units.

1.3 RELATED SECTIONS

1. Section 22 00 10, Basic Plumbing Requirements.
2. Section 22 05 00, Common Work Results for Plumbing.
3. Section 22 11 16, Domestic Water Piping
4. Section 22 13 19, Sanitary Waste & Vent Piping.

1.4 SUBMITTALS

A. Submit in accordance with Section 22 00 10.

B. Product Data: Provide catalog data for the following:
   1. All plumbing fixtures including, drains, supplies and all accessories and options.

PART 2 - PRODUCTS

2.1 PLUMBING FIXTURES AND EQUIPMENT

A. General:
   1. Furnish and install all plumbing fixtures shown on the Drawings and as hereinafter Scheduled.
   2. To establish a standard of quality and design desired, specifications have been based generally on the use of Kohler Company fixtures; Elkay sinks and Sloan flush valves. An equal type and quality of fixture as manufactured by Zurn, American Standard or Eljer Company or flush valve by Coyne and Delaney is acceptable. Stainless steel sinks by Just are also acceptable.
   3. All fixtures are to be white vitreous china where not otherwise specified. All fittings shall have chromium finish.
   4. Refer to Architectural drawings for mounting heights of all fixtures.

B. Sinks

1. Type P-1A (ADA Lab Sink)
    a. Sink: By others
    b. Trim: By others.
    c. Supplies: Coordinate with Lab Equipment
    d. Strainer: Coordinate with Lab Equipment
    e. Trap: Coordinate with Lab Equipment
2. Type P-1B (Lab Sink)
    a. Sink: By others
    b. Trim: By others.
    c. Supplies: Coordinate with Lab Equipment
    d. Strainer: Coordinate with Lab Equipment
    e. Trap: Coordinate with Lab Equipment
    f. Disposal Unit: Provide Insinkerator Model Badger 5, 120V, ½ hp, at P-1B
3. Type P-1C (Lab Sink)
    a. Sink: By others
    b. Trim: By others.
    c. Supplies: Coordinate with Lab Equipment
    d. Strainer: Coordinate with Lab Equipment
    e. Trap: Coordinate with Lab Equipment
    f. Gray Water Pump: Provide Upflush model Sanivite at P-1C
4.

C. Emergency Eyewash/Drench Hose Unit Deck Mounted
1. Type P-2A
    a. Fixture: Guardian G5022, meets the provisions of ANSI Z358.1-2014 as both an eyewash and a drench hose. Unit may be left in the deck flange for use as a fixed eyewash, leaving user's hands free. Alternatively, unit may be removed for use as a drench hose to rinse any part of user's eyes, face or body.
        1) Spray Head Assembly: Two GS-Plus™ spray heads mounted side-by-side. Each head has a "flip top" dust cover, internal flow control and filter to remove impurities from the water flow.
        2) Valve: Forged brass squeeze valve activated by stainless steel lever handle. Valve has replaceable stainless steel seat for exceptional durability. Locking clip engages when handle is depressed, providing "hands free" operation. Valve stays open until locking clip is released.
        3) Hose: 8' reinforced PVC hose. 300 PSI maximum working pressure.
        4) Mounting: Deck flange for countertop mounting. Flange has handle locator guide to position spray heads and handle facing forward at all times.
        5) Backflow Preventer: In-line dual check backflow preventer installed on inlet of hose (G5022BP only).
        6) Supply: 3/8" NPT male swivel-type inlet.
        7) Sign: ANSI-compliant identification sign.
        8) Quality Assurance: Unit is completely assembled and water tested prior to shipment.
        9) Options:
            a) HG Undercounter hose guide bracket to prevent hose from tangling or binding.
            b) VB In-line vacuum breaker for installation between valve and spray head.
            c) TMV G3600LF thermostatic mixing valve precisely blends hot and cold water to deliver warm (tepid) water as provided by ANSI

Z358.1-2014. Refer to “Tempering Units” section for complete technical and product selection information.

D. Water Purification Unit: Supplied by others. Pipe unit with ½” cold water, valves, and backflow preventer, and run to purified water faucet at each sink. Refer to detail on drawing P-200.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Provide traps in wastes and stop valves on hot and cold water and steam supplies to each Food Service or Laundry fixture and install trim and accessories furnished by the equipment supplier.

B. Provide traps in wastes and stop valves on hot and cold water supplies to all fixtures.

END OF SECTION

SECTION 23 00 10 – BASIC HVAC REQUIREMENTS

PART 1 - GENERAL

1.1 SUMMARY OF MECHANICAL WORK

A. The Mechanical Work includes, but is not limited to, the following:
   1. Furnish all labor, materials, equipment, transportation and perform all operations as required to install a complete HVAC system in accordance with these specifications and applicable drawings.
   2. Furnish all labor, materials, equipment, transportation and perform all operations as required to install a complete plumbing system in accordance with these specifications and applicable Drawings.
   3. Study the drawings and specifications and coordinate Mechanical and Plumbing work with that of Architectural and other trades. Report all discrepancies to the Engineer prior to submitting a bid.
   4. Other work as required to provide complete and operating mechanical and plumbing systems.

1.2 RELATED DOCUMENTS

A. Drawings, Division 00, including General and Supplementary Conditions and Division 01 Specification Sections, apply to Division 23 and all its Sections.

1.3 RELATED WORK DESCRIBED ELSEWHERE

A. Provide under the appropriate Section, all cutting, patching, trenching, plastering, chases, slots, furring, grounds, masonry foundations, excavation, backfilling, pads, conduits, etc., incidental to the installation of HVAC apparatus. Execute the work by qualified trades as shown on the Drawings and under the direction of this Section.

B. Electrical work: HVAC work shall include the installation of all motors, temperature controls, limit switches, etc., as herein specified. Work by the electrical sub-contractor (EC) shall include all other switches, pilot lights, fused and non-fused disconnect switches, outlets, motor starters, except as herein specified, and all necessary wiring and fuses to properly connect all mechanical/electrical equipment.

C. The following work shall be provided under the designated Sections:
   1. Cutting and patching: By the respective trades or General Contractor.
   2. Division 01, General Requirements: Temporary toilets.
   3. Division 26, Electric Work.

1.4 ALTERNATES

A. There are no HVAC alternates on the project.

1.5 ENGINEER/ARCHITECT

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

1.6 WORK SEQUENCE & COORDINATION

A. Provide on a timely basis the proper trade with all locations and details as required.

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

C. Coordinate in advance with other trades the shape, size and position of all necessary openings, sleeves, supports and related to avoid conflicts. In the event of unavoidable conflicts, consult Engineer for resolution.

D. Refer to Division 26 specifications for electrical work required for mechanical. Verify that the electrical characteristics of the mechanical equipment being provided is compatible with the project electric power circuits available; if in doubt consult Engineer.

1.7 STANDARDS OF MATERIALS

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

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

1. Underwriters Laboratories, Inc. (UL).
2. American National Standards Association (ANSI).
3. National Fire Protection Association (NFPA).
4. Occupational Safety and Health Administration (OSHA).
5. Standards of local Building Codes
6. American Society of Heating Refrigeration and Air Conditioning Engineers (ASHRAE)

1.8 SUBSTITUTIONS

A. Any proposal for a substitution shall be made in writing by the Contractor, who shall submit full details for consideration and obtain written acceptance of the Engineer.

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

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

D. Any additional cost, by this or other trades, resulting from the substitution of equipment shall be paid by this Contractor.

E. Any cost savings resulting from a substitution shall be deducted from the contract amount.

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

1.9 SUBMITTALS

A. Submit under procedures given in Division 01.

B. Shop Drawings: Before any materials are purchased or released for production, submit to the Engineer an electronic set of shop drawings showing all the HVAC materials proposed to be furnished and installed.

C. Record Drawings: During progress of the Work, maintain an accurate record of all changes made in the system installation from the layout and materials shown on the approved shop drawings. At the completion of the project, transfer all information onto a set of new blue-line prints and submit them to the Engineer.

D. Owner's Manual: Upon completion of this portion of the Work, and as a condition of its acceptance, deliver to the Engineer for the Owner two copies of a manual describing the system:
   1. Provide manuals in durable plastic ring binders, nominal 8½ x 11" size.
   2. Identification on, or readable through, the front cover stating general nature of the manual.
   3. A copy of all reviewed submittals and shop drawings.
   4. Complete instructions regarding operation and maintenance of all equipment involved.
   5. Complete name and address of nearest vendor of replaceable parts.
   6. Copy of all guarantees and warranties issued.
   7. Where contents of manuals include manufacturer's catalog pages, clearly indicate the precise items included in this installation.

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

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

G. Submittals shall be reviewed by, and carry the approval stamp of, the subcontractor and be initialed and dated by the reviewer.

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

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

1.10 PROJECT/SITE CONDITIONS

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

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

C. Inspection:
   1. Prior to commencing the work of this Section, carefully inspect the installed work of all other trades to verify that the work is complete to the point where this installation may properly commence.
   2. Verify that H & V work may be installed in strict accordance with all pertinent codes and regulations and the approved Shop Drawings.

D. Discrepancies
   1. In the event of discrepancy, immediately notify the Engineer.
   2. Do not proceed with installation in areas of discrepancy until the discrepancies have been fully resolved.

1.11 DEMOLITION

A. The mechanical contractor shall be responsible for the removal or relocation of existing HVAC equipment and the associated piping, ductwork and controls.

B. Removed equipment shall be turned over to the owner or properly disposed of by the contractor as directed by the owner.

1.12 DEFINITIONS

A. In this Section, the word “furnish” means to supply and deliver to the site ready for installation. The word “install” means to unload and place in proper position at the site and perform all operations necessary for secure mounting and correct operation ready for the intended service or use. The word “provide” means to furnish and install.

1.13 WORKMANSHIP

A. Qualifications of Workmen: Use sufficient qualified workmen and competent supervisors in the execution of the work to ensure proper and adequate installation of system throughout and to comply with the project schedule.

B. Codes: Work and/or mechanical equipment shall conform with all Local and State Rules and Regulations as well as the most recent versions of the National Fire Protection Association and the Maine Uniform Building and Energy Code, Maine State Plumbing Code, Ventilation Standard ASHRAE 62.1, the Maine State Energy Code (ASHRAE 90.1). These codes are considered a part of these specifications.

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

D. Qualification of Workmen: Use sufficient journeyman plumbers and competent supervisors in the execution of this portion of the work to ensure proper and adequate installation of plumbing throughout.

1.14 PRODUCT HANDLING

A. Protection: Protect all materials before, during and after installation and protect the installed work and materials of all other trades.

B. Replacements: In the event of damage, immediately make all repairs and replacements necessary to the acceptance of the Engineer at no additional cost to the Owner.

1.15 DEVIATIONS AND DISCREPANCIES

A. The Drawings are intended to indicate only diagrammatically the extent, general character, and approximate locations of the mechanical work and exact locations shall be determined in the field subject to approval by the Engineer. Work indicated, but having minor details obviously omitted such as pipe and duct rise, drop and/or fittings, shall be furnished complete to perform the functions intended without additional cost to the Owner. Follow the architectural, structural, and electrical drawings so that work under this section is properly installed and coordinated with other sections.

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

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

1.16 INSURANCE

A. The Contractor shall purchase and maintain all Workers' Compensation Insurance, Public Liability and Property Damage Insurance during the progress of the work and until completion and acceptance of the entire project by the Owner in the amounts as specified in the GENERAL CONDITIONS AND SUPPLEMENTARY CONDITIONS.

1.17 SAFETY REGULATIONS

1.18 All work shall be performed and/or installed to conform to all requirements of the Occupational Safety and Health Act of 1970 and all amendments thereto

1.19 TEMPORARY HEAT

A. The Mechanical Contractor shall comply with the requirements for temporary heat as specified in Division 01.

B. The use of electric heaters for temporary heating is prohibited.

1.20 CHANGE ORDERS

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

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

1.21 PERMITS

A. Apply for, obtain and pay for all permits and inspections required by law and notify proper authorities in ample time for inspections to be made prior to completion of the Work.

1.22 ASBESTOS ABATEMENT

A. If during the course of the work, the existence of asbestos or asbestos containing materials is encountered or suspected in the structure or building, promptly notify the Owner and Engineer. The Owner shall be responsible for all asbestos related activities that may be required including: site surveys, sampling, testing, removal specifications and removal.

B. Do not perform any work prior to receipt of written instructions from the Owner.

1.23 CLOSING IN UNINSPECTED WORK

A. General: Do not cover up or enclose work until it has been properly and completely inspected and approved.

B. Noncompliance: Should any of the work be covered up or enclosed prior to all required inspections and approvals, uncover the work as required, and after it has been completely inspected and approved, make all repairs and replacements with such materials as are necessary to the approval of the Engineer and at no additional cost to the Owner.

1.24 CONTRACT CLOSEOUT

A. Final Cleaning:

1. Prior to acceptance of the buildings, thoroughly clean all exposed portions of the heating installation, removing all labels and all traces of foreign substance. Provide clean air filters in all air handling equipment.
2. Execute final cleaning prior to final inspection.
3. Clean interior and exterior surfaces. Vacuum carpeted and soft surfaces.
4. Clean debris from site, roofs, gutters, downspouts, and drainage systems.
5. Replace filters of operating equipment.
6. At the closeout of the project and before occupancy the building shall be flushed for 48 hours with all air handling units set at 100% of their respective scheduled outside air quantities.

B. Project Record Documents: Submit the following

1. Record Documents and Shop Drawings: Legibly mark each item to record actual construction.
2. Submit documents to Engineer prior to claim for final application for payment.

C. Final Adjustment: Provide necessary mechanics and/or engineers as necessary to make final adjustment of operation of the systems so that the systems are turned over to the Owner in first class operating condition.

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

E. Warranties: Warrant all work and materials for a period of one year commencing with the acceptance by the Owner of the completed installation in accordance with the Contract Documents. Replace any work, materials, equipment, or system, which develops defects within the warranty period, without cost to the Owner. Specific equipment may require a warranty greater than one year and shall be complied with as noted within the equipment specification.

END OF SECTION

SECTION 23 05 00 – COMMON WORK RESULTS FOR HVAC

PART 1 - GENERAL

1.1 SECTION INCLUDES

A. The work of this section includes, but is not limited to the following:

1. Interior Pipe Sleeves and Escutcheons.
2. Firestopping.
3. Hangers and Supports.
4. Equipment Identification.
5. Electric Motor Efficiency Requirements.
6. General equipment installation requirements

1.2 RELATED SECTIONS

1. Section 23 00 10, Basic HVAC Requirements.

1.3 SUBMITTALS

A. Submit in accordance with Section 23 00 10.

B. Product Data: Provide catalog data for the following:
1. All equipment included in this section.

1.4 QUALITY ASSURANCE

A. Steel Support Welding: Qualify welder personnel and install according to AWS D1.1, "Structural Welding Code—Steel",

B. Steel Piping Welding: Qualify welder personnel and install according to ASME Boiler and Pressure Vessel Code, Section IX, "Welding and Brazing Qualifications." Comply with ASME B31 Series, "Code for Pressure Piping" for all piping installations.

C. Certify that all welder personnel have passed AWS qualification tests applicable to the work and that their certification is current.

PART 2 - PRODUCTS

2.1 INTERIOR PIPE SLEEVES AND ESCUTCHEONS

A. Masonry and/or fire rated wall and floor penetrations: Steel Pipe, ASTM A 53, Type E, Grade B, Schedule 40, galvanized, non-threaded ends.

B. Non-masonry wall penetrations: Schedule 40 PVC with non-threaded ends, or #24 gauge galvanized steel tubes with wired or hemmed ends.

C. Sealing:
   1. Caulk spaces between sleeves and pipes with a modular mechanical type seal consisting of interlocking synthetic rubber links shaped to continuously fill the annular space between the object and sleeve, connected with bolts and pressure plates causing rubber sealing elements to expand when tightened to make smoke and watertight. Thunderline Link-Seal or equal.

D. Escutcheons: Two piece nickel plated steel floor and ceiling plates.

2.2 FIRESTOPPING MATERIALS

A. Provide under this section in accordance with Section 07841.

B. Use only through-penetration firestop products that have been tested for specific fire resistance rated conditions conforming to construction assembly type, penetrating item type, annular space requirements, and fire rating required for the application:
   1. Latex Sealants: Single component latex formulations that when cured do not re-emulsify during exposure to moisture.
   2. Firestop Devices: Factory assembles steel collars lined with intumescent material sized to fit a specific outside diameter of penetrating item.
   3. Firestop Putty: Intumescent, non-hardening, water resistant putties containing no solvents, inorganic fibers or silicone compounds.
   4. Wrap Strips: Single component intumescent elastomeric strips faced on both sides with a plastic film.
   5. Firestop Pillows: Re-useable, non-curing, mineral fiber core encapsulated with an intumescent coating contained in a flame retardant poly bag.
   6. Silicone Sealants: Moisture curing, single component, silicone elastomeric sealant for horizontal surfaces (pourable or non-sag) or vertical surface (non-sag).
   7. Silicone Foam: Multi-component, silicone based, liquid elastomers that when mixed expand and cure in place to produce a flexible, non-shrinking foam.

C. Firestop systems shall be UL classified and rated for the type of construction where it is applied.

2.3 HANGERS AND SUPPORTS

A. General

   1. All hangers and supports shall be specifically manufactured for that purpose and shall be the pattern, design and capacity required for the location of use.
   2. Piping specified herein shall not be supported from piping or equipment of other trades.
   3. Hangers shall be heavy duty steel adjustable clevis type; plain for steel and cast iron pipe and copper plated for copper tubing.
   4. Exposed vertical risers 3/4" and smaller shall be supported at the mid-point between each floor with split ring type hangers; copper plated for copper tubing.
   5. All hangers on chilled water piping are to be installed on the exterior of the insulation with appropriate saddles.

B. Hanger Rods

1. Hanger rods shall be all thread rod in concealed area, and rods threaded on ends of rod only in finished areas and the Boiler Room. Rod size and spacing shall be as follows:

Nominal Pipe Size (in)	Maximum Span (ft)	Minimum Rod Diameter (in)
1	7	3/8
1 1/2	9	3/8
2	10	3/8
3	12	1/2
3 1/2	13	1/2
4	14	5/8
5	16	5/8
6	17	3/4
8	19	7/8
10	22	7/8
12	23	7/8

2. Provide lag points with rod couplings for fastening to wood, toggle bolts in concrete blocks or concrete structural slabs and compound anchor shields and bolts in poured concrete.

C. Supports

1. Provide and install angle iron supports for pipe hangers as required. Angle iron supports shall be adequate size for span and piping load.

D. Vibration Isolators

1. Provide rubber in shear or spring type vibration isolators of adequate capacity to support equipment where shown.

E. Safety

1. **Any support for piping, ductwork or equipment which is installed below seven (7) feet above finished floor shall have sharp edges blunted or rounded-off and shall be padded with 1" foam insulation to prevent possible personnel injury.**

2.4 ELECTRIC MOTOR EFFICIENCY RATINGS

A. Motors 1/3 hp and smaller shall be wired for 120 volt, 1 phase, 60 hz; motors ½ hp and larger shall be wired for 3 phase, 60 Hz, unless specifically shown otherwise. Motors 1 Hp and larger shall be NEMA Premium Efficiency Motors in accordance with The NEMA Premium™ efficiency levels are contained in NEMA Standards Publication MG 1- 2006, in Tables 12-12 and12-13, respectively.

B. Additionally, all mechanical equipment shall comply with efficiency requirements as outlined in ASHRAE 90.1 2007 or MUBEC (Maine Uniform Building and Energy Code).

PART 3 - EXECUTION

3.1 GENERAL

A. Inspection
1. Prior to commencing the work of this Section, carefully inspect the installed work of all other trades to verify that such work is complete to the point where this installation may properly commence.
2. Verify that equipment can be installed in strict accordance with all pertinent codes and regulations and the approved Shop Drawings.

B. Discrepancies:
1. In the event of discrepancy, immediately notify the Architect/Engineer.
2. Do not proceed with installation in areas of discrepancy until all such discrepancies have been fully resolved.

3.2 INSTALLATION OF PIPING AND EQUIPMENT

A. General:
1. Install all piping promptly, capping or plugging all open ends and making pipe generally level and plumb, free from traps, and in a manner to conserve space for other work.
2. Inspect each piece of pipe, tubing, fittings, and equipment for defects and obstructions; promptly remove all defective material from the job site.
3. Install pipes to clear all beams and obstructions; do not cut into or reduce the size of load-carrying structural members without the approval of the Architect/Engineer.
4. All risers and offsets shall be substantially supported.
5. Arrange all piping to maintain required grade and pitch and to prevent vibration.
6. Provide expansion loops and anchors where shown on Drawings.
7. Make all changes in pipe size with reducing fittings.
8. Provide drains at all low points in water piping with ½" gate valve with hose nipple, or hose-end boiler drain.
9. Install piping to prevent back siphoning or reverse flow of liquid under all operating conditions.

B. Joints and Connections:
1. Smoothly ream all cut pipe; cut all threads straight and true; apply best quality Teflon tape to all male pipe threads but not to inside of fittings; use graphite on all cleanout plugs.
2. Make all joints in copper pressure pipe with a 95-5 tin-antimony solder applied in strict accordance with the manufacturer's recommendations, except underground water to be silver soldered. Make joints in non-pressure copper tube with 50-50 tin-lead solder.

C. Installation of mechanical equipment:
1. In general all equipment is to be installed in accordance with the manufacturers recommendations and installation instructions.
2. All mechanical equipment shall be installed with adequate space available to perform normal maintenance and accessibility shall be provided for filter replacement.

3.3 FIRESTOPPING

A. Install through penetration firestop systems in accordance with firestop system manufacturer's written installation instructions for products and applications indicated.

B. Engage an experienced installer who is trained, certified, licensed, or otherwise qualified by the firestop system manufacturer to install the firestop products.

C. Coordinate construction of openings and penetrating items to ensure that firestop systems are installed according to specified requirements.

D. Provide firestop systems that are compatible with one another, with the substrates forming openings, with the items penetrating the firestop system, and under the conditions of service for the application being considered.

E. Provide components for each firestop system that are needed to install fill materials. Use only components specified by the firestop system manufacturer and approved by the qualified testing agency for the designated system.

F. Keep areas of work accessible until inspection by the AHJ has been completed.

G. Inspecting Agency: Owner may engage a qualified independent inspecting agency to inspect the completed firestop system. The independent agency shall comply with ASTM E 2174 requirements including inspecting personnel qualifications, method of conducting inspections, and preparation of test reports.

H. Where deficiencies are found, repair or replace the firestop systems so that they comply with requirements. Proceed with enclosing firestop systems with other construction only after inspection reports are issued and the firestop installations comply with requirements.

3.4 Protect the firestop system during and after installation to insure that the systems do not deteriorate and are not damaged during the remaining period of construction. In the event damage or deterioration occurs, remove affected firestop system and replace with new materials in compliance with this specification.]

3.5 EQUIPMENT IDENTIFICATION

A. Valves: Provide with brass tags and chains securely attached to the stem or body. Identify by number or name to indicate the service.

B. Provide a framed and glazed directory to show the location and function of each item. The directory shall be mounted in the mechanical room and will be incorporated as part of the Operating and Maintenance Instructions.

C. All mechanical equipment including pumps, air handling units, boilers, fan coil units, unit heaters, condensers, etc., shall be neatly stenciled in a conspicuous place indicating the service or equipment number.

D. All pipes shall be identified and provided with flow arrows spaced at 50 foot intervals with the exception of drops or risers to terminal units.

END OF SECTION

SECTION 23 05 93 – TESTING, ADJUSTING & BALANCING

PART 1 - GENERAL

1.1 SECTION INCLUDES

A. The work of this section includes, but is not limited to the following:

1. Demonstration of mechanical equipment.
2. Duct testing, adjusting and balancing.
3. Equipment testing adjusting and balancing.
4. Mechanical equipment starting.
5. Pipe testing, adjusting and balancing.

1.2 RELATED SECTIONS

1. Section 23 00 10, Basic HVAC Requirements
2. Section 23 09 23, DDC Temperature Controls

1.3 SUBMITTALS

A. Submit in accordance with Section 23 00 10:
1. Provide report indicating all operational parameters as listed below for all new HVAC equipment.

1.4 QUALITY ASSURANCE

A. Balancing Contractor shall be approved by Engineer and be one of the following testing and balancing contractors:
1. Yankee Balancing
2. Central Air Balance
3. Tekon Technical Consultants Inc.
4. Air Solutions and Balancing
5. Maine Air Balance

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION

3.1 TESTING AND BALANCING

A. Upon completion of the heating, ventilating and air conditioning systems of the building, the Mechanical Contractor shall employ an independent balance firm to check, adjust and balance all HVAC equipment included in the contract. Notify Engineer two days in advance of start of balancing.

B. **The air for the new VAV box is to be obtained from a large air handling unit serving the second floor of the facility. The balancing contractor is to increase the units airflow by 300 CFM and in turn increase the main branch trunk by 300 CFM. The unit is located on the roof of the facility**.

C. It is the balancing contractors responsibility to refer to Section 23 09 23 3.1 "DDC Description of Operation" and to coordinate with the temperature control contractor to determine all operating modes and required CFM's, GPM's etc for the mechanical systems, which shall be reflected in the balancing report.

D. All instruments used in the checking, adjusting and balancing shall be accurately calibrated and maintained. Accuracy tests on instruments shall be performed in the presence of and whenever requested by the Engineer.

E. Air and water balance and checking shall not begin until systems have been completed and are in full working order. The Mechanical Contractor shall put all heating, ventilating, and air conditioning systems and equipment into full operation and shall continue the operating of same during each working day of testing and balancing. Before starting any air system, the complete system shall be checked to make sure all components are in place and operating properly and that all manual dampers are open.

F. Duct traverses shall be made to determine air flow and properly balance air quantities in main ducts for all ducted units. Traverse shall be made as close to the unit as possible to get an accurate measurement.

G. All air terminals shall be tested with three readings taken and the average recorded along with that specified.

H. Take all necessary air flow measurements to determine the output of the fans and units. Revise the RPM of the equipment as necessary to produce the CFM required at the various air outlets or inlets. The final air flow readings at the air outlets and inlets shall be within -5% to +10% of the air volumes indicated on the plans, however, relative space pressurization shall remain positive or negative as designed.

I. The various systems shall operate with a minimum of air noise and the use of the air volume control dampers at the diffusers and registers to restrict air flow to the point they are noisy will not be acceptable.

J. Balancing information shall be provided for all operating conditions on any piece of equipment designed to operate at multiple CFM or GPM settings. **This applies to, but is not limited to, fans operating under multiple set speeds or outside air quantities.**

K. Upon completion of the checking, adjusting and balancing, the Contractor shall submit six (6) certified copies of the Mechanical systems Test and Balance Report to the A/E for approval. The Report shall be in tabulated form with each piece of equipment or outlet properly identified by its equipment number or room number and location and shall include the following:
   1. Air Systems
      a. Fan/Air Handling Unit Designation and service Location
         Manufacturer
         Model Number
         Serial Number

b. Capacities (specified and actual) Total CFM
   Return CFM
   Outside air CFM
   Total static pressure
   Inlet static pressure
   Discharge static pressure
   Fan RPM
c. Motor and Drive Data (specified/actual/manufacturer)
   Horsepower
   Phase
   Voltage
   Amperage
   RPM
   Service factor
   Sheave size and number of grooves
   Fan sheave size and number of grooves
   Belts - quantity and model number
d. Duct Traverse Data
   Equipment designation
   Duct size and location
   Effective area
   Duct velocity (specified/actual)
   CFM (specified/actual)
   Pressure
e. Outlet Data
   Equipment designation and type
   Equipment location
   Equipment size
   CFM (design, initial, final)

2. Water Systems
   a. Pumps
      Designation and service
      Location
      Manufacturer
      Model number
      Serial number
   b. Capacities (specified and actual)
      GPM
      TDH
      Amperage
      Suction pressure
      Discharge pressure
      Pressure differential
   c. Motor (specified and actual)
      Horsepower
      Voltage
      Amperage
      Phase
   d. Terminal Heaters and Branch Mains
      System and location
      Heater designation

Valve size
Setting, differential and GPM (specified and actual)
Pressure drops through heating and cooling coils

L. Air balance dampers shall be adjusted and the position marked.

M. Water flow fittings shall be adjusted and the position marked.

N. Check operation of fire dampers, reset and tag date of test on side of duct next to access panel.

END OF SECTION

SECTION 23 07 00 – HVAC INSULATION

PART 1 - GENERAL

1.1 SECTION INCLUDES

A. The work of this section includes mechanical insulation for the following:
   1. Hot water supply and return piping.
   2. All ductwork associated with VAV-1.
   3. Last seven (7) feet of exhaust ducts up to wall cap, louver or brickvent.

1.2 RELATED SECTIONS

1. Section 23 00 10, Basic HVAC Requirements.
2. Section 23 05 00, Common Work Results for HVAC.

1.3 SUBMITTALS

A. Submit in accordance with Section 23 00 10.

B. Product Data: Provide catalog data for the following:
   1. Insulation for all equipment listed in this section including type, thickness, application and jacketing.

1.4 QUALITY ASSURANCE

A. Manufacturer: A company specializing in the manufacture of mechanical insulation with a minimum of five years experience.

PART 2 - PRODUCTS

2.1 GENERAL

A. Insulation systems shall have a flame spread rating per ASTM E 84 of 25 or less and a smoke developed and fuel contributed rating of 50 or less.

2.2 PIPING INSULATION

A. Glass Fiber Insulation: Provide manufacturer's standard product by one of the following acceptable manufacturers:
1. CertainTeed
2. Knauf Fiberglass
3. Owens-Corning
4. Schuller International, Inc.
5. Approved equal.

B. Minimum pipe insulation thickness (inches), based on minimum thermal resistance (R) of 4.0 per inch of thickness on a flat surface at a mean temperature of 75°F: Unit to be fiberglass heavy density sectional pipe insulation system having a factory applied vapor barrier laminate all-service jacket.

Piping System Type	Fluid Temp Range, °F	Runouts	Size 0<1"	Size 1" to <1 1/2"	Size 1 1/2" to <4"	Size 4" to 8"	Size 8" and Larger
Domestic cold water		1/2	1/2	1/2	1	1	1
Domestic hot water	105+	1	1	1	1	1	1
Recirculation water	105+	1	1	1	1	1	1

Piping System Type	Fluid Temp Range, °F	Size 0≤ 1 1/2"	Size >1 1/2" to <4"	Size 4" to 8"	Size 8" and Larger
Process or safe system		1/2	1/2	1	1
Heating, hi pres/temp	350+/-	2 1/2	3	4	4
Heating, med pres/temp	251 – 350	1 1/2	3	3	3
Heating, low pres/temp	201 - 250	1 1/2	3	3	3
Heating, low temp	141 - 200 105 - 140	1 1/2	2	2	2
Cooling, chilled water, brine, Refrigerant	40 – 60 <40	1 1/2	1 1/2	1 1/2	1 1/2

2.3 DUCT INSULATION

A. Interior: 1½" thick fiberglass duct wrap with a factory applied vapor barrier facing and an installed R-value of 4.2 in accordance with ASTM C518 at a mean temperature of 75 ^{o}F. Material to carry U.L. label and be by one of the following acceptable manufacturers:
   1. CertainTeed
   2. Knauf Fiberglass
   3. Owens-Corning
   4. Schuller International, Inc.
   5. Approved equal.

PART 3 - EXECUTION

3.1 PIPING

A. Insulate all water supply and return piping; exposed, above ceilings, within walls, pipe chases or pipe enclosures with heavy density fiberglass pipe insulation with all service jacket and a factory applied vapor barrier laminate all-service jacket. Secure longitudinal jacket flaps with flare type stainless steel staples to eliminate fishmouths. Cut insulation to include pipe hangers on hot water piping. All insulation in exposed locations (except boiler room) shall have all seams and laps sealed with adhesive, in addition to staples. Thickness shall be as indicated in Table 1, Minimum Pipe Insulation.

B. Wrap all fittings with fiberglass insulation and cover with a one piece PVC fitting cover secured with flare type staples. Cover joints with 4" insulation straps over.

C. Insulate piping runouts to HV units, unit heaters, unit ventilators and cabinet unit heaters snug to the unit enclosures.

D. Finish the ends of insulation on exposed pipes at valves, flanges, unions, etc., neat with covering to match jacket and secured with mastic.

E. Do not insulate valves, flanges and unions except on chilled water piping. Insulation shall not be cut to include pipe hangers on chilled water piping.

3.2 DUCT INSULATION

A. Installation: Install all insulation using skilled insulation workmen regularly employed in the trade.

B. Interior: All laps to be sealed and held in place with adhesive and flare staples. All lap joints to be folded under before stapling so no raw insulation will be showing. On the bottom of ducts 24" or wider, provide mechanical fasteners approximately 12" O.C.

C. Insulation shall be continuous through interior partitions.

END OF SECTION

SECTION 23 09 23 – DIRECT DIGITAL CONTROL SYSTEM

PART 1 - GENERAL

1.1 SECTION INCLUDES

A. The work of this section includes, but is not limited to the following:

1. Direct digital controls.
2. Sequence of operation.

1.2 DESCRIPTION OF WORK:

A. Furnish and install a complete system of automatic temperature controls to provide the sequences as described in these specifications. The system shall be electric/electronic direct digital control with DDC operators and include all required components, including low voltage (24 V) and line voltage wiring. The installation diagrams shall be a part of the temperature control system design and installation. The new controls shall be integrated with the Honeywell controls on-site and all points will be displayed on the head end computer.

1.3 RELATED SECTIONS

1. Section 23 00 10, Basic HVAC Requirements.

1.4 SUBMITTALS

A. Submit in accordance with Section 23 00 10.

B. Submittal Brochure - The following shall be submitted for approval prior to installation:
1. Control drawings with detailed wiring diagrams, including bill of material and description of operation for all systems.
2. Panel layouts and name plate lists for all local and central panels.
3. Valve and damper schedules showing size, configuration, capacity and location of all equipment.
4. Product data for all control system components.
5. The complete sequence of operation of the control system.
6. The locations of all control equipment.
7. Upon completion of the installation and final system adjustment, provide a full set of As-built Drawings of the installation and the control strategies.

1.5 QUALITY ASSURANCE

A. Proven Experience: Provide a list of no less than ten similar projects which have building control systems specified. These projects must be on-line and functional such that the Owner's Representative would observe a direct digital control system in full operation. The Contractor must be a direct, wholly owned branch of a national control's manufacturer, or a representative not a wholesale distributor.

B. Quality of Compliance: Control systems shall be installed by trained control mechanics regularly employed in installation and calibration of ATC equipment by the manufacturer of temperature control equipment.

C. Acceptable installers:
   1. Honeywell - County Road, Westbrook, Maine

      NOTE: Control installation is not acceptable by wholesalers, contractors and franchised dealers, or by any firm whose principal business is not direct manufacture and installation of ATC systems.

D. The temperature control contractor shall be independent of both the installing contractor and other equipment suppliers for this contract.

E. Supervision:
   1. Provide any necessary wiring diagrams and supervise the installation. These diagrams shall be incorporated into the Owning and Operating Manuals.
   2. ATC contractor shall have capability to service ATC settings remotely from Contractor's place of business.

1.6 COORDINATION

A. Coordination of The Work: The following work shall be furnished by designated contractor under supervision of the Control Contractor.
   1. Heating Contractor shall:
      a. Install automatic valves and separable wells that are specified to be supplied by the Control Contractor.
      b. Furnish and install all necessary valved pressure taps, water, drain and overflow connections and piping.
      c. Provide on magnetic starters furnished, all necessary auxiliary contacts with buttons and switches in the required configurations.
   2. Sheet Metal Contractor shall:
      a. Install all automatic dampers and associated access panels.
      b. Provide necessary blank-off plates required to install dampers that are smaller than duct size.
      c. Assemble multiple section dampers with required interconnecting linkages and extend required number of shafts through duct for external mounting of damper motors.
      d. Provide access doors or other approved means of access through ducts for service to all control equipment.
      e. Install smoke detectors in duct or equipment for Electrical Contractor.
   3. General Contractor shall:
      a. Provide all necessary cutting, patching, and painting.
      b. Provide access doors or other approved means of access through ceilings and walls for service to control equipment.

B. Wiring: All wiring for installation of temperature controls shall be by Temperature Control Contractor. Electrical Contractor shall furnish and install power wiring for equipment and wiring for smoke detectors.

1. All wiring shall comply with the requirements of Division 26, Electrical. Wiring not complying with the requirements of Division 26 shall be corrected by the EC at the expense of the ATC Contractor.
2. Temperature control panels are indicated on the drawings with power supply by EC. Wiring for additional or relocated panels shall be at the expense of the ATC Contractor.

PART 2 - PRODUCTS

2.1 PRODUCTS

A. Control Panels: In general, relays, controllers, transformers and other control devices (not including room thermostats or duct-mounted instruments) shall be grouped and mounted in a factory-built cabinet enclosure. Locations of temperature control panels shall be as indicated on the Drawings.

B. Automatic Control Dampers:
1. All control dampers shall be furnished as part of the automatic temperature control system unless specifically specified to be furnished as an integral portion of equipment. Dampers shall be low leak equal to Ruskin CD36.
2. All dampers shall be installed by sheet metal trades under supervision of the automatic temperature control trades.
3. General:
   a. Dampers shall be opposed blade for modulating application and opposed or parallel blade for open-closed application.
   b. Provide end and edge blade seals for all dampers.
   c. Maximum allowable leakage shall be 1% at 4 inch W.C. differential pressure for all outdoor air dampers.
   d. Bearings shall be nylon or similar material with oil impregnated sintered metal bushings.
   e. Linkages shall be furnished with fusible links where indicated.
   f. Maximum blade width shall be 6 inches, maximum
   g. Unsupported length shall be 48 inches.
4. Galvanized Steel Dampers:
   a. General use where aluminum dampers not required.
   b. Channel or fabricated sheet steel or aluminum frames.
   c. Blades constructed of two 22GA sheets spot-welded together or a single sheet 16GA minimum.
   d. Damper Actuators: For each automatically controlled damper, a suitable damper actuator or actuators shall be provided in accordance with the following specifications:
      1) Actuator: Damper actuators shall be of the spring-return type and have a rating of not less than twice the torque needed for actual operation of the damper.
      2) Mounting: Damper actuators shall be provided with suitable mounting base and frame. The damper actuators and mounting base shall not be mounted directly on cold or insulated ducts and casings, but shall be mounted outside the insulated covering in such a manner as to prevent sweating and interference with the insulation.

3) Where indicated, damper actuators shall be provided with an auxiliary switch rated at 120 V AC.

C. Automatic Control Valves (Hot Water, 250°F Max.):

1. Valves shall have removable composition discs with monel stem. Bodies two inches or smaller shall be bronze with screwed ends. Bodies 2-1/2 inches and 'larger shall be cast-iron with flanged ends. Valve bodies, trim and stuffing boxes shall be designed for not less than 125 psi working pressure. Valve packing shall be non-lubricated Teflon packing suitable for hot water service, as required.
2. Modulating valves shall be sized for CV's required. Valve pressure drop shall not exceed 5 psig.
3. Automatic control valve differential shut-off pressure shall be a minimum of 15 psig or higher as required by the pressure of the system.
4. Two-position control valves shall be full line size.
5. Three-way valves shall be mixing pattern.
6. Heating valves shall fail to the "normally-open" position.
7. Electrically actuated valves shall have a clearly located position indicator as part of the operating linkage.
8. All heating valves shall be NO and fail in the open position.

D. Room Thermostats/Temperature Sensors:

1. Room temperature sensors shall have a range of 55° to 90° adjustable sensitivity with a minimum sensitivity of not less than one degree plus or minus. Sensors shall be securely attached to a suitable base mounted on the wall or other building surface. Each sensor shall be located where shown or if not shown, where it will respond to the average temperature in the room. Thermostats, generally, shall be mounted 48 inches above the floor and shall not be mounted on outside walls or partitions between offices if other locations are possible. If located on outside wall, it shall have an insulated base. Room sensors shall not be provided with thermometers.

2.2 DIRECT DIGITAL CONTROL SYSTEM

A. Scope of Work: Furnish and install equipment, accessories, wiring and instrument piping required for a complete and functioning system. Materials and equipment shall be standard components, regularly manufactured for this and/or other systems and not custom designed especially for this project. Components shall have been thoroughly tested and proven in actual use. The building control system shall possess a fully modular architecture, permitting expansion through the addition of more stand-alone control units (SCU), sensors, actuators, and/or operator terminals.

B. Wiring: The entire building control system shall be installed by skilled electricians and mechanics, who are properly trained and qualified for this work. Wiring shall be installed in accordance with the Project Electrical Specifications. Supervision and checkout of the system shall be by local branch engineers and technicians directly employed by the Contractor.

C. Building Control System: The building control system specified herein shall be a direct digital control system which can, without additional equipment, perform the automatic temperature control and energy management functions as required in this specification.

D. The system, as specified, shall independently control the building's HVAC equipment to maintain the specified environmental conditions in an energy-efficient manner. The building operator shall be able to communicate with the system and control the sequence of operation within the building.

E. System Architecture: The building control system shall consist of a network of independent control units. Each control unit shall be capable of performing specified control functions in a completely independent manner. Operator communication with the system shall be via operator terminals provided as specified. Each control unit shall be able to support its own directly connected operator's terminal through an input/output port contained within each control unit.

F. Control Unit: Each control unit shall be capable of full operation either as a completely independent unit or as a part of the building-side control system. Units shall contain the necessary equipment for direct interface to the sensors and actuators connected to it. It shall be possible to define control strategies at each control unit and for the control units in the system from any operator terminal in the system. Each control unit shall provide the ability to support its own operator terminal. Each control unit shall include its own micro-computer controller, power supply, input/output modules, termination modules and battery. The battery shall be self-charging and be capable of supporting memory within the control unit if the commercial power to the unit is interrupted or lost for a minimum of 24 hours. Data base shall be non-volatile. The control unit shall be listed by Underwriters' Laboratories (UL) against fire and shock hazard as a signal system appliance unit.

G. Sensors/Input Signals: Each control unit shall be capable of direct interface to a variety of industry standard thermistors, dry contacts, pulse accumulators, sensors and input devices such as 4-20 Ma, 0-10 VDC.

H. Actuators/Output Signals: The control unit shall directly control electronic actuators through a 4-20 Ma or 1-16V DC signal. Also, control fans, pumps, and motors through digital contact closures.

I. Building Control Functions: Each control unit within the building control system shall perform both temperature functions and energy management routines as defined by the operator.
   1. Temperature control functions shall execute within the control unit via direct digital control algorithms. The user shall be able to customize control strategies and sequences of operation and defining the appropriate control loop algorithms and choosing the optimum loop parameters.
   2. Control loops shall be able to utilize any of the following control modes:
      a. two position (on-off, slow-fast, etc.)
      b. proportional (P)
      c. proportional plus integral (PI)
      d. proportional, integral, plus derivative (PID)
   3. It shall be possible to fully create, modify, or remove control algorithms within a specific control unit while it is operating and performing other control functions. The Owner shall be able to modify any system function while this system is totally on-line. Each control loop shall be fully user definable in terms of:
      a. sensors/actuators that are part of the control strategy
      b. control mode
      c. gain
      d. control action.

4. It shall be possible to define a control loop which receives its input signals from other sensors connected to other stand-alone control units within the network. Control units must be able to share common point and program information. If the network communication link fails or other control unit malfunctions, the control loop shall continue to function using the last value received from the stand-alone control units. Each control unit shall contain the capability of performing energy managements routines such as:
   a. time of day scheduling
   b. start/stop time optimization
   c. duty cycling (temperature compensate)
   d. supply air reset
5. In addition, the Owner shall be able to create customized control strategies based upon arithmetic, Boolean or time-delay logic. The arithmetic function's shall permit simple relationships between variables (i.e., addition, subtraction, division, and multiplication), as well as more complex relationships (i.e., square root, exponential, and/or any combination of the above in a program control statement).
6. The system shall permit the generation of job-specific control strategies that can be activated in any of the following ways:
   a. Continuously
   b. at a particular time of day
   c. on a pre-defined date
   d. when a specific measured or controlled variable reads a selected value of state
   e. when a piece of equipment has run for a certain period of time
7. Upon a loss of commercial power to any control unit, the other units within the network shall not be affected. Control strategies and energy management routines defined for the control unit shall not be affected. Control strategies and energy management retained during a power failure via the battery with the unit for a minimum of eight (8) hours. Upon resumption of commercial power, the control unit shall resume full operation without operator intervention.
8. The unit shall also automatically reset its clock such that proper operation of timed sequences is possible without the need for manual reset of the clock. Should a loss of power exceed memory back-up the Building Operator shall be able to manually restore system programs from cassette tapes or floppy disks.

J. Operator Interface
1. The building control system shall permit full English language operator communication including: obtaining information about performance of his system, allowing the operator to change the system operation, and diagnosing system malfunction. Operator communication shall be through a portable laptop computer.
2. There shall be three levels of pre-defined security. The first level shall allow an operator to simply display point values and status. The second level shall permit the user to display and command points. The third level shall permit the user to access the entire system including energy management routines, programs, the points data base.
3. It shall be possible to have one operator's terminal at each control unit or to have a single operator's device which can be connected to any panel in the network. The building control system shall permit complete operation of any control unit within the network, from any operator terminal within the system. The operator shall be able to change a program in the control unit he is presently connected to and also change the program in another control unit while the terminal is still connected to the first control unit.

K. User Programmability

1. Temperature control strategies and energy management routines shall be definable by the operator through the operator's terminal. It small be possible for the operator to modify system functions independently after receiving the training from the Control Contractor.
2. Through the operator terminal, any trained building operator shall be able to:
   a. read the value of a measured variable (i.e., temperature)
   b. start or stop equipment
   c. monitor the status of equipment being controlled
   d. trend the status and operation of equipment being controlled
   e. read the setpoint of a control loop
   f. determine the control signal to an actuator
   g. set or change alarm limits
   h. determine the control strategies that have been defined for a specific piece of equipment
   i. generate displays of control strategies
3. The system shall provide an operator with the ability to:
   a. add control loops to the system
   b. add points to the system
   c. create, modify, or delete control strategies
   d. assign sensors and/or actuators to a control strategy
   e. tune control loops through the adjustment of control loop parameters
   f. enable or disable control strategies
   g. generate hard copy records of control strategies on a printer
   h. select points to be alarmable and define the alarm state(s)
   i. select points to be trended over a period of time and initiate the recording of values
4. The Owner shall not require any assistance to perform any of these functions. Equipment required to perform any of these functions shall be included as part of the Contract and be fully documented in the submittal data. This equipment should be used by the Owner or his operator with minimum training required.

L. System Head End
1. The building head end is existing and all new equipment shall be tied into it accordingly.

PART 3 - EXECUTION

3.1 DDC DESCRIPTION OF OPERATION

A. Setpoints: All setpoints in the DDC system shall be adjustable.

B. Fans: Fans with ECM motors shall have "external speed control" for variable speed control.
1. EF-1 shall be provided with a variable ECM motor shall be interlocked to come on to minimum operating speed in the occupied mode. A pressure sensor in the lab shall speed the fan up to maintain a negative static pressure setpoint of .05” w.c. relative to the corridor, in response to VAV-1 modulation. The ECM motor, fan and pressure controller are by the fan manufacturer, coordinate with supplier.

C. VAV Box
1. VAV Box: Note: The purpose of the VAV box is to introduce additional air into the space from the large air handling unit serving the second floor. In general, it is the intent that this air be controlled in conjunction with the existing VRF evaporator serving this

room. There is no output available from the VRF evaporator indicating heating or cooling mode, hence the VAV box setpoint shall be the same as the VRF setpoint.

a. Provide space and discharge temperature sensor.
b. Heating: On a fall in space temperature the unit will modulate to minimum airflow (adjustable). On a further fall in temperature the HW coil will maintain temperature via a 2-way modulating valve.
c. Cooling: On a rise in temperature the unit will modulate airflow to 100%.
d. Provide actuator, coordinate with VAV box supplier.
e. Minimum airflow for VAV's shall be 30% of maximum (adjustable).
f. Because the AHU associated with the VAV box may not be in the same mode as the VRF unit in the space, the discharge air sensor shall determine if the AHU is in the proper mode, heating or cooling, based on the space sensor. If it is not in the proper mode the VAV box shall modulate down to minimum airflow. If it is in the proper mode it shall operate as indicated above.

D. DDC Input/Output Summary

1. Exhaust fans:
   a. Control relay
   b. Equipment Status On/Off
2. VAV Box
   Coils: (20 MA module)
   Airflow.

3.2 SYSTEM TURNOVER AND SERVICE

A. Upon completion of the installation, start up the system and perform necessary testing and run diagnostics to ensure proper operation. An acceptance test in the presence of the Owner's Representative, the Architect, and the Engineer shall be performed. When the system performance is deemed satisfactory by these observers, the system parts will be accepted for beneficial use and placed under warranty.

B. Instruction and Adjustment - Upon completion of the project, the Temperature Control Contractor shall:

1. Adjust for use by Owner, all thermostats, controllers, valves, damper operators, and software relays provided under this section.
2. Furnish two (2) instruction manuals covering function and operation of control systems. Provide factory authorized Technician to instruct Owner's personnel in operation and care of control systems and equipment.

C. Guarantee: The control system shall be guaranteed for a period of one year from the date of acceptance by the Owner.

3.3 TRAINING/OWNER'S INSTRUCTIONS

A. Provide two copies of an operator's manual describing operating and routine maintenance service procedures to be used with the system.

B. Provide a competent technician to instruct the owner's representative upon completion of the project. Instructions shall be given by the ATC as scheduled by the Owner, during normal work

hours, for a period not more than 2 hours. The instructions shall consist of both hands-on and classroom training at the job site.

END OF SECTION

SECTION 23 21 13 – HEATING & COOLING HYDRONIC PIPING

PART 1 - GENERAL

1.1 SECTION INCLUDES

A. The work of this section includes, but is not limited to the following:
1. Hydronic piping.
2. Valves.
3. Shut-off and balancing valves
4. Air vents
5. Strainers
6. Vibration isolators

1.2 RELATED SECTIONS
1. Section 23 00 10, Basic HVAC Requirements.
2. Section 23 05 00, Common Work Results for HVAC.
3. Section 23 07 00, HVAC Insulation

1.3 SUBMITTALS

A. Submit in accordance with Section 23 00 10.

B. Product Data: Provide catalog data for the following:
1. All equipment included in this section.
2. Provide pressure drop information for air separator.
3. Provide pre-charge information for expansion tanks.

PART 2 - PRODUCTS

2.1 WATER PIPING

A. Water, Drains, Vents - Schedule 40 standard weight black steel ASTM A-120 and A-53 or Type "L" copper hard temper, ASTM B88.

B. Cold Water - Type "L" hard drawn copper tubing.

C. Pipe Fittings
1. Screwed - 125# cast or malleable iron screwed pattern ANSI B16.1
2. Unions - 250# malleable iron with brass to iron ground seats.
3. Flanges - 150# forged steel slip-on ANSI B16.5.
4. Sweat - Cast bronze or wrought copper and bronze ANSI B16.18 andB16.22.
5. Connections to Equipment - 2" smaller screwed unions, 2½” and larger flanged.
6. Welded - Standard weight butt well carbon steel ASTM A-234 from A106 Grd. B. seamless tube.
7. Dielectric Fittings: To be installed on all piping connections between dissimilar metals.

a. Description: Combination fitting of copper alloy and ferrous materials with threaded, solder-joint, plain, or weld-neck end connections that match piping system materials.
b. Insulating Material: Suitable for system fluid, pressure, and temperature.
c. Dielectric Unions: Factory-fabricated, union assembly, for 250-psig minimum working pressure at 180 deg F.
d. Dielectric Flanges: Factory-fabricated, companion-flange assembly, for 150- or 300-psig minimum working pressure as required to suit system pressures.
e. Dielectric Couplings: Galvanized-steel coupling with inert and noncorrosive, thermoplastic lining; threaded ends; and 300-psig minimum working pressure at 225 deg F.
f. Dielectric Nipples: Electroplated steel nipple with inert and noncorrosive, thermoplastic lining; plain, threaded, or grooved ends; and 300-psig minimum working pressure at 225 deg F .
g. Metal to plastic transitions: All transition fittings are to be produced from PVC Type I, Cell Classification 12454, or CPVC Type IV, Cell Classification 23447. All transition fittings shall be designated as Schedule 80. All transition fittings shall contain a molded-in-place Threaded Brass Insert conforming to ANSI B1.20.1 internal tapered pipe thread dimensions with internal O-ring seal. An external Stainless Steel Collar reinforcement shall be incorporated over the effective thread length. Units shall be manufactured by Spears or equal.

D. Jointing
1. Screwed - Use suitable pipe joint compound or tape.
2. Flanges
3. Solder (Heating) - Solid string or wire, 95% tin, 5% antimony, acid core; paste types or solder-flux combinations not permitted.

2.2 VALVES

A. Acceptable Manufacturers: Valves shall be the product of one manufacturer and be equal in type quality and construction to the following manufacturers:
1. Nibco
2. Hammond.
3. Approved equal.

B. Valves shall be provided as shown and as required to make the installation and its apparatus complete in operation. Location to permit easy operation, replacement and repair.

C. All valves must be so constructed that they may be repacked under pressure while open.

D. In general, all gate valves shall be OS&Y or rising stem. Non-rising stem valves are acceptable only where clearance for valve stem is not available.

E. Combination balancing-meter valves shall be installed in all lines where regulation is required.

F. Check valves shall be installed in all lines where flow may reverse from intended direction.

G. Except for above, or as otherwise noted on drawings, gate valves shall be installed in all supply and return lines and on all drain lines.

H. The following list is based on Nibco as a means of identifying the quality and type required.
   1. Gate Valves, 2½" and larger - 125# iron body bronze mounted, solid wedge, OS & Y flanged ends, F-617-0.
   2. 2" and smaller - 125# bronze, solid wedge, rising stem, screwed bonnet, screwed ends, T-121, T111.
   3. Ball Valves - Acceptable in lieu of gate and globe valves, in sizes ½" to 2". 400 lb. WOG bronze body, screwed or solder ends, bronze ball, Buna stem seals, Buna-N or equal resilient seats, lever handle. Equal to Nibco T-580.
   4. Globe Valve, 2" and smaller - 150# bronze, renewable composition disc for service intended, screwed ends, T235Y.
   5. Check Valves - 200# bronze horizontal swing type, regrindable disc, screwed ends, T-453B.
   6. Valves 6" and larger shall be resilient seated butterfly design. Seat to be rigid type and made of E.P.D.M. Body will be cast iron with neck extended to provide for 2" of insulation over flange O.D. Stem to be 410 series S.S., disc will be aluminum bronze.
   7. Valves 6" and smaller shall have lever type handle with 10° notched throttling plate. 8" and larger valves to have enclosed heavy duty handwheel worm gear operator. All valves must be suitable for installing between any type of 125 or 150 lb. A.S.A. flange.
   8. Butterfly valves shall be NIBCO Fig. WL-082 wafer type. Refer to drawings for locations of butterfly valves.

2.3 HOT WATER SYSTEM SPECIALTIES

A. Shut-off and Balancing Valves:
   1. Balancing valves on the units, coils, pumps, and piping mains where shown shall be Bell & Gossett circuit-setter, Taco, or equal.
   2. The valves shall be of the plug type with bronze or cast iron body, bronze disc screwed pattern up to 2" size and flanged 2½" and larger.
   3. Valves shall have provisions for connecting a portable differential pressure gauge. Meter connections shall have built-in check valves.
   4. Air Vents: Automatic air vents shall be B & G air vents No. 107 or equal with 3/4" NPT vent connection and 1" tapping at the top.

B. Strainers
   1. "Y" Pattern: Bronze or cast iron body flange ends, 150 PSI body, model or stainless steel screen.
   2. Basket Type: Bronze or cast iron body, clamped cover, 125 PSI working pressure, perforated brass basket, equal to Mueller #135.

PART 3 - EXECUTION

3.1 INSTALLATION OF WATER PIPING

A. Refer to Section 23 05 00 for common materials and installation requirements.

B. Provide and erect in accordance with the best practice of the trade all water supply and return, piping as shown on the drawings and as required to complete the intended installation. Make such offsets as are shown or required to place all piping in proper position to avoid the work of other trades and to allow the application of insulation and finish painting.

C. The size and general arrangements, as well as the methods of connecting all piping, valves, equipment, etc., shall be as indicated.

D. Erect all piping to provide for the easy and noiseless passage of fluids under all working conditions. Inverted eccentric reducing fittings shall be used whenever hot water pipes reduce in size.

E. All water mains shall be run level or pitch slightly upward away from boiler so that no air pockets are formed in the piping. Set the mains at elevations such that the runouts feeding equipment will have no pockets where air can collect. Provide air vents at all high points in the system. Provide drains at all low points in the piping system.

F. In the erection of water piping, make proper allowances for expansion and contraction; anchor piping as necessary to control the expansion. Runouts shall be the size indicated on the plans and come off the main with a minimum of two 90° elbows.

G. Install a sufficient number of flanged fittings or unions to facilitate assembly and disassembly of piping and removal of equipment.

H. All steel pipe mains 2½" and larger and concealed piping in chases and walls regardless of size shall have welded connections, using standard factory-fabricated tees, elbows, reducers, caps, etc. Branch outlets in welded sizes shall be made with tees for full size or one size reduction and with either "Weldolets" and "Threadolets" or factory shaped nipples for all other sizes. All welds shall be made by qualified welders. All welds shall conform with the rules set forth in the Standard Manual on Pipe Welding of the Heating, Piping, and Air Conditioning Contractors National Association.

I. Provide combination balancing/shut-off valves to balance all terminal heating equipment and install within a minimum of 20 pipe diameters of unobstructed straight run upstream and 10 downstream of the valve.

3.2 INSTALLATION OF SPECIALTIES

A. All terminal units such as unit heaters, heating coils, cabinet unit heaters, unit ventilators, etc. shall be provided with a tight closing gate valve on the supply side and a tight closing combination balancing and meter valve on the return side.

B. Drain Valves: Each downfeed terminal shall be provided with a drain valve between the shut-off valves and heating equipment at the lowest point in the piping. All low points in piping mains shall be provided with drain valves. The valves shall be 1" gate valves or sized as shown on the drawings and provided with hose nipples and caps.

C. Air Vents:
   1. Install in the piping and at the equipment as indicated on the plans and at high points as required.
   2. Run line from tapping to nearest suitable drain or to 12" AFF in mechanical rooms. Provide manual shut off in feed to automatic air vent.

D. Manual air vents shall consist of air chamber with a 3/8" pipe off the top and a 3/8" gate valve. The valve shall be installed in an accessible location.

E. Relief Valves: Pipe relief valves to 12” AFF.

3.3 TEST AND ADJUST

A. During the installation, and prior to installing insulation or otherwise concealing, test all concealed hot water heating piping with water at a pressure of 100 psi and hold for a period of 4 hours. Repair any leaks and then retest until all leaks are eliminated.

B. Before operating the system flush out all of the piping to remove oil and foreign materials. Boilers shall be "boiled" clean in accordance with manufacturer's instructions.

C. After the installation is complete and ready for operation, test the system under normal operating conditions in the presence of the Engineer and demonstrate that the system functions as designed.

D. Demonstrate that all parts of the heating system have a free and noiseless circulation of hot water and that all parts, including stuffing boxes, are tight. Also demonstrate that all units are functioning properly and that the control system operates correctly.

E. Immediately correct any defects in operation found during the test period, and conduct additional tests after the defect is corrected.

END OF SECTION

SECTION 23 30 00 –HVAC AIR DISTRIBUTION

PART 1 - GENERAL

1.1 SECTION INCLUDES

A. The work under this section includes all the required sheet metal extensions for grilles, manual dampers, automatic shutter deflectors, setting of control dampers, louvers, grilles, registers, diffusers, flexible connections, fire dampers, etc., as shown on the drawings or required to make the installation complete in accordance with the intent of the drawings and specifications.

B. The work of this section includes, but is not limited to the following:

1. Ductwork.
2. Ductwork accessories
3. Duct access doors.
4. Diffusers, registers and grilles.
5. Brickvents and backdraft dampers.
6. Fire dampers.

1.2 RELATED SECTIONS

1. Section 23 00 10, Basic HVAC Requirements.
2. Section 23 05 00, Common Work Results for HVAC.
3. Section 23 07 00, HVAC Insulation.

1.3 SUBMITTALS

A. Submit in accordance with Section 23 00 10.

B. Product Data: Provide catalog data for the following:
1. All equipment, and accessories, included in this section.

C. Shop drawing submittals shall show CFM, size, throw, SP and NC levels in tabular form for each grille or diffuser.

D. Shop drawings shall be submitted certifying AMCA compliance, and showing free area and pressure drop for each louver and/or brickvent submitted.

E. Shop drawing submittals for fire dampers shall show size, quantity, rating and orientation of the unit.

PART 2 - PRODUCTS

2.1 DUCTWORK

A. General:

1. Standing seams shall not be used on any HVAC ductwork 24 inches or less.
2. For ducts smaller than 24” size provide un-reinforced flat seams using appropriate SMACNA material gauges.

B. Ductwork Material and Application: Construct ducts using the following materials, in the locations indicated:
1. Galvanized Sheet Metal - Generally used throughout H & V system for supply, return, exhaust and outside air intakes unless noted otherwise. All galvanized ducts and fittings shall be a minimum of G-60 galvanized sheet metal in accordance with ASTM A525 and A527 specifications.
2. Factory Fabricated Flexible Round Duct - Where shown on Drawings.
3. Gauges shall be in accordance with current SMACNA standards.

C. Requirements:
1. All dampers and deflectors shall be #22 gauge minimum and stiffened as required.
2. All joints in ducts shall be made substantially airtight. Substantially airtight shall mean that no air leakage is noticeable through the senses of feeling or hearing at all joints and connections. All branches, turns, etc., shall be made with long radius elbow and fittings or small be provided with fixed turning vanes designed to reduce the resistance of the elbow to the equivalent of a long radius elbow with a throat radius of not less than duct width.
3. All ducts shall be installed with necessary offset, changes in cross sections, risers, or drops, etc., which may be required. Construct with approved joints and substantially support in an approved manner.
4. Provide flexible equipment connections at the intake and discharge of each fan. Connections shall be made from Venglas neoprene coated glass fabric as furnished by Ventfabrics, Inc.

D. Galvanized Steel Ducts: Ducts shall be constructed of galvanized steel sheets, with a G60 zinc coating, of lock-forming quality in accordance with SMACNA and ASHRAE recommendations and requirements as to gauge, support, bracing, seams, joints, connections, cross breaking, and accessories.

E. Duct Sealant: Airseal #33 sealant/mastic, or equal.
1. Fiber reinforced suitable for indoor and outdoor use and shall comply with U.L. Class 1 construction.
2. Flame spread of 0 and smoke developed rating of 5, per ASTM-E-84, suitable for duct pressures up to 10" W.C.

TABLE #2 RECOMMENDED RECTANGULAR DUCT CONSTRUCTION		
Dimension of Longest Side (Inches)	Galvanized Sheet Gauge	Min. Reinforcing Angle Size & Max. Longitudinal Spacing Between Transverse Joints
	(Low Pressure)	
thru 12	26	None
13-18	24	None
19-30	24	1 x 1 x 1/8 @ 60 in.
31-42	22	1 x 1 x 1/8 @ 60 in.
43-54	22	1½ x 1½ x 1/8 @ 60 in.
55-60	20	1½ x 1½ x 1/8 @ 60 in.
61-84	20	1½ x 1½ x 1/8 @ 30 in.
85-96	18	1½ x 1½ x 3/16 @ 30 in..
97-120	18	2 x 2 x 1/4 @ 30 in.
Over 120	18	2 x 2 x 1/4 @ 30 in.
	(Medium Pressure)	
thru 12	24	None
13-18	24	1 x 1 x 16 ga @ 48 in.
19-24	22	1 x 1 x 1/8 @ 48 in.
25-36	22	1 1/4 x 1 1/4 x 1/8 @ 40 in.
37-48	22	1 ½ x 1 ½ x 1/8 @ 24 in.
49-60	20	2 x 2 x 3/16 @ 24 in.
61-72	20	2½ x 2½ x 3/16 @ 24 in
73-84	18	2½ x 2½ x 3/16 @ 24 in
85-96	18	1½ x 1½ x 1/8 @ 24 in.
97 & over	18	2 x 2 x 1/8 @ 24 in.
	(High Pressure)	
thru 12	22	None
13-18	22	1 x 1 x 16 ga @ 48 in.
19-24	22	1 x 1 x 1/8 @ 48 in.
25-36	22	1 1/4 x 1 1/4 x 1/8 @ 32 in.
37-48	22	2 x 2 x 1/8 @ 30 in.
49-60	20	2 x 2 x 3/16 @ 24 in.
61-72	20	1½ x 1½ x 1/8 @ 24 in.
73-84	18	1½ x 1½ x 1/8 @ 24 in.
85-96	18	1½ x 1½ x 1/8 @ 24 in.
97 & over	16	2 x 2 x 1/8 @ 24 in.

F. Flexible Duct: Flexible duct shall be insulated, wire reinforced, with vapor barrier coating, and shall be U.L. listed. Performance specifications include: Temperature range -20°F to 250°F; pressure range -1/2" to +2" W.G.; 4000 FPM max. velocity and thermal conductance .19. Type GSL as manufactured by Genflex.

G. Duct Access Doors: Provide duct access doors in the following locations:
   1. Before duct mounted coils.
   2. At control dampers.
   3. At fire dampers.
   4. At smoke dampers.
   5. Upstream of smoke detector sampling tubes.
   6. At maximum 20 foot intervals and at the base of each vertical riser in horizontal return air, exhaust air and fresh air intake ductwork, in accordance with NFPA 90A.
   7. At any location where a duct mounted component required access for maintenance or service.
   8. Access doors less than 12 inches square shall be secured with sash locks. Access doors up to 18 inches square shall have 2 hinges and 2 sash locks. Access doors larger than 18 inches square shall have 3 hinges and 2 compression latches.

2.2 AIR DEVICES

A. Aluminum Backdraft Damper:
   1. Provide low leakage backdraft damper to exhaust air from classrooms. Leakage rate shall be less than 12 CFM per square foot at 1/2" W.G.
   2. Frame construction shall be extruded aluminum with .09" wall thickness.
   3. Linkage shall be 1/8" x 1/2" aluminum tie bars concealed in frame with Zytel bearings.
   4. Blades shall be .025" formed aluminum with overlapping vinyl edge seals.
   5. Temperature range shall be -40°F to +200°F.
   6. Units shall be Ruskin Model BD2/A1.

B. Fire Dampers:
   1. Fire dampers shall be installed to comply with NFPA Code No. 90A for 2 hour fire wall or 3 hour fire wall, refer to Architectural drawings. Each unit shall bear a U.L. label in accordance with the latest version of UL 555.
   2. Fire dampers at ceiling diffusers shall be specifically listed and designed for such use and shall have 1-1/2 hour minimum rating. Fusible element shall be accessible by removing ceiling diffuser. Model shall be Ruskin CFD5 or equal. Provide ceramic fiber thermal blanket as indicated.
   3. Fire dampers to be equal to Ruskin. All blades shall be spring loaded and located outside the air stream. Provide types as shown and required. Provide wall sleeves as shown and required. Provide accessible insulated doors in duct at all fire dampers.
   4. Transfer grilles with no ductwork shall have Ruskin model IBDT or equal thinline dampers where indicated on the plans.

C. Volume Dampers: Provide volume dampers at each branch take off for supply, return, exhaust and outside air ducts. Dampers shall be located as close to main duct as possible.

D. Brickvents

1. General - Brickvents shall be provided as a portion of this Contract. Pressure drop shall not exceed 0.1 inches of water for a 16"x8" unit at 400 cfm or for a 16"x5" unit at 260 cfm..
2. Materials - All brickvents shall be constructed of extruded aluminum blades and channels. Units shall not be provided with insect screens.
3. Finish - Brickvents shall have a Kynar finish.
4. Brickvent Type - Unit shall be 4 inch thick, equal to model EX by Sunvent Industries. Brickvents of other manufacturers are acceptable providing free area, performance, and construction are similar.

2.3 DIFFUSERS, GRILLES AND REGISTERS

A. Install grilles and registers at the air supply, return and exhaust openings and as shown on the Drawings. The equipment schedule is based generally on model numbers of Metalaire to establish a standard of quality; units of equal distribution, air throw and noise generated as manufactured by Tuttle and Bailey, Titus, Anemostat or equal are acceptable. Units to be provided with white baked enamel finish as noted.

B. Supply Air:
1. 5000-6 square and rectangular ceiling diffusers, extruded aluminum, removable fixed pattern louvered core, straight deflector blades (without a horizontal lip), lay-on extension panel for 24"x24" T-bar ceilings, white paint finish.
2. 5700-6 square diffusers, round to square design, lay-in type for 24"x24" T-bar ceiling, steel construction, removable inner assembly white lacquer finish.
3. V4004/H4004 supply grilles, double deflection, adjustable louvers, extruded aluminum.
4. V4004S/H4004S same as V4004/H4004 only with steel frame.

C. Return/Exhaust Air
1. CC5-1 grille with 1/2"x-1/2"x1/2" grid core, aluminum construction, white finish, suitable for surface mount.
2. CC5-6 grille similar to GC5 with flat border for lay-in ceiling.
3. 4538 heavy duty grille, 16 ga. frame, 14 ga. fins with 1/2" spacing, 38° fins, steel construction and white finish.

PART 3 - EXECUTION

3.1 GENERAL

A. All work shall conform to ASHRAE duct construction recommendations, SMACNA "Low Velocity Duct Construction Standards", and applicable NFPA requirements (see Table #2).

B. Ducts: The size of ducts as marked on the drawings will be adhered to as closely as possible. The right is reserved by the Engineer to vary the sizes of ducts to accommodate structural conditions during the progress of the work without additional cost to the Owners. The duct layout is schematic to indicate size and general arrangement only. Sizes given are "inside clear" dimensions. All ducts shall be arranged to adjust to "field conditions". The ductwork trade shall coordinate his work with other trades.

C. All dampers, grilles, registers, ducts, air handling units and fans shall be adjusted to the satisfaction of the Engineer, to obtain an even distribution of the air throughout the system. AlI of the supply outlets and exhaust registers must be balanced to the air volumes shown to produce the required results. A copy of the balancing report shall be submitted to the Engineer for approval.

D. On larger ducts all protruding edges and corners shall be rounded and/or turned down to eliminate a potential hazard to workers around ductwork.

E. Indoor Air Quality: The interior of the duct system and all equipment shall be kept free from dirt, rubbish, etc., during construction. This includes but is not limited to sealing open ductwork, air handling units, fans, fan-coil units, unit ventilators, blower coils etc with polyethylene. No air moving equipment shall be started until construction has been completed to a point such that airborne construction dust is no longer present. At completion of the project, the Contractor shall thoroughly clean all equipment, ductwork, etc., to the satisfaction of the Engineer. If it is determined by the Engineer that the ductwork or air moving equipment contains a significant amount of dust or debris the Contractor shall have, at the contractors expense, the ductwork and equipment cleaned by a recognized duct cleaning contractor approved by the Engineer.

F. Duct Sealing: Thoroughly clean all new and existing ducts prior to the application of sealant. Seal all transverse joints, longitudinal seams and duct wall penetrations ducts in accordance with SMACNA, Seal Class A. Apply sealant in accordance with the manufacturer's recommendations.

G. Louvers / Brickvents: The bottom of all ductwork connecting to louvers and brickvents shall slope such that any water entering the unit will drain out off the unit. All ductwork shall be sealed water tight for the last 7 feet of duct up to the louver or brickvent.

END OF SECTION

SECTION 23 34 00 – HVAC FANS

PART 1 - GENERAL

1.1 SECTION INCLUDES

A. The work of this section includes, but is not limited to the following:

1. Ventilation fans.

1.2 RELATED SECTIONS

1. Section 23 00 10, Basic HVAC Requirements.
2. Section 23 05 00, Common Work Results for HVAC.
3. Section 23 30 00, HVAC Air Distribution.

1.3 SUBMITTALS

A. Submit in accordance with Section 23 00 10.

B. Product Data: Provide catalog data for the following:
1. Ventilation Fans: Submittals shall include fan curves, CFM, SP, motor horsepower, voltage, size, color, model number, sound data, dimensions and all applicable accessories.

PART 2 - PRODUCTS

2.1 VENTILATION FANS

A. Acceptable Manufacturers:
1. Penn, Cook, Acme, Greenheck

B. General: Provide return and exhaust fans with the capacities and of the types shown on the drawings.
1. All fans shall carry the AMCA Certified rating seal and shall be zone rated in accordance with AMCA Bulletin 300, when so indicated.
2. Direct drive fans shall have performance similar to that shown. If performance is higher, provide a speed control for mounting at fan.
3. Provide motors with thermal overload protection.
4. All fans shall be provided with a readily visible label for identification including fan tag and room serviced.
5. Fans with ECM motors shall either be "external speed control" for variable speed control or "motor mounted speed control" for balancing purposes only, as indicated.

C. In-Line Fans: In-line fans shall be V-Belt or Direct Drive of the size, capacity and arrangement as shown on the drawings. Fans shall have straight-sided housing and companion angle rings as

an integral part of the fan and shall incorporate integral straightening vanes and disconnect switch. Motors on V-belt units shall be supported on the exterior of the round fan casing with bearings encased within the fan tube. Direct Drive units shall be externally ventilated and incorporate a 100% gasketed panel to permit access to motor and wheel. All moving parts shall be provided with vibration isolation. Wheels to be backwardly included, non-overloading, and dynamically balanced. Provide ECM motors where noted on the schedule.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Provide flexible connections at all fans.

B. Fans shall not be operated until construction is complete. Prior to operation it shall be verified that all ductwork, diffusers and filters (where applicable) are clean.

C. Verify all electrical characteristics are correct and the fan is rotating properly.

END OF SECTION

SECTION 23 36 16 –VARIABLE AIR VOLUME BOXES

PART 1 - GENERAL

1.1 SECTION INCLUDES

A. The work of this section includes, but is not limited to the following:

1. VAV Boxes

1.2 RELATED SECTIONS

1. Section 23 00 10, Basic HVAC Requirements.
2. Section 23 05 00, Common Work Results for HVAC.
3. Section 23 30 00, HVAC Air Distribution.

1.3 SUBMITTALS

A. Submit in accordance with Section 23 00 10

B. VAV Boxes: Submittals shall include CFM, SP, size, model number, dimensions and all applicable accessories.

PART 2 - PRODUCTS

2.1 VARIABLE AIR VOLUME BOX

A. General: Shutoff terminal variable air volume units with hot water heat shall be model VCWF by Trane or approved equal.

B. Casing: 22 gauge galvanized steel.

C. Insulation: **Dual Wall** - interior liner shall be made of 26 gauge phosphatized steel. All cut edges of insulation shall be covered by metal flange. All wire penetrations shall be covered by grommet. Supply with 1" 2.1 lb/ft3, R-3.0, UL listed insulation.

D. Access Panel: Provide access panel in bottom of unit for access to air valves.

E. Primary Air Valve: Nominal sizes 300, 600, 1100, 1700, 2400, 3200 and 4200 CFM on all unit types. The air valve shall be a cylindrical flow control device with an integral pneumatic or electric actuator. Valve inlet shall be die cast aluminum and tapered to fit standard round flexible ductwork. Maximum leak rate shall be 1 percent at 4 inches wg. inlet static pressure. Prove integral multiple point, averaging flow sensing ring to provide primary airflow measurement within ± 5 percent of unit rated airflow with 1½ diameters of straight duct upstream of unit. Integral flow taps and calibration chart shall be provided on each unit.

F. Outlet Connection: Straight flange - provide sheet metal connection at unit discharge to facilitate ductwork installation.

G. Agency Listing: All units are UL listed and CSA approved.

H. Hot Water Coil: Standard and high capacity coils are factory mounted. Full fin collars provided for accurate fin spacing and maximum fin-tube contact. 3/8" OD seamless copper tubes mechanically expanded into the fin collars. Coils are leak tested at 300 psig air pressure under water. Female sweat type water connections provided. Available as right or left hand connections with all coils having same end water connections.

I. Unit shall operate on 24V control voltage. Actuator is by the ATC, coordinate with ATC as necessary.

PART 3 - EXECUTION

3.1 ISTALLATION

A. Units shall be supported from the structure and not adjacent ductwork.

B. Provide flex duct at the intake to the unit.

END OF SECTION

SECTION 26 00 10 – BASIC ELECTRICAL REQUIREMENTS

PART 1 - GENERAL

1.1 SUMMARY

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

1. Electric distribution.
2. Grounding System.
3. Roughing in and branch circuit wiring.
4. Interior Lighting System.
5. Telecommunications Wiring System.
6. Coordination with mechanical subcontractor including supervision of HVAC temperature control system wiring work.
7. Other work as required to provide a complete and operating system.

B. Site Inspection: Visit the site, before submitting bid, to become familiar with the procedural manner, materials, labor, quantities, and expenses involved in completing the work. No allowances for extra work will be granted to accomplish these ends if the need for which could have been foreseen or anticipated by such a visit. Bidders shall attend prebid conference . Refer to Form 2A, Notice to contractors for date and time.

C. Related Sections:

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

1.2 SUBMITTALS

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

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

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

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

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

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

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

1. Provide manuals in durable plastic ring binders, nominal 8½ x 11" size.
2. Identification on, or readable through, the front cover stating general nature of the manual.
3. A copy of all reviewed submittals and shop drawings.
4. Complete instructions regarding operation and maintenance of all equipment involved.
5. Complete name and address of nearest vendor of replaceable parts.

6. Copy of all guarantees and warranties issued.
7. Where contents of manuals include manufacturer's catalog pages, clearly indicate the precise items included in this installation.

1.3 QUALITY ASSURANCE

A. Regulatory Requirements:

1. Electrical: Conform to ANSI/NFPA 70, National Electrical Code.
2. Obtain permits and request inspections from local building inspector.

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

1. Underwriters Laboratories, Inc. (UL).
2. National Electrical Manufacturers Association (NEMA).
3. American National Standards Association (ANSI).
4. National Fire Protection Association (NFPA).
5. Occupational Safety and Health Administration (OSHA).
6. National Electrical Contractors Association (NECA).
7. Standards of local Building Codes, Electrical, and Fire Departments, City of Augusta.

1.4 WORK SEQUENCE & COORDINATION

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

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

C. Refer to Division 23 for electrical work required for mechanical. Prior to roughing in, verify that the electrical characteristics of the mechanical equipment being provided are compatible with the electric power circuits specified; if in doubt consult Engineer.

D. Wiring for H&V temperature controls is specified under Division 23 but shall be supervised by and wired to the standards of this section. Coordinate electrical work with controls requirements to provide a complete and operating system.

E. Supervise installation of wiring provided under Division 23 to ensure that such wiring is installed according to the standards of Division 26. Report discrepancies to Engineer.

1.5 WIRING STANDARD

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

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

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

TABLE 1

		Building Wire & Cables in Raceway							Cable	
	Application Location	RSC	EMT	PVC	Cable Tray	Suface Rc'wy	LiqTgt	Flex	MC	NM
1	Wet Interior	SFBC	SFBC							
2	Concealed dry interior Wall stud spaces Ceiling void	 FBC FBC	 FBC FBC					 BC BC	 BC BC	
3	Accessible dry interior Ceiling void Lighting fixture whip Casework	 SFBC	 FBC				 BC BC	 BC BC	 BC BC	
4	Exposed dry interior Finished space Unfinished space	 SFBC	 BC			 BC				
5	Motor/equipment connection						B	B	B	

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

1.6 SUBSTITUTIONS

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

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

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

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

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

1.7 PROJECT/SITE CONDITIONS

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

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

1.8 WORKMANSHIP

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

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

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

1.9 DEVIATIONS AND DISCREPANCIES

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

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

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

1.10 CHANGE ORDERS

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

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

1.11 RECORD DRAWINGS

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

1.12 TESTING AND TRAINING

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

END OF SECTION

SECTION 26 05 00 - BASIC ELECTRICAL MATERIALS AND METHODS

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

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

B. Related Sections:

1. Drawings, Division 00, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.
2. Section 26 00 10, Basic Electrical Requirements.

1.2 REFERENCES

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

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

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

1.3 SUBMITTALS

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

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

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

C. Test reports.

1. Grounding system continuity and resistance test.
2. Conductor continuity and insulation resistance test.

1.4 PROJECT CONDITIONS

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

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

C. Verify removal of existing electric work.

D. Report discrepancies to Engineer before disturbing existing installation.

1.5 COORDINATION

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

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

PART 2 - PRODUCTS

2.1 GROUNDING MATERIALS

A. Mechanical Connectors: Bronze.

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

C. Thermit Welds: Cadweld.

2.2 BASIC MATERIALS

A. Steel Channel: Galvanized or painted steel.

B. Anchors:

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

C. Miscellaneous Hardware: Treat for corrosion resistance.

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

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

2.3 METAL CONDUIT

A. Acceptable Manufacturers:

1. Allied Tube and Conduit
2. Wheatland Tube Company
3. Jones and Laughlin
4. Republic Steel
5. Triangle PWC

B. Conduit:

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

2.4 PLASTIC CONDUIT

A. Acceptable Manufacturers:

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

B. Plastic Conduit:

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

2.5 FITTINGS

A. Manufacturers:

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

B. Conduit Fittings:

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

9. Fittings for Liquidtight Flexible Metallic Conduit: Galvanized steel or malleable iron, couplings and fittings threaded.
10. Fittings for Liquidtight Flexible Non-Metallic Conduit: High strength, chemical resistant, glass filled thermoplastic compression nut & ferrule assembly, Carlon Carflex or approved equal.
11. Conduit Clamps: Galvanized malleable iron equivalent to O-Z/Gedney 14-G and 15-G Series with clamp back spacer for RSC, and single hole #15-75G malleable or #15-75S galvanized steel clips for EMT.

2.6 SURFACE METAL RACEWAY

A. Manufacturers:

1. Walker/Wiremold

B. Description: One piece surface metal, Wiremold Series as indicated on drawing and suitable for use as surface raceway.

1. Size: As shown on drawing.
2. Finish: Ivory enamel.

C. Telepower Poles: Two channel steel, ivory enamel finish, nominal 3" square cross-section, suitable for housing power and communications wiring and mounting convenience power and communications outlets. Refer to drawings for additional requirements.

2.7 MULTI-OUTLET ASSEMBLY

A. Manufacturers:

1. Walker/Wiremold

B. Description: Sheet metal channel with fitted cover, Wiremold #2000 with prewired receptacles, and wired ground, suitable for use as multi-outlet assembly.

1. Size: 3/4" x 1 9/32". As indicated on drawing.
2. Receptacles: Convenience receptacle mounted in cover, 12" on center or as shown on drawings.
3. Finish: Ivory enamel.

2.8 ELECTRICAL BOXES

A. Manufacturers:

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

B. Boxes:

1. Sheet Metal: NEMA OS 1; galvanized steel, 4" x 4" x 2" with raised plaster ring and non-gangable 3" H x 3 1/2" D x 2" W per section masonry boxes. Gangable or sectionalizing boxes are not permitted.

2. Cast Metal: Aluminum or cast alloy, deep type "FD", gasket cover, threaded hubs, "Bell" boxes not permitted.

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

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

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

2.9 WIRE AND CABLE

A. Manufacturers:

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

B. Building Wire:

1. Feeders and Branch Circuits Larger Than 6 AWG: Stranded annealed copper conductor, 600 volt insulation, XHHW.
2. Feeders and Branch Circuits 6 AWG and Smaller: Annealed copper conductor, 600 volt insulation, THHN/THWN or XHHW, stranded conductor; use compression set terminals.
3. Control Circuits: Copper, stranded conductor, 600 volt insulation, THHN/THWN.

C. Metal Clad Cable:

1. Metal Clad Cable, Size 12 through 10 AWG: Interlocked galvanized steel armor, stranded annealed copper conductor, 600 volt insulation, rated 60E C, with separate green ground wire, NEC Type MC.

D. Remote Control and Signal Cable:

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

2.10 TAPE AND TERMINATIONS

A. Manufacturers, Tape:

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

B. Manufacturers, Terminations:

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

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

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

2.11 WIRING DEVICES AND WALL PLATES

A. Manufacturers:

1. Bryant
2. Hubbell
3. Arrow-Hart
4. Pass and Seymour
5. General Electric
6. Leviton

B. Wall Switch: AC general use, specification grade, quiet operating snap switch rated 20 amperes and 120/277 volts AC, with plastic toggle handle, ivory color, Hubbell Model 1221.

1. Pilot Light Type: Lighted handle, Model 1221-1L manufactured by Hubbell, or strap mounted lamp in adjacent gang, Model 48071-R manufactured by Bryant.

C. Receptacle:

1. Provide straight blade receptacles to NEMA WD 1.
2. Provide locking blade receptacles to NEMA WD 5.
3. Convenience Receptacle Configuration, general use: Type 5-20 R, specification grade, plastic face, ivory color, Bryant Model 5352.
4. GFCI Receptacle, general use: Specification grade duplex convenience receptacle with integral ground fault current interrupter, ivory color, Bryant Model GFR53FT.
5. Specific Purpose Receptacle: Configuration indicated on drawings with ivory nylon face.

D. Decorative Cover Plate: Ivory smooth rigid nylon or high impact plastic.

2.12 CORDS AND CAPS

A. Straight-blade Attachment Plug: NEMA WD 1.

B. Locking-blade Attachment Plug: NEMA WD 5.

C. Attachment Plug Configuration: Match receptacle configuration at outlet provided for equipment.

D. Cord Construction: Oil resistant thermoset insulated Type SJOW multiconductor flexible cord with identified equipment grounding conductor, suitable for extra hard usage in damp location.

E. Cord Size: Suitable for connected load of equipment and rating of branch circuit overcurrent protection.

2.13 FIRESTOPPING MATERIALS

A. Use only through-penetration firestop products that have been tested for specific fire resistance rated conditions conforming to construction assembly type, penetrating item type, annular space requirements, and fire rating required for the application:

1. Latex Sealants: Single component latex formulations that when cured do not re-emulsify during exposure to moisture.
2. Firestop Devices: Factory assembles steel collars lined with intumescent material sized to fit a specific outside diameter of penetrating item.
3. Firestop Putty: Intumescent, non-hardening, water resistant putties containing no solvents, inorganic fibers or silicone compounds.
4. Wrap Strips: Single component intumescent elastomeric strips faced on both sides with a plastic film.
5. Firestop Pillows: Re-useable, non-curing, mineral fiber core encapsulated with an intumescent coating contained in a flame retardant poly bag.
6. Silicone Sealants: Moisture curing, single component, silicone elastomeric sealant for horizontal surfaces (pourable or non-sag) or vertical surface (non-sag).
7. Silicone Foam: Multi-component, silicone based, liquid elastomers that when mixed expand and cure in place to produce a flexible, non-shrinking foam.

B. Firestop systems shall be UL classified and rated for the type of construction where it is applied.

PART 3 - EXECUTION

3.1 EXISTING ELECTRICAL WORK

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

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

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

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

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

1. Existing electrical feeders and branch circuits.
2. Existing fire alarm system.
3. Existing telecommunications system.

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

1. Remove abandoned wiring to source of supply, and/or back to the serving panelboard and turn off breaker and mark as spare in the panelboard directory.
2. Remove exposed abandoned conduit and boxes, including abandoned conduit above accessible ceiling finishes.
3. Disconnect abandoned outlets and remove devices.
4. Provide blank cover for abandoned outlets which are not removed.

5. Disconnect and remove abandoned panelboards and distribution equipment.
6. Disconnect and remove electrical devices and equipment serving utilization equipment that has been removed.
7. Disconnect and remove abandoned luminaires, brackets, stems, hangers, and other accessories.
8. Disconnect and remove underfloor wiring, cut raceways flush with floor and patch and restore floor surfaces.

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

H. Maintain access to existing, active electrical installations.

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

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

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

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

3.2 EXAMINATION AND PREPARATION

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

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

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

1. Obtain verification from Engineer of floor box locations, and locations of outlets in office and work areas, prior to rough-in.
2. Elevator System: Determine location of outlets for lights, cab circuits, machines, and equipment installed in elevator pit, shaft, and machine rooms with elevator system installer prior to rough-in.

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

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

3.3 GROUNDING

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

B. Provide ground bonding as indicated and to meet Regulatory Requirements. Include a separate green ground wire in each branch and feeder circuit and bond to grounding system.

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

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

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

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

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

3.4 SUPPORT SYSTEMS

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

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

3.5 CONDUIT

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

1. Minimum Size Conduit: 3/4".
2. Maximum Size Conduit in Slabs Above Grade: 1"; for conduits larger than 3/4", route so they do not cross each other.

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

1. Route exposed raceway parallel and perpendicular to walls and adjacent piping.
2. Maintain minimum 6" clearance to piping and 12" clearance from parallel runs of flues, steam pipes, and heating appliances. Install horizontal raceway runs above water and steam piping.
3. Complete raceway installation before installing conductors.
4. Maintain required fire, acoustic, and vapor barrier rating when penetrating walls, floors, and ceilings. Where indicated on drawings, sleeve penetrations through concrete walls, floors, and ceilings.
5. Group in parallel runs where practical and install on steel channel support system. Maintain spacing between raceways or derate circuit ampacities to NFPA 70 requirements.

6. Use conduit hangers and clamps; do not fasten with wire or perforated pipe straps.
7. Use conduit bodies to make sharp changes in direction.
8. Terminate conduit stubs and box connections with insulated bushings.
9. Steel conduit joints shall be threaded; clamp on or set screw fittings are not permitted.
10. Use suitable caps to protect installed raceway against entrance of dirt and moisture.
11. Provide No. 12 AWG insulated conductor or suitable pull string in empty raceways, except sleeves and nipples.
12. Install expansion joints where raceway crosses building expansion joints, and where necessary to compensate for thermal expansion.
13. Install plastic conduit and tubing in accordance with manufacturer's instructions; thermoweld or cement PVC joints..
14. Use flexible or liquidtight conduit, short as possible, maximum 72 inches, for motor and equipment hookup; always include a separate green ground wire.
15. Use liquidtight conduit for flexible connections in damp or wet locations.
16. Install conduit so condensation will drain and not be trapped.
17. Prevent lodgement of dirt, trash, and mortar; swab all raceways prior to installation of wire and cable.

C. Surface Raceways and multi-outlet assemblies:

1. Always install as inconspicuously as possible following corners wherever possible, mount plumb and level.
2. Securely anchor to mounting surfaces using methods specified in Section 26 05 00.
3. Use fittings and accessories designed for use with raceway system, and install in accordance with manufacturer's instructions.
4. Use suitable insulated bushings and inserts at connections to outlets and corner fittings in metal raceway.

3.6 BOXES

A. General:

1. Install electrical boxes where shown on the drawings, and as required for splices, taps, wire pulling, equipment connections, and regulatory requirements.
2. Locate and install electrical boxes to maintain headroom and to present neat mechanical appearance.
3. Align wall mounted outlet boxes for switches, thermostats, and similar devices.
4. Coordinate mounting heights and locations of outlets above counters, benches, and back splashes.
5. Install lighting outlets to locate luminaires as shown on reflected ceiling plan.
6. Use expansion anchors, shields, or toggle bolts to fasten boxes in place. Do not use explosive powder driven anchors, except where specifically permitted by Engineer. Do not use nails or wire for permanent support.
7. Secure boxes to interior wall and partition studs, accurately positioned to allow for surface finish thickness; select raised cover depth to assure proper fit.
8. Do not install boxes back-to-back in walls; provide 6" minimum separation, except provide 24" separation, in acoustic rated walls.
9. Use hinged cover enclosure for interior pull and junction boxes larger than 12 inches in any dimension. Install in an accessible location that will allow easy access.
10. Field punch openings in pull boxes using punch/dies of appropriate size. Provide knockout closures for unused openings.

B. Surface mounted applications:

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

C. Concealed above ceilings:

1. Install 4" x 4" x 2" or larger steel boxes for general wiring.
2. Octagon boxes, 3 ½" or 4" by 1 ½" or larger depth, are permitted for flush mounted lighting fixture outlets, use adjustable steel channel fasteners for support.
3. Locate and install electrical boxes to allow access. Provide access panels where required for practical access, and as required by the NEC.

D. Concealed in GWB or plaster walls:

1. Install 4" x 4" x 2" steel box; select raised plaster ring and set box so that outer edge is not less than 1/8" below finished wall surface.
2. Use stamped steel mounting bracket for flush outlet/device boxes in hollow stud wall.
3. Align wall mounted outlet boxes for switches, thermostats, and similar devices.
4. Coordinate mounting heights and locations of outlets above counters, benches, and back splashes.

3.7 INSTALLATION OF WIRES AND CABLES

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

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

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

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

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

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

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

G. Terminate spare conductors with electrical tape.

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

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

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

3.8 CORDS AND CAPS

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

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

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

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

3.9 DEVICES

A. Install wiring devices in accordance with manufacturer's instructions.

1. Install wall switches 48" above floor, OFF position down.
2. Install wall dimmers 48" above floor. Derate ganged dimmers as instructed by manufacturer. Do not use common neutral.
3. Install convenience receptacles 18" above floor, 6" above counters and backsplash or as indicated, with grounding pole on top.
4. Install specific purpose receptacles at heights shown on Drawings.
5. Install cord and attachment plug caps on equipment. Size cord for connected load and rating of branch circuit overcurrent protection.

B. Install wall plates flush and level.

1. Install decorative plates on switch, receptacle, and blank outlets in finished areas, using oversized plates for outlets installed in masonry walls.
2. Install galvanized steel plates on outlet boxes and junction boxes in unfinished areas, above accessible ceilings, and on surface mounted outlets.

3.10 FIRESTOPPING

A. Install through penetration firestop systems in accordance with firestop system manufacturer’s written installation instructions for products and applications indicated.

B. Engage an experienced installer who is trained, certified, licensed, or otherwise qualified by the firestop system manufacturer to install the firestop products.

C. Coordinate construction of openings and penetrating items to ensure that firestop systems are installed according to specified requirements.

D. Provide firestop systems that are compatible with one another, with the substrates forming openings, with the items penetrating the firestop system, and under the conditions of service for the application being considered.

E. Provide components for each firestop system that are needed to install fill materials. Use only components specified by the firestop system manufacturer and approved by the qualified testing agency for the designated system.

F. Keep areas of work accessible until inspection by the AHJ has been completed.

G. Inspecting Agency: Owner may engage a qualified independent inspecting agency to inspect the completed firestop system. The independent agency shall comply with ASTM E 2174 requirements including inspecting personnel qualifications, method of conducting inspections, and preparation of test reports.

H. Where deficiencies are found, repair or replace the firestop systems so that they comply with requirements. Proceed with enclosing firestop systems with other construction only after inspection reports are issued and the firestop installations comply with requirements.

I. Protect the firestop system during and after installation to insure that the systems do not deteriorate and are not damaged during the remaining period of construction. In the event damage or deterioration occurs, remove affected firestop system and replace with new materials in compliance with this specification.

3.11 IDENTIFICATION

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

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

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

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

3.12 FIELD QUALITY CONTROL

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

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

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

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

END OF SECTION

SECTION 26 20 00 - SERVICE AND DISTRIBUTION

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Panelboards
2. Enclosed switches
3. Fuses
4. Enclosed circuit breakers

B. Related Sections:

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

1.2 SYSTEM DESCRIPTION

A. Electric Service System: 208/120 volts, three phase, four wire, 60 Hz.

1.3 SUBMITTALS

A. Provide submittals in accordance with Section 26 00 10 for the following:

1. Panelboard
2. Overcurrent devices
3. Disconnects

B. Shop Drawings: Indicate relevant information on switchboards, panelboards, and busways. Indicate circuit breaker arrangement in panelboard, type, size, number of poles, interrupting rating, size of enclosures, and quantities.

C. Product Data: Provide data on enclosed switches and circuit breakers, fuses, panelboards, motor starters, and contactors.

D. Upon request, submit samples for inspection.

E. Test Reports: Submit for field inspection and testing. Include description of procedures, duration, instruments used, and test values obtained. Present information in table comparing acceptable values to actual values.

F. Operating and Maintenance Instructions:

1. Panelboard: Submit NEMA PB 2.1

PART 2 - PRODUCTS

2.1 PANELBOARDS

A. Manufacturers:

1. Square D, no substitutions.

B. Lighting and Appliance Branch Circuit Panelboards: NEMA PB 1; circuit breaker type and similar to type referenced on drawings.

1. Enclosure: NEMA PB 1; Type 1.
2. Provide flush or surface cabinet front, as indicated, with hinged lockable door in hinged cover, keyed alike, two keys per panelboard.
3. Bus: Copper or tin plated aluminum.
4. Ground Bus: Copper.
5. Voltage: 208/120 volts, three phase, 4 wire.
6. Minimum Integrated Equipment Rating: As shown on drawings.
7. Provide Arc Flash and Shock Hazard labels in accordance with NFPA 70.

C. Panelboard design shall be such that individual circuit breakers can be removed without disturbing adjacent units or removing supplemental insulation installed to obtain clearances required by UL. Where space only is indicated, make provisions for future installation of breakers of size indicated.

D. Circuit Breakers: Thermal and magnetic, bolt-on, trip free, trip elements in each pole and single common handle or factory applied handle tie. For GFCI breakers, provide push-to-test button, visible indication of tripped condition, and ability to detect and trip on current imbalance of approximately 6 milliamperes or greater per requirements of UL 943 for Class A GFCI devices. Tripping of GFCI breakers to occur instantaneously without delays.

1. Provide fully rated circuit breakers; series ratings are not permitted unless specifically noted on the drawings

E. Panelboard Tubs: Code gauge galvanized steel, prepunched knockouts not permitted.

2.2 ENCLOSED SWITCHES

A. Manufacturers:

1. Square D

B. Enclosed Switch Assemblies: NEMA KS 12; Type HD.

1. Fuse clips: Designed to accommodate Class R fuses.

C. Enclosures: NEMA KS 12; Type 12 or as indicated on drawings.

D. Motor Disconnect Switches: General duty for up to 240 volts and 1.5 HP, heavy duty for over 240 volts or 1.5 HP, quick make/break type, fused or nonfused (NF) as indicated. For 1/6 HP or less, motor rated toggle switches are permitted.

2.3 FUSES

A. Manufacturers:

1. Bussman
2. Gould

B. Fuses 600 Amperes and Less: Current limiting, time delay, one-time fuse, 250 volts, UL Class RK 1.

C. Fuses Larger Than 600 Amperes: Current limiting, time delay, one-time fuse, 600 volt, UL Class L.

D. Fuse Interrupting Rating: 200,000 rms amperes.

PART 3 - EXECUTION

3.1 EXAMINATION AND PREPARATION

A. Make arrangements with Utility Company to obtain permanent electric service to the Project.

3.2 INSTALLATION

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

B. Install proper fuses in each fused switch.

C. Install panelboard to NEMA PB 1.1.

D. Mount panelboard and disconnects 6'-6" AFF to top of cabinet on steel channel of sufficient length to bridge studs, except where indicated otherwise or approved by Engineer.

E. Set flush mounted panelboards such that tub flanges extend within 1/8" of wall surface at all points, covers rest firmly against wall, and completely close all openings to interior of cabinet.

F. Panelboard circuiting has been worked out with breakers numbered and increasing in size and number of poles from top to bottom. If this is not retained, the Contractor shall be responsible for revising contract drawings and paying to have it done. This is not to prohibit an occasional revision approved by Engineer and properly marked on as-built drawings for correction by others.

G. For each branch circuit panelboard, provide a typewritten tabulation indicating fixture outlets, devices, machines, or apparatus served by each breaker and their room location. This shall follow coding on the drawings with breakers numbered from top to bottom. Mount tabulation inside the door in a frame for the purpose with a transparent plastic cover.

H. Coordinate installation with other sections. It is the responsibility of this section to ensure that mechanical ducts and piping maintain code required clearances around electrical equipment and that walls have sufficient thickness to accept recessed panelboards.

3.3 GROUNDING

A. Bond system neutral and all ground conductors together at the service. Bond all feeder conduits to ground at the service and at the main distribution switchboard. Bond service to water and sprinkler mains on street side of water meter and to heating main.

B. Bond separately derived systems such as dry transformers and generators to building steel and water main.

C. Provide grounding and bonding to NFPA 70, include a separate green grounding conductor in each circuit. Bond all panelboards, cabinets, and equipment to service ground.

D. On all but service equipment and separately derived systems, the neutral bus shall be isolated from ground except for the common bond at the main distribution.

3.4 FIELD QUALITY CONTROL

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

B. Measure ground resistance from system neutral connection at service entrance to convenient ground reference point by passing minimum current of 10 amperes DC and measuring voltage drop. Maximum resistance: 10 ohms.

3.5 CLEANING

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

END OF SECTION

SECTION 26 51 00 - INTERIOR LIGHTING

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Luminaires and lamp holders

B. Related Documents

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

1.2 REFERENCES

A. Furnish products listed by Underwriters Laboratories, Inc., ETL Testing Laboratories, or other testing firm acceptable to the Owner.

B. Conform to requirements of ANSI/NFPA 70.

C. Conform to requirements of NFPA 101.

D. Consortium for Energy Efficiency (CEE).

E. DesignLights Consortium (DLC).

1.3 SUBMITTALS

A. Submit shop drawings, product data, test data, warranties, and other information as appropriate for the following:

1. Luminaires

B. Shop Drawings: Indicate construction details for products which are not manufacturer's standard, when product data does not adequately describe fixture physical characteristics, or upon request by Engineer.

C. Product Data: Provide product data for each luminaire and lighting unit.

D. Submit written warranty for extended warranty items such as batteries and ballasts.

E. Submit luminaire shop drawings in booklet form with a separate sheet for each luminaire type. Indicate clearly on each sheet the proposed luminaire "type" designation, manufacturer, luminaire, lamp, and ballast designation.

F. Submittals shall indicate materials, finishes, metal gauges, overall and detail dimensions, sizes of electrical and mechanical connections, fasteners, welds, joints, end conditions, provisions for the work of others and similar information.

G. The submittals shall state whether or not the fixture, as an assembly, has been UL tested and approved.

H. Upon request, submit sample products for inspection. Provide luminaires identical with approved samples; retain approved samples at site for comparison until after all other luminaires have been shipped to site and installed. Transportation charges for samples shall be paid by Contractor. Unapproved samples will be returned at Contractor's expense. Upon notification of disapproval, immediately submit new samples that meet contract requirements.

I. Operating and Maintenance Instructions: Provide maintenance and operating instructions for battery powered lighting units. Include technical data sheets and parts ordering information for components used in all luminaires.

1.4 QUALITY ASSURANCE

A. Warrant all lighting and components for one year after acceptance of the work and at no additional cost to the Owner, promptly provide and install replacements for luminaires or components which are defective in materials or workmanship; or repair installed equipment at the job site as necessary to restore first class operating condition. For any time during the warranty period that luminaires are not fully functional due to defects in materials or workmanship, provide, install, and remove suitable temporary lighting. Warrant replacement luminaires in a similar manner for a period of one year following replacement including replacement of defective replacements.

B. Warrant power supplies as further specified herein.

C. Provide products of firms regularly engaged in the manufacture of interior luminaires or components of similar types and ratings to those required. Such products shall have been in satisfactory use in similar applications for not less than two years.

1.5 DELIVERY, STORAGE AND HANDLING

A. Deliver luminaires and their components to job site, factory assembled and wired to the greatest extent practical, in strict accordance with approved shop drawings, samples, certificates and catalog cuts.

B. Protect exposed finishes during manufacture, transport, storage and handling; replace damaged materials.

C. Luminaires shall be stored under cover, above the ground, in clean, dry areas, and be tagged and/or marked as to type and site destination.

PART 2 - PRODUCTS

2.1 GENERAL

A. Provide lighting fixtures as listed on the Lighting, Lamping, and Fixture Schedule on the drawings and as specified herein that meet the physical, performance and quality standard exhibited by that fixture. Substitutes shall be equal in all respects including mechanical, electrical, physical, performance, photometric, and quality characteristics except minor variances in construction details which do not affect overall quality or performance are permitted.

B. Accessories: Provide required accessories for mounting and operation of each luminaire as indicated.

1. Thermal Protection: Provide thermal protection devices to meet NFPA 70 requirements.

2. Surface Luminaires: Provide spacers and brackets required for mounting; design for a minimum ambient temperature of 92EF.

2.2 LED LUMINAIRES

A. Exterior Housing: Diecast aluminum with five stage polyester powder paint finish, electrical components solidly heat-sink mounted to housing, type as described on the drawings.

B. Shall be approved by DesignLights Consortium, if not, shall have LM-79 and LM-80 testing or shall have 5 year warranty that cover the product if light levels drop below 70% of the initial light output.

C. Power Supply: 0 - 10v dimming capabilities.

D. Reflector: Precision injection molded, high specular reflector, minimum photometric performance in accordance with fixtures listed on Lighting Fixture Schedule.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Examine adjacent surfaces to determine that surfaces are ready to receive work.

B. Install wiring in accordance with Section 26 00 10.

C. Install luminaires and accessories in accordance with manufacturer's instructions, as indicated, with equipment, materials, parts, attachments, devices, hardware, hangers, cables, supports, channels, frames and brackets necessary to make a safe, complete, and fully operative installation.

D. Install luminaires plumb, square, and level with ceiling and walls, in alignment with adjacent luminaires, and secure in accordance with manufacturers' directions and approved shop drawings. Conform to the requirements of National Electrical Code ANSI/NFPA 70.

1. Specified or indicated mounting heights are to be to the bottom of each luminaire for suspended and ceiling mounted luminaires, and to the center of each luminaire for wall mounted luminaires. Obtain approval of exact mounting for luminaires on the job before installation is commenced and, where applicable, after coordinating with type, style, and pattern of ceiling being installed.
2. Support surface mounted luminaires from ceiling grid tee structure; provide auxiliary support laid across top of ceiling tees and fasten to prohibit movement.
3. Provide two support hangers for the minimum security fixtures so that each is independently supported from the building structure.
4. Install lamps in luminaires and lamp holders.
5. Ground non current carrying parts of electrical equipment in accordance with UL and NEC provisions.

E. Install lighting fixtures where indicated on the plans; plans may be scaled for approximate locations; minor adjustments are permitted to avoid conflicts. Fixture placement that does not conform to the layout indicated shall be corrected; if in doubt about correct placement consult Engineer prior to roughing in. Install all lighting so that it is securely fastened, rows are uniformly spaced and in alignment, and fixture rests flat on mounting surface.

F. Perform insulation resistance and ground continuity test.

3.2 ADJUSTING AND CLEANING

A. Align luminaires and clean lenses and diffusers at completion of work.

B. Adjust directional arrows on exit signs to meet approval of authority having jurisdiction.

C. Clean paint splatters, dirt, and debris from installed luminaires.

D. Touch up luminaire and pole finish at completion of work.

3.3 OWNER INSTRUCTION

A. Provide on-site training of Owner's personnel in operation of controls systems by a factory trained manufacturer's representative. Include instruction in programming time controls to obtain required control functions. Provide one follow-up visit if necessary.

END OF SECTION

SECTION 27 10 00 – DATA WIRING SYSTEM

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes, but is not limited to, the following:

1. Furnish outlets and wiring for data distribution outlets.
2. Test outlet wiring for circuit integrity.

B. Related Documents:

1. Drawings, Division 00, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.
2. Section 09 91 00, Painting.
3. Section 26 00 10, Basic Electrical Requirements.

C. Work Not Included:

1. Telephone equipment and its installation.
2. Telephone service entrance cables.

1.2 REFERENCES

A. Comply with the latest revisions of the following:

1. ANSI/NFPA 70, National Electrical Code.
2. State of Maine Telecommunications Facilities & Wiring Specifications.
3. ANSI/TIA/EIA-568-B, Commercial Building Telecommunications Standard.
4. TIA/EIA-607, Commercial Building Grounding and Bonding Requirements for Telecommunications.
5. BICSI Telecommunications Distribution Methods Manual.

1.3 SUBMITTALS

A. Submit catalog cuts in accordance with Section 26 00 10 for the following:

1. Data Cable
2. Data Outlet and Cover Plate
3. Patch Panel

B. Submit factory certification that cable has been tested and meets the specified standards.

C. Submit test report for installed cables and terminations.

PART 2 - PRODUCTS

2.1 GENERAL

A. Telephone backer boards shall be 3/4 inch AB grade fir plywood with two coats black enamel paint. Backer board shall be minimum 48" x 96", or as indicated, install 6'-6" AFF to top of board.

2.2 DATA OUTLETS

A. Acceptable Manufacturers:

1. Lucent

B. Data Jacks: UL verified and listed Category 5e, UL 1863 file #E129878, meeting FCC Part 68.5, gold plated (50 micro-inch) beryllium copper jack contacts, tin/lead plated IDC "110" contacts, TIA/EIA-568-B configuration, Lucent #MPS100E-112 or MPS100BH-112 orange color.

C. Voice Jacks: UL verified and listed Category 5e, 8-position, similar to Data Jack, TIA/EIA-568-B configuration, ivory color.

D. Mounting Plate: High impact 94 V-O rated gray thermoplastic (Noryl) flush cover plate with labels stenciled by thermal ink transfer, Lucent #M13A-246 or M14A-246 or M16A-246.

E. Portable Furniture Plates: Same as above except, Lucent #M13C-246.

F. Blank insert dust covers #M20AP-246.

2.3 CABLE

A. Acceptable Manufacturers:

1. Alpha
2. Belden
3. Berk-Tek
4. Commscope
5. Mohawk/CDT
6. West Penn

B. Data Horizontal Cables: Inside cable, non plenum applications, NEC Type CM, CMG; riser applications Type CMR; UL Listed Category 5e, unshielded 4-twisted pair solid 24 AWG copper conductors with polyvinyl chloride or polyolefin insulation and polyvinyl chloride sheath, factory certified to conform with EIA/TIA-568-A and Addenda TSB-36 and TSB-40-A, 100 ohms characteristic impedance, designed to support Fast Ethernet Standard of 100 MHz with maximum attenuation of 23db and NEXT minimum of 27db. For plenum applications provide cable with CMP (plenum) rating and FEP Teflon insulation for both jacket and individual conductors.

C. EQUIPMENT

D. Data Patch Panels: Category 5e, "110" termination, Hubbell #MCC5806110I19 series, provide ports as required for installed cables, plus 10 percent spares, or approved equal. Use for terminating all Category 5e cables.

PART 3 - EXECUTION

3.1 INSTALLATION

A. All telecommunications wiring, devices, and equipment shall be installed and terminated in accordance with the requirements of the State of Maine Telecommunications Facilities & Wiring Specifications, latest edition, except where otherwise specified herein. In the event of a conflict between specifications, consult Engineer for resolution; in general, assume that whichever is more stringent shall apply except as may otherwise be permitted by Engineer.

B. Install wiring in conduit as specified for branch circuits, Section 26 00 10.

C. All conduit installed for data wiring shall have no more than two 90° bends in any run unless one or more accessible, appropriately sized pull boxes are provided.

D. Installers shall be well trained, experienced, and familiar with TIA/EIA-568-A and its application in the installation of communication wiring. Run Category 5e cables in strict compliance with TIA/EIA-568-A. Observe bending radius rules, do not staple cable, and do not exert excessive tension when installing in raceway.

E. Make up data jacks to cables in accordance with TIA/EIA-568-X Verify 568-A or B with Owner prior to installing standards and test for opens, shorts and grounds at each pin. Cooperate with Owner's telephone equipment installer, who will install trunk cables and telephone equipment, and aid in troubleshooting cable problems. Correct defects in circuits supplied under this section.

3.2 TERMINATIONS

A. Station Outlets: Flush mounted four position faceplate with unused positions covered with blank off insert. Terminate cables on jack inserts, install voice jack in top position, data jack(s) in bottom position(s).

B. Station Terminal Fields:

1. Terminate data station cables on Category 5e modular patch panels having 110 type insulation displacement connection termination for the station cable, and RJ-45 style eight (8) position jacks wired in TIA-T-568-A pin configuration. maintain pair twists to within ½”, or less, of the termination points.

C. Ground patch panels via a bond connection to the appropriate telecommunications grounding busbar.

3.3 LABELING REQUIREMENTS

A. Number both ends of each cable with labels of waterproof materials and indelible ink text information, using either mechanical or waterproof adhesive attachment.

B. Wall Plate Marking:

1. Wall Plate ID = FTNN Where F= Floor Designator
   T= Terminal Identifier (i.e. “A”, “B”)
   N= Sequential station placement drop number (Keyed to room number)
2. Example: G-A-1024.3-3 = Ground floor, IDF A, Room 1024.3-Outlet number 3 in this room.
3. This designation must be permanently and indelibly marked on the wall plate in a clear and legible manner. The designation must also be marked on the terminal block or patch panel of the associated distribution frame location (MDF/IDF).
4. Record the wall plate number on the building floor plan record diagram.

3.4 GROUNDING REQUIREMENTS

A. Extend service equipment ground to service backer board using min. #6 AWG copper. In exposed locations, install ground wire in EMT. Bond all telecommunications raceway to form a continuous path to ground.

B. Ground patch panels, equipment racks and other telecommunications’ equipment via a min. #6 AWG bond connection to the appropriate telecommunications grounding busbar.

C. Provide appropriate grounding for the protection of personnel, materials and equipment conforming to all applicable regulations, codes and standards.

3.5 FIRE STOPPING

A. Apply UL 1479 listed cementitious fire stop materials conforming to ASTM E-814 F and T ratings, in full hours, compatible with the rating of the penetrated fire barrier.

3.6 TESTING

A. Data Circuits: Test and certify all Category 5e cable runs to conform to TIA/EIA-568-B and UTP Addenda TSB-36, TSB-40A, 569, and 606. Runs shall support the Fast Ethernet Standard for 100 Mhz with maximum attenuation of 23db and NEXT minimum of 27db. Perform bi-directional test using a network analyzer, Microtest Penta scanner, or approved equal. Defective pairs are not permitted; runs which do not meet this requirement shall be replaced or suitably repaired and retested. Submit a computer generated test report listing results for each run.

B. Submit a typed test report indicating test results for each circuit, including station circuits and trunk cables.

END OF SECTION