

Harriman

State of Maine
Judicial Branch
250 Goddard Road
Renovations
Lewiston, Maine

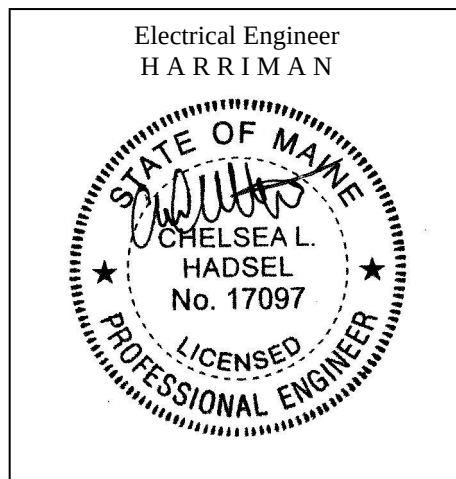
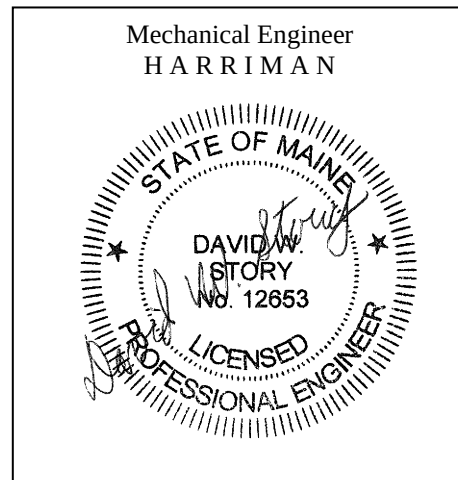
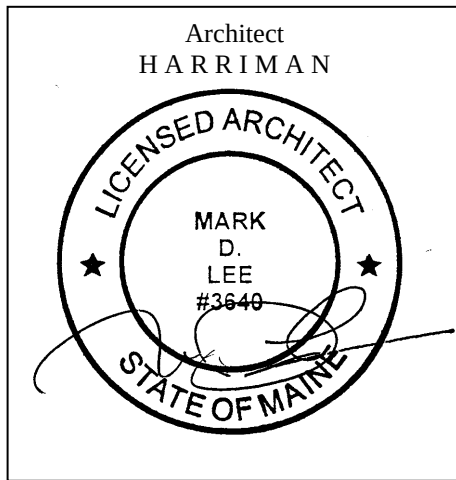
Project No. 26107

September 18, 2026

Construction Documents

This Page Intentionally Blank

PROFESSIONAL SEAL PAGE



This Page Intentionally Blank

STATE OF MAINE
JUDICIAL BRANCH
250 GODDARD ROAD RENOVATIONS

TABLE OF CONTENTS

DIVISION 00 - PROCUREMENT AND CONTRACTION REQUIREMENTS

00 11 13 Notice to Contractors
00 21 13 Instructions to Bidders
00 41 13 Contractor Bid Form
00 43 13 Contractor Bid Bond
00 52 13 Contract Agreement
00 61 13.13 Contractor Performance Bond
00 61 13.16 Contractor Payment Bond
00 71 00 Definitions
00 72 13 General Conditions
00 73 46 Wage Determination Schedule
007346.13 2026 Fair Minimum Wage Rates -- Building 2 Androscoggin County

DIVISION 01 - GENERAL REQUIREMENTS

010000 Division 01 General Requirements
013300 Electronic Document Release Agreement

DIVISION 02 - EXISTING CONDITIONS

024119 Selective Demolition

DIVISION 03- DIVISION 05 – NOT USED

DIVISION 06 - WOOD, PLASTICS, AND COMPOSITES

061000 Rough Carpentry

DIVISION 07 - THERMAL AND MOISTURE PROTECTION

079200 Joint Sealants

DIVISION 08 - OPENINGS

080671 Door Hardware Schedule
081110 Hollow Metal Doors and Frames
083113 Access Doors and Frames
087100 Door Hardware

DIVISION 09 - FINISHES

092900 Gypsum Board Assemblies
095100 Acoustical Ceilings
096510 Resilient Flooring and Accessories
096810 Tile Carpeting
098433 Acoustic Wall Units
099000 Painting and Coating

DIVISION 10 – DIVISION 11 – NOT USED

DIVISION 12 - FURNISHINGS

122400 Shades

DIVISION 23 - HEATING VENTILATING AND AIR CONDITIONING

230500 Common Work Results for HVAC
230529 Hangers and Supports for HVAC Piping and Equipment
230553 Identification for HVAC Piping and Equipment
230593 Testing, Adjusting, and Balancing for HVAC
230713 Duct Insulation
230719 HVAC Piping Insulation
232113 Hydronic Piping
232300 Refrigerant Piping
233113 HVAC Ducts
233300 Air Duct Accessories
233423 HVAC Power Ventilators
233700 Air Outlets and Inlets

DIVISION 26 – ELECTRICAL

260100 Short Form Electrical Specifications

LIST OF DRAWINGS

GENERAL DRAWINGS

G00-1 COVER SHEET
G00-2 CODE SUMMARY
G00-3 CODE PLAN

ARCHITECTURAL DRAWINGS

A00-1 ABBREVIATIONS AND LEGENDS
A05-1 FIRST FLOOR DEMOLITION PLAN
A05-2 FIRST FLOOR DEMOLITION CEILING PLAN
A10-1 FIRST FLOOR PLAN
A40-1 DOOR SCHEDULE AND DETAILS, PARTITION LEGEND AND DETAILS
A70-1 FIRST FLOOR CEILING PLAN
A71-1 MATERIALS PLAN & ROOM FINISH SCHEDULE
A72-1 FIRST FLOOR FURNITURE PLAN
A81-1 INTERIOR ELEVATIONS
A82-1 INTERIOR DETAILS

MECHANICAL DRAWINGS

M00-1 LEGEND & GENERAL NOTES
M05-1 FIRST FLOOR DEMOLITION DUCTWORK
M06-1 FIRST FLOOR DEMOLITION PIPING
M10-1 FIRST FLOOR DUCTWORK
M20-1 FIRST FLOOR PIPING
M50-1 DETAILS
M60-1 SCHEDULES

ELECTRICAL DRAWINGS

E00-1	SYMBOLS, ABBREVIATIONS AND NOTES
E05-1	FIRST FLOOR PLAN DEMOLITION
E10-1	FIRST FLOOR PLAN LIGHTING
E20-1	FIRST FLOOR PLAN POWER AND SYSTEMS
E70-1	DETAILS

END OF TABLE OF CONTENTS

This Page Left Intentionally Blank

00 11 13
Notice to Contractors

STATE OF MAINE JUDICIAL BRANCH 250 GODDARD ROAD RENOVATIONS 3873

Interior renovation to approximately 1,200 square feet consisting of selected demolition, new partitions, flooring, ceilings, and associated mechanical and electrical modification.

The contract shall designate the Substantial Completion Date on or before *29 January 2027*, and the Contract Final Completion Date on or before *12 February 2027*

1. Bids shall be submitted in sealed envelopes plainly marked "**Bid for 250 Goddard Road Renovations**" and addressed to:

*Jeremy Gray
Maine Judicial Branch
Director of Court Facilities
250 Goddard Road
Lewiston, Maine 04240*

The envelope shall contain a completed Contractor Bid Form (section 00 41 13), provided in the Bid Documents, and include bid security when required. The bids shall be received no later than **2:00:00 p.m. on 29 October 2026**.

Bid submissions will be opened and read aloud at *the address shown above* at the time and date noted above.

Any bid submitted after the noted time will not be considered a valid bid and will remain unopened. Any bid submitted by any other means will not be considered a valid bid. The Owner reserves the right to accept or reject any or all bids as may best serve the interest of the Owner.

2. Questions and comments on the *bid opening process* shall be addressed to: Division of Planning, Design & Construction, Bureau of General Services, 77 State House Station, Augusta, Maine 04333-0077, BGS.Architect@Maine.gov.
3. Questions and comments regarding the design specifications or drawings shall be directed in writing to the Consultant during the bid period prior to the question and comment deadline of 5:00 p.m. on 22 October 2026

*Harriman
Alyssa Doherty
adoherty@harriman.com*

4. ☒ Bid security is required on this project.

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

or

- ☐ Bid security is not required on this project.

00 11 13
Notice to Contractors

5. ☒ Performance and Payment Bonds are required on this project.
If noted above as required, or if any combination of Base Bid and Alternate Bids amounts selected in the award of the contract exceeds \$125,000.00, the selected Contractor shall furnish a 100% contract Performance Bond (section 00 61 13.13) and a 100% contract Payment Bond (section 00 61 13.16) in the contract amount to cover the execution of the Work. Bond forms are available on the BGS website.
or
☐ Performance and Payment Bonds are not required on this project.
6. Filed Sub-bids *are not required* on this project.
7. ☐ Pre-qualified General Contractors are utilized on this project.
or
☒ Pre-qualified General Contractors are not utilized on this project.
8. ☒ An on-site pre-bid conference (☒ *mandatory* or ☐ *optional*) will be conducted for this project. The pre-bid conference is intended for General Contractors. Subcontractors and suppliers are welcome to attend. Contractors who arrive late or leave early for a mandatory meeting may be prohibited from participating in this meeting and bidding.
13 October 2026
250 Goddard Road
9:00 am
or
☐ An on-site pre-bid conference will not be conducted for this project.
9. Bid Documents will be available on or about *October 1* and may be obtained from:

The Bureau of General Services website: <https://www.maine.gov/dafs/bgs/business-opportunities>
10. Bid Documents may be examined at:
- | | |
|---|--|
| <i>AGC Maine</i>
<i>188 Whitten Road, Augusta, ME 04330</i>
<i>207-622-4741</i> | <i>Construction Summary</i>
<i>734 Chestnut Street, Manchester, NH 03104</i>
<i>603-627-8856</i> |
| <i>Dodge Data & Analytics</i>
<i>1-800-393-6343</i> | |

00 21 13
Instructions to Bidders

1. Bidder Requirements

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

00 21 13
Instructions to Bidders

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

00 21 13
Instructions to Bidders

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

This Page Intentionally Blank

00 41 13
Contractor Bid Form

STATE OF MAINE JUDICIAL BRANCH 250 GODDARD ROAD RENOVATIONS 3873

Bid Form submitted by: *paper documents only to address below*

Bid Administrator:

Jeremy Gray
Director of Court Facilities
Maine Judicial Branch
250 Goddard Road
Lewiston, Maine 04240

Bidder:

Signature: _____

Printed name and
title: _____

Company name: _____

Mailing address: _____

City, state, zip code: _____

Phone number: _____

Email address: _____

State of
incorporation,
if a corporation: _____

List of all partners,
if a partnership: _____

The Bidder agrees, if the Owner offers to award the contract, to provide any and all bonds and certificates of insurance, as well as Schedule of Values, Project Schedule, and List of Subcontractors and Suppliers if required by the Owner, and to sign the designated Construction Contract within twelve calendar days after the date of notification of such acceptance, except if the twelfth day falls on a State of Maine government holiday or other closure day, or a Saturday, or a Sunday, in which case the aforementioned documents must be received before 12:00 noon on the first available business day following the holiday, other closure day, Saturday, or Sunday.

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

00 41 13
Contractor Bid Form

1. The Bidder, having carefully examined the 250 Goddard Road Renovations Project Manual dated September 18, 2026, prepared by Harriman (Consultant), as well as Specifications, Drawings, and any Addenda, the form of contract, and the premises and conditions relating to the work, proposes to furnish all labor, equipment and materials necessary for and reasonably incidental to the construction and completion of this project for the **Base Bid** amount of:

\$ _____ .00

Note: Base Bid includes Allowances and Unit Price Quantities as applicable (see below).

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

<u>No.</u>	<u>Description</u>	
1	<i>insert brief name of Allowance or "not used"</i>	<u>\$0.00</u>
2	<i>insert brief name of Allowance or "not used"</i>	<u>\$0.00</u>
3	<i>insert brief name of Allowance or "not used"</i>	<u>\$0.00</u>
4	<i>insert brief name of Allowance or "not used"</i>	<u>\$0.00</u>
5	<i>insert brief name of Allowance or "not used"</i>	<u>\$0.00</u>

3. Alternate Bids *are not included* on this project.
No Alternate Bids
 Any dollar amount line below that is left blank by the Bidder shall be read as a bid of **\$0.00**.

<u>No.</u>	<u>Description</u>	
1	<i>insert title of Alternate or "not used"</i>	<u>\$0.00</u>
2	<i>insert title of Alternate or "not used"</i>	<u>\$0.00</u>
3	<i>insert title of Alternate or "not used"</i>	<u>\$0.00</u>
4	<i>insert title of Alternate or "not used"</i>	<u>\$0.00</u>
5	<i>insert title of Alternate or "not used"</i>	<u>\$0.00</u>

00 41 13
Contractor Bid Form

4. Unit Prices *are not included* on this project.

No Unit Prices

Any dollar amount line below that is left blank by the Bidder shall be read as a bid of **\$0.00**. **Note:** **ADD and DEDUCT unit prices cannot differ by more than 20%.**

<u>No.</u>	<u>Description</u>	<u>Unit</u>	<u>Quantity*</u>	<u>Unit Price</u> <u>ADD</u>	<u>Unit Price</u> <u>DEDUCT</u>
1	<i>insert name of Unit Price Item or "not used"</i>		_____	<u>\$0.00</u>	<u>\$0.00</u>
2	<i>insert name of Unit Price Item or "not used"</i>		_____	<u>\$0.00</u>	<u>\$0.00</u>
3	<i>insert name of Unit Price Item or "not used"</i>		_____	<u>\$0.00</u>	<u>\$0.00</u>
4	<i>insert name of Unit Price Item or "not used"</i>		_____	<u>\$0.00</u>	<u>\$0.00</u>
5	<i>insert name of Unit Price Item or "not used"</i>		_____	<u>\$0.00</u>	<u>\$0.00</u>

* Unit price quantities are included in the **Base Bid** amount above. If installed quantities differ, then cost will be adjusted by Change Order according to the ADD and DEDUCT unit prices as provided above. Quantities shall be verified by the Consultant.

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

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

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

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

This Page Intentionally Blank

00 43 13
Contractor Bid Bond

Bond No.: insert bond number

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

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

Now therefore:

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

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

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

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

00 43 13
Contractor Bid Bond

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

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

Contractor

(Signature)

insert name and title

insert company name

insert address
insert city state zip code

Surety

(Signature)

insert name and title

insert company name

insert address
insert city state zip code

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

State of Maine
CONSTRUCTION CONTRACT

Large Construction Project

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

Agreement entered into by and between the **State of Maine, Maine Judicial Branch** hereinafter called the **Owner** and **Contractor company name** hereinafter called the **Contractor**.

BGS Project No.: **3873**

Other Project No.: **26107**

For the following Project: **250 Goddard Road Renovations** at **Androscoggin Judicial Branch, Lewiston**, Maine.

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

The Owner and Contractor agree as follows:

ARTICLE 1 COMPENSATION AND PAYMENTS

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

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

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

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

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

ARTICLE 2 COMMENCEMENT AND COMPLETION DATES

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

2.2 The Substantial Completion Date shall be **31 December 2026**.

2.3 The Work of this Contract shall be completed on or before the Contract Final Completion Date of **31 January 2026**.

2.4 The Contract Expiration Date shall be **31 May 2026**. (This date is the Owner's deadline for internal management of contract accounts. The Contract Expiration Date does not directly relate to any contract obligation of the Contractor.)

ARTICLE 3 INELIGIBLE BIDDER

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

3.2 By signing this contract the Contractor attests that it is not presently indicted for or otherwise criminally or civilly charged by a Federal, State or local government entity with commission of any of the following offenses and has not within a three-year period preceding this bid been convicted of or had a civil judgment rendered against them for commission of fraud or a criminal offense in connection with obtaining, attempting to obtain, or performing a public (Federal, State or local) transaction, or contract under a public transaction, violation of Federal or State anti-trust statutes or commission of embezzlement, theft, forgery, bribery, falsification or destruction of records, making false statements, or receiving stolen property.

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

ARTICLE 4 CONTRACTOR'S RESPONSIBILITIES

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

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

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

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

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

ARTICLE 5 OWNER'S RESPONSIBILITIES

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

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

ARTICLE 6 INSTRUMENTS OF SERVICE

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

ARTICLE 7 MISCELLANEOUS PROVISIONS

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

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

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

ARTICLE 8 CONTRACT DOCUMENTS

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

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

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

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

BGS Project No.: _____

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

OWNER

CONTRACTOR

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

Signature *Date*
name and title
name of contractor company
address
telephone
email address
Vendor Number

Indicate the names of the review and approval individuals appropriate to the approval authority.

<i>select proper approval authority</i>	
Reviewed by:	Approved by:
<i>Signature</i> <i>Date</i> <i>insert name</i>	<i>Signature</i> <i>Date</i> <i>John Kenney, P.E.</i>
<i>Project Manager/ Contract Administrator</i>	<i>Director, Planning Design and Construction Division (PDCD)</i>

00 61 13.13
Contractor Performance Bond

Bond No.: insert bond number

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

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

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

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

00 61 13.13
Contractor Performance Bond

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

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

Contractor

(Signature)

insert name and title

insert company name

insert address

insert city state zip code

Surety

(Signature)

insert name and title

insert company name

insert address

insert city state zip code

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

00 61 13.16
Contractor Payment Bond

Bond No.: insert bond number

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

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

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

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

00 61 13.16
Contractor Payment Bond

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

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

Contractor

(Signature)

insert name and title

insert company name

insert address

insert city state zip code

Surety

(Signature)

insert name and title

insert company name

insert address

insert city state zip code

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

00 71 00
Definitions

1. Definitions

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

00 71 00
Definitions

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

00 71 00
Definitions

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

00 71 00
Definitions

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

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

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

00 71 00
Definitions

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

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

00 71 00
Definitions

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

00 72 13
General Conditions

Table of Contents of this General Conditions Section

1. Preconstruction Conference	2
2. Intent and Correlation of Contract Documents.....	2
3. Additional Drawings and Specifications	3
4. Ownership of Contract Documents	3
5. Permits, Laws, and Regulations	3
6. Taxes	4
7. Labor and Wages.....	4
8. Indemnification	5
9. Insurance Requirements	5
10. Contract Bonds.....	7
11. Patents and Royalties	7
12. Surveys, Layout of Work	7
13. Record of Documents.....	7
14. Allowances	8
15. Shop Drawings.....	8
16. Samples	8
17. Substitutions	9
18. Assignment of Contract.....	9
19. Separate Contracts.....	9
20. Subcontracts	10
21. Contractor-Subcontractor Relationship	10
22. Supervision of the Work.....	11
23. Observation of the Work	11
24. Consultant's Status.....	12
25. Management of the Premises	12
26. Safety and Security of the Premises	13
27. Changes in the Work	14
28. Correction of the Work.....	16
29. Owner's Right to do Work.....	16
30. Termination of Contract and Stop Work Action	16
31. Delays and Extension of Time	17
32. Payments to the Contractor	18
33. Payments Withheld	19
34. Liens	19
35. Workmanship	19
36. Close-out of the Work	20
37. Date of Completion and Liquidated Damages	21
38. Dispute Resolution	21

00 72 13
General Conditions

1. Preconstruction Conference

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

2. Intent and Correlation of Contract Documents

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

00 72 13
General Conditions

such errors or omissions. The Consultant shall make any corrections or clarifications necessary in such a situation to document the true intent of the Contract Documents.

3. Additional Drawings and Specifications

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

4. Ownership of Contract Documents

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

5. Permits, Laws, and Regulations

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

00 72 13
General Conditions

- 5.8 The Contractor shall comply with the Maine Code of Fair Practices and Affirmative Action, 5 M.R.S. §784 (2).

6. Taxes

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

7. Labor and Wages

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

00 72 13
General Conditions

- 7.7 The Contractor shall promptly pay all employees when their compensation is due, shall promptly pay all others who have billed and are due for materials, supplies and services used in the Work, and shall promptly pay all others who have billed and are due for insurance, workers compensation coverage, federal and state unemployment compensation, and Social Security charges pertaining to this Project. Before final payments are made, the Contractor shall furnish to the Owner affidavits that all such payments described above have been made.
- 7.8 The Contractor may contact the Maine Department of Labor, 54 State House Station, Augusta, Maine 04333 for guidance on labor issues.
- 7.9 The Contractor may contact the Maine Workers' Compensation Board, 27 State House Station, Augusta, Maine 04333 for guidance on workers' compensation issues.

8. Indemnification

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

9. Insurance Requirements

- 9.1 The Contractor shall provide, with each original of the signed Contract, an insurance certificate or certificates acceptable to the Owner and BGS. The Contractor shall submit insurance certificates to the Owner and BGS at the commencement of this Contract and at policy renewal or revision dates. The certificates shall identify the project name and BGS project number, and shall name the Owner as certificate holder and as additional insured for general liability and automobile liability coverages. The submitted forms shall contain a provision that coverage afforded under the insurance policies will not be canceled or materially changed unless at least ten days prior written notice by registered letter has been given to the Owner and BGS.
- 9.2 The Owner does not warrant or represent that the insurance required herein constitutes an insurance portfolio which adequately addresses all risks faced by the Contractor or its Subcontractors. The Contractor is responsible for the existence, extent and adequacy of insurance prior to commencement of work. The Contractor shall not allow any Subcontractor to commence work until all similar insurance required of the Subcontractor has been confirmed by the Contractor.

00 72 13
General Conditions

- 9.3 The Contractor shall procure and maintain primary insurance for the duration of the Project and, if written on a Claims-Made basis, shall also procure and maintain Extended Reporting Period (ERP) insurance for the period of time that any claims could be brought. The Contractor shall ensure that all Subcontractors they engage or employ will procure and maintain similar insurance in form and amount acceptable to the Owner and BGS. At a minimum, the insurance shall be of the types and limits set forth herein protecting the Contractor from claims which may result from the Contractor's execution of the Work, whether such execution be by the Contractor or by those employed by the Contractor or by those for whose acts they may be liable. All required insurance coverages shall be placed with carriers authorized to conduct business in the State of Maine by the Maine Bureau of Insurance.
- 9.3.1 The Contractor shall have Workers' Compensation insurance for all employees on the Project site in accordance with the requirements of the Workers' Compensation law of the State of Maine. Minimum acceptable limits for Employer's Liability are:
- | | |
|--------------------------------|-------------------------|
| Bodily Injury by Accident..... | \$500,000 |
| Bodily Injury by Disease..... | \$500,000 Each Employee |
| Bodily Injury by Disease..... | \$500,000 Policy Limit |
- 9.3.2 The Contractor shall have Commercial General Liability insurance providing coverage for bodily injury and property damage liability for all hazards of the Project including premise and operations, products and completed operations, contractual, and personal injury liabilities. The policy shall include collapse and underground coverage as well as explosion coverage if explosion hazards exist. Aggregate limits shall apply on a location or project basis. Minimum acceptable limits are:
- | | |
|---|-------------|
| General aggregate limit..... | \$2,000,000 |
| Products and completed operations aggregate | \$1,000,000 |
| Each occurrence limit..... | \$1,000,000 |
| Personal injury aggregate | \$1,000,000 |
- 9.3.3 The Contractor shall have Automobile Liability insurance against claims for bodily injury, death or property damage resulting from the maintenance, ownership or use of all owned, non-owned and hired automobiles, trucks and trailers. Minimum acceptable limit is:
- | | |
|--------------------------------|-----------|
| Any one accident or loss | \$500,000 |
|--------------------------------|-----------|
- 9.3.4 For the portion of a project which is new construction, the Contractor shall procure and maintain Builder's Risk insurance naming the Owner, Contractor, and any Subcontractor as insureds as their interest may appear. Covered causes of loss form shall be all Risks of Direct Physical Loss, endorsed to include flood, earthquake, transit and sprinkler leakage where sprinkler coverage is applicable. Unless specifically authorized in writing by the Owner, the limit of insurance shall not be less than the initial contract amount, for the portion of the project which is new construction, and coverage shall apply during the entire contract period and until the work is accepted by the Owner.
- 9.3.5 The Contractor shall have Owner's Protective Liability insurance for contract values \$50,000 and above, naming the Owner as the Named Insured. Minimum acceptable limits are:
- | | |
|------------------------------|-------------|
| General aggregate limit..... | \$2,000,000 |
| Each occurrence limit..... | \$1,000,000 |

00 72 13
General Conditions

10. Contract Bonds

- 10.1 When noted as required in the Bid Documents, the Contractor shall provide to the Owner a Performance Bond and a Payment Bond, or "contract bonds", upon execution of the contract. Each bond value shall be for the full amount of the contract and issued by a surety company authorized to do business in the State of Maine as approved by the Owner. The bonds shall be executed on the forms furnished in the Bid Documents. The bonds shall allow for any subsequent additions or deductions of the contract.
- 10.2 The contract bonds shall continue in effect for one year after final acceptance of the contract to protect the Owner's interest in connection with the one year guarantee of workmanship and materials and to assure settlement of claims for the payment of all bills for labor, materials and equipment by the Contractor.

11. Patents and Royalties

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

12. Surveys, Layout of Work

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

13. Record of Documents

- 13.1 The Contractor shall maintain one complete set of Contract Documents on the jobsite, in good order and current status, for access by the Owner and Consultant.
- 13.2 The Contractor shall maintain, continuously updated, complete records of Requests for Information, Architectural Supplemental Instructions (or equivalent), Information Bulletins,

00 72 13
General Conditions

supplemental sketches, Change Order Proposals, Change Orders, Shop Drawings, testing reports, et cetera, for access by the Owner and Consultant.

14. Allowances

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

15. Shop Drawings

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

16. Samples

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

00 72 13
General Conditions

17. Substitutions

- 17.1 The Contractor shall furnish items and materials described in the Contract Documents. If the item or material specified describes a proprietary product, or uses the name of a manufacturer, the term “or approved equal” shall be implied, if it is not included in the text. The specific item or material specified establishes a minimum standard for the general design, level of quality, type, function, durability, efficiency, reliability, compatibility, warranty coverage, installation factors and required maintenance. The Drawing or written Specification shall not be construed to exclude other manufacturers products of comparable design, quality, and efficiency.
- 17.2 The Contractor may submit detailed information about a proposed substitution to the Consultant for consideration. Particular models of items and particular materials which the Contractor asserts to be equal to the items and materials identified in the Contract Documents shall be allowed only with written approval by the Consultant. The request for substitution shall include a cost comparison and a reason or reasons for the substitution.
- 17.3 The Consultant may request additional information about the proposed substitution. The approval or rejection of a proposed substitution may be based on timeliness of the request, source of the information, the considerations of minimum standards described above, or other considerations. The Consultant should briefly state the rationale for the decision. The decision shall be considered final.
- 17.4 The duration of a substitution review process can not be the basis for a claim for delay in the Schedule of the Work.

18. Assignment of Contract

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

19. Separate Contracts

- 19.1 The Owner reserves the right to create other contracts in connection with this Project using similar General Conditions. The Contractor shall allow the Owner's other contractors reasonable opportunity for the delivery and storage of materials and the execution of their work. The Contractor shall coordinate and properly connect the Work of all contractors.
- 19.2 The Contractor shall promptly report to the Consultant and Owner any apparent deficiencies in work of the Owner's other contractors that impacts the proper execution or results of the Contractor. The Contractor's failure to observe or report any deficiencies constitutes an acceptance of the Owner's other contractors work as suitable for the interface of the Contractor's work, except for latent deficiencies in the Owner's other contractors work.
- 19.3 Similarly, the Contractor shall promptly report to the Consultant and Owner any apparent deficiencies in their own work that would impact the proper execution or results of the Owner's other contractors.

00 72 13
General Conditions

- 19.4 The Contractor shall report to the Consultant and Owner any conflicts or claims for damages with the Owner's other contractors and settle such conflicts or claims for damages by mutual agreement or arbitration, if necessary, at no expense to the Owner.
- 19.5 In the event the Owner's other contractors sue the Owner regarding any damage alleged to have been caused by the Contractor, the Owner shall notify the Contractor, who shall defend such proceedings at the Contractor's expense. The Contractor shall pay or satisfy any judgment that may arise against the Owner, and pay all other costs incurred.

20. Subcontracts

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

21. Contractor-Subcontractor Relationship

- 21.1 The Contractor shall be bound to the Subcontractor by all the obligations in the Contract Documents that bind the Contractor to the Owner.
- 21.2 The Contractor shall pay the Subcontractor, in proportion to the dollar value of the work completed and requisitioned by the Subcontractor, the approved dollar amount allowed to the Contractor no more than seven days after receipt of payment from the Owner.
- 21.3 The Contractor shall pay the Subcontractor accordingly if the Contract Documents or the subcontract provide for earlier or larger payments than described in the provision above.
- 21.4 The Contractor shall pay the Subcontractor for completed and requisitioned subcontract work, less retainage, no more than seven days after receipt of payment from the Owner for the Contractor's approved Requisition for Payment, even if the Consultant fails to certify a portion of the Requisition for Payment for a cause not the fault of the Subcontractor.
- 21.5 The Contractor shall not make a claim for liquidated damages or penalty for delay in any amount in excess of amounts that are specified by the subcontract.

00 72 13
General Conditions

- 21.6 The Contractor shall not make a claim for services rendered or materials furnished by the Subcontractor unless written notice is given by the Contractor to the Subcontractor within ten calendar days of the day in which the claim originated.
- 21.7 The Contractor shall give the Subcontractor an opportunity to present and to submit evidence in any progress conference or disputes involving subcontract work.
- 21.8 The Contractor shall pay the Subcontractor a just share of any fire insurance payment received by the Contractor.
- 21.9 The Subcontractor shall be bound to the Contractor by the terms of the Contract Documents and assumes toward the Contractor all the obligations and responsibilities that the Contractor, by those documents, assumes toward the Owner.
- 21.10 The Subcontractor shall submit applications for payment to the Contractor in such reasonable time as to enable the Contractor to apply for payment as specified.
- 21.11 The Subcontractor shall make any claims for extra cost, extensions of time or damages, to the Contractor in the manner provided in these General Conditions for like claims by the Contractor to the Owner, except that the time for the Subcontractor to make claims for extra cost is seven calendar days after the receipt of Consultant's instructions.

22. Supervision of the Work

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

23. Observation of the Work

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

00 72 13
General Conditions

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

00 72 13
General Conditions

- 25.2 The Contractor shall not use the premises for any purpose other than that which is directly related to the scope of work. The Owner shall not use the premises for any purpose incompatible with the proposed work simultaneous to the work of the Contractor.
- 25.3 The Contractor shall enforce the Consultant's instructions regarding information posted on the premises such as signage and advertisements, as well as activities conducted on the premises such as fires, and smoking.
- 25.4 The Owner may occupy any part of the Project that is completed with the written consent of the Contractor, and without prejudice to any of the rights of the Owner or Contractor. Such use or occupancy shall not, in and of itself, be construed as a final acceptance of any work or materials.

26. Safety and Security of the Premises

- 26.1 The Contractor shall designate, and make known to the Consultant and the Owner, a safety officer whose duty is the prevention of accidents on the site.
- 26.2 The Contractor shall continuously maintain security on the premises and protect from unreasonable occasion of injury all people authorized to be on the job site. The Contractor shall also effectively protect the property and adjacent properties from damage or loss.
- 26.3 The Contractor shall take all necessary precautions to ensure the safety of workers and others on and adjacent to the site, abiding by applicable local, state and federal safety regulations. The Contractor shall erect and continuously maintain safeguards for the protection of workers and others, and shall post signs and other warnings regarding hazards associated with the construction process, such as protruding fasteners, moving equipment, trenches and holes, scaffolding, window, door or stair openings, and falling materials.
- 26.4 The Contractor shall restore the premises to conditions that existed prior to the start of the project at areas not intended to be altered according to the Contract Documents.
- 26.5 The Contractor shall protect existing utilities and exercise care working in the vicinity of utilities shown in the Drawings and Specifications or otherwise located by the Contractor.
- 26.6 The Contractor shall protect from damage existing trees and other significant plantings and landscape features of the site which will remain a permanent part of the site. If necessary or indicated in the Contract Documents, tree trunks shall be boxed and barriers erected to prevent damage to tree branches or roots.
- 26.7 The Contractor shall repair or replace damage to the Work caused by the Contractor's or Subcontractor's forces, including that which is reasonably protected, at the expense of the responsible party.
- 26.8 The Contractor shall not load, or allow to be loaded, any part of the Project with a force which imperils personal or structural safety. The Consultant may consult with the Contractor on such means and methods of construction, however, the ultimate responsibility lies with the Contractor.
- 26.9 The Contractor shall not jeopardize any work in place with subsequent construction activities such as blasting, drilling, excavating, cutting, patching or altering work. The Consultant must

00 72 13
General Conditions

approve altering any structural components of the project. The Contractor shall supervise all construction activities carried out by others on site to ensure that the work is neatly done and in a manner that will not endanger the structure or the component parts.

- 26.10 The Contractor may act with their sole discretion in emergency situations that potentially effect health, life or serious damage to the premises or adjacent properties, to prevent such potential loss or injury. The Contractor may negotiate with the Owner for compensation for expenses due to such emergency work.
- 26.11 The Contractor and Subcontractors shall have no responsibility for the identification, discovery, presence, handling, removal or disposal of, or exposure of persons to, hazardous materials in any form at the project site. The Contractor shall avoid disruption of any hazardous materials or toxic substances at the project site and promptly notify the Owner in writing on the occasion of such a discovery.
- 26.12 The Contractor shall keep the premises free of any unsafe accumulation of waste materials caused by the work. The Contractor shall regularly keep the spaces "broom clean". See the Close-out of the Work provisions of this section regarding cleaning at the completion of the project.

27. Changes in the Work

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

00 72 13
General Conditions

- 27.6 The Contractor shall determine the dollar value of the extra work for both the lump sum and cost plus designated percentage methods so as not to exceed the following rates. The rates include all overhead and profit expenses.
- .1 Contractor - for any work performed by the Contractor's own forces, up to 20% of the cost;
 - .2 Subcontractor - for work performed by Subcontractor's own forces, up to 20% of the cost;
 - .3 Contractor - for work performed by Contractor's Subcontractor, up to 10% of the amount due the Subcontractor.
- 27.7 The Contractor shall keep and provide records as needed or directed for the cost plus designated percentage method. The Consultant shall review and certify the appropriate amount which includes the Contractor's overhead and profit. The Owner shall make payments based on the Consultant's certificate.
- 27.8 Cost reflected in Change Orders shall be limited to the following: cost of materials, cost of delivery, cost of labor (including Social Security, pension, Workers' Compensation insurance, and unemployment insurance), and cost of rental of power tools and equipment. Labor cost may include a pro-ratio share of a foreman's time only in the case of an extension of contract time granted due to the Change Order.
- 27.9 Overhead reflected in Change Orders shall be limited to the following: bond premium, supervision, wages of clerks, time keepers, and watchmen, small tools, incidental expenses, general office expenses, and all other overhead expenses directly related to the Change Order.
- 27.10 The Contractor shall provide credit to the Owner for labor, materials, equipment and other costs but not overhead and profit expenses for those Change Order items that result in a net value of credit to the contract.
- 27.11 The Owner may change the scope of work of the Project without invalidating the contract. The Owner shall notify the Contractor of a change of the scope of work for the Owner's Contractors, which may affect the work of this Contractor, without invalidating the contract. Change Orders for extension of the time caused by such changes shall be developed at the time of directing the change in scope of work.
- 27.12 The Consultant may order minor changes in the Work, not involving extra cost, which is consistent with the intent of the design or project.
- 27.13 The Contractor shall immediately give written notification to the Consultant of latent conditions discovered at the site which materially differ from those represented in the Drawings or Specifications, and which may eventually result in a change in the scope of work. The Contractor shall suspend work until receiving direction from the Consultant. The Consultant shall promptly investigate the conditions and respond to the Contractor's notice with direction that avoids any unnecessary delay of the Work. The Consultant shall determine if the discovered conditions warrant a Change Order.
- 27.14 The Contractor shall, within ten calendar days of receipt of the information, give written notification to the Consultant if the Contractor claims that instructions by the Consultant will constitute extra cost not accounted for by Change Order or otherwise under the contract. The Consultant shall promptly respond to the Contractor's notice with direction that avoids any

00 72 13
General Conditions

unnecessary delay of the Work. The Consultant shall determine if the Contractor's claim warrants a Change Order.

28. Correction of the Work

- 28.1 The Contractor shall promptly remove from the premises all work the Consultant declares is non-conforming to the contract. The Contractor shall replace the work properly at no expense to the Owner. The Contractor is also responsible for the expenses of others whose work was damaged or destroyed by such remedial work.
- 28.2 The Owner may elect to remove non-conforming work if it is not removed by the Contractor within a reasonable time, that time defined in a written notice from the Consultant. The Owner may elect to store removed non-conforming work not removed by the Contractor at the Contractor's expense. The Owner may, with ten days written notice, dispose of materials which the Contractor does not remove. The Owner may sell the materials and apply the net proceeds, after deducting all expenses, to the costs that should have been borne by the Contractor.
- 28.3 The Contractor shall remedy any defects due to faulty materials or workmanship and pay for any related damage to other work which appears within a period of one year from the date of substantial completion, and in accord with the terms of any guarantees provided in the contract. The Owner shall promptly give notice of observed defects to the Contractor and Consultant. The Consultant shall determine the status of all claimed defects. The Contractor shall perform all remedial work without unjustifiable delay in either the initial response or the corrective action.
- 28.4 The Consultant may authorize, after a reasonable notification to the Contractor, an equitable deduction from the contract amount in lieu of the Contractor correcting non-conforming or defective work.

29. Owner's Right to do Work

- 29.1 The Owner may, using other contractors, correct deficiencies attributable to the Contractor, or complete unfinished work. Such action shall take place only after giving the Contractor three days written notice, and provided the Consultant approves of the proposed course of action as an appropriate remedy. The Owner may then deduct the cost of the remedial work from the amount due the Contractor.
- 29.2 The Owner may act with their sole discretion when the Contractor is unable to take action in emergency situations that potentially effect health, life or serious damage to the premises or adjacent properties, to prevent such potential loss or injury. The Owner shall inform the Contractor of the emergency work performed, particularly where it may affect the work of the Contractor.

30. Termination of Contract and Stop Work Action

- 30.1 The Owner may, owing to a certificate of the Consultant indicating that sufficient cause exists to justify such action, without prejudice to any other right or remedy and after giving the Contractor and the Contractor's surety seven days written notice, terminate the employment of the

00 72 13
General Conditions

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:

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

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

31. Delays and Extension of Time

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

00 72 13
General Conditions

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

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

32. Payments to the Contractor

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

00 72 13
General Conditions

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

33. Payments Withheld

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

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

34. Liens

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

35. Workmanship

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

00 72 13
General Conditions

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

00 72 13
General Conditions

37. Date of Completion and Liquidated Damages

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

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

38. Dispute Resolution

38.1 Mediation

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

00 72 13
General Conditions

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

38.2 Arbitration

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

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

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

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

00 73 46
Wage Determination Schedule

PART 1- GENERAL

1.1 Related Documents

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

1.2 Summary

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

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)

End of Section 00 73 46

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

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

2026 Fair Minimum Wage Rates -- Building 2 Androscoggin County (other than 1 or 2 family homes)

<u>Occupational Title</u>	<u>Minimum Wage</u>	<u>Minimum Benefit</u>	<u>Total</u>
Brickmasons and Blockmasons	\$33.00	\$11.13	\$44.13
Bulldozer Operator	\$30.62	\$5.38	\$36.00
Carpenter	\$30.01	\$19.69	\$49.70
Cement Masons and Concrete Finisher	\$24.42	\$2.52	\$26.94
Construction and Maintenance Painters	\$22.47	\$1.84	\$24.31
Construction Laborer	\$18.66	\$11.38	\$30.04
Conveyor Operators and Tenders	\$30.17	\$13.77	\$43.94
Crane and Tower Operators	\$40.43	\$8.63	\$49.06
Crushing Grinding and Polishing Machine Operators	\$26.15	\$3.24	\$29.39
Earth Drillers - Except Oil and Gas	\$22.81	\$7.62	\$30.43
Electrical Power - Line Installer and Repairers	\$57.50	\$34.35	\$91.85
Electricians	\$38.74	\$21.14	\$59.88
Elevator Installers and Repairers	\$74.17	\$38.44	\$112.61
Excavator Operator	\$34.12	\$6.49	\$40.61
Fence Erectors	\$30.90	\$2.18	\$33.08
Flaggers	\$21.39	\$0.86	\$22.25
Floor Layers - Except Carpet/Wood/Hard Tiles	\$29.00	\$8.65	\$37.65
Glaziers	\$39.32	\$19.22	\$58.54
Hazardous Materials Removal Workers	\$23.00	\$1.37	\$24.37
Heating and Air Conditioning and Refrigeration Mechanics and Installers	\$36.59	\$7.12	\$43.71
Heavy and Tractor - Trailer Truck Drivers	\$29.13	\$3.98	\$33.11
Highway Maintenance Workers	\$23.30	\$1.14	\$24.44
Industrial Machinery Mechanics	\$29.97	\$6.74	\$36.71
Industrial Truck and Tractor Operators	\$24.61	\$4.21	\$28.82
Insulation Worker - Mechanical	\$25.00	\$4.60	\$29.60
Light Truck or Delivery Services Drivers	\$26.79	\$5.14	\$31.93
Loading Machine and Dragline Operators	\$29.71	\$4.79	\$34.50
Millwrights	\$35.99	\$10.52	\$46.51
Mobile Heavy Equipment Mechanics - Except Engines	\$30.67	\$5.10	\$35.77
Operating Engineers and Other Equipment Operators	\$39.74	\$3.67	\$43.41
Paving Surfacing and Tamping Equipment Operators	\$30.74	\$10.67	\$41.41
Pile-Driver Operators	\$37.15	\$3.12	\$40.27
Pipe/Steam/Sprinkler Fitter	\$43.76	\$25.44	\$69.20
Pipelayers	\$28.75	\$3.64	\$32.39
Plumbers	\$40.00	\$24.71	\$64.71
Radio Cellular and Tower Equipment Installers	\$34.72	\$5.63	\$40.35
Reinforcing Iron and Rebar Workers	\$32.94	\$20.82	\$53.76
Riggers	\$27.16	\$21.25	\$48.41
Roofers	\$24.86	\$2.03	\$26.89
Sheet Metal Workers	\$30.22	\$6.70	\$36.92
Structural Iron and Steel Workers	\$32.94	\$25.00	\$57.94
Tapers	\$30.09	\$2.12	\$32.21
Telecommunications Equipment Installers and Repairers - Except Line Installers	\$37.09	\$10.21	\$47.30
Telecommunications Line Installers and Repairers	\$28.49	\$5.29	\$33.78
Tile and Marble Setters	\$28.91	\$5.46	\$34.37

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

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

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

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

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

A true copy

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

Supersedes 02-03-2025
Effective 01-10-2026

SECTION 010000 - DIVISION 01 GENERAL REQUIREMENTS

1.1 DIVISION 1 CONTENTS

- A. Contents
- B. Related Documents
- C. Summary of Work
- D. Allowances
- E. Unit Prices
- F. Applications for Payment
- G. Alternates
- H. Modification Procedures
- I. Project Coordination
- J. Cutting and Patching
- K. Field Engineering
- L. Reference Standards and Definitions
- M. Project Meetings
- N. Submittals
- O. Quality Control Services
- P. Temporary Facilities
- Q. Materials and Equipment
- R. Product Substitutions
- S. Starting of Equipment and System
- T. Project Closeout
- U. Warranties and Bonds

1.2 RELATED DOCUMENTS

- A. General provisions of Contract, including General Conditions apply to this Division and to Contractors, Subcontractors and other persons supplying materials and/or labor, entering into the Project site and/or premises, directly or indirectly.
- B. This Division is intended to provide additional details and procedures for the implementation of requirements prescribed in the Agreement.

1.3 SUMMARY OF WORK

- A. Project Description: The Project shall be known as 250 Goddard Road Renovations.
 - 1. The Project consists of Interior renovation to approximately 1,200 square feet consisting of selected demolition, new partitions, flooring, ceilings, and associated mechanical and electrical modification.
 - a. The Work shall include all labor, materials, supplies, equipment, components and systems required to complete the Project as specified and reasonably inferred by the Contract Documents, without exception, and all Work or portions of the Work normally required by accepted trade practices in projects of similar type, scope and locale, without which the Work could not be completed and without which the Work would not function properly.
 - b. Date of Substantial Completion of the Work shall be December 31, 2026.
 - c. Project location is 250 Goddard Road, Lewiston, ME 04240
 - 2. The Owner is Maine Judicial Branch.
 - 3. The Architect for the Project is Harriman, Auburn Business Park, 46 Harriman Drive, Auburn, Maine 04210. Tel #207-784-5100.
 - 4. The Work will be constructed under a single General Contract for a stipulated Contract Sum.
- B. Contractor Use of Premises: Limit use of the premises to construction activities in areas indicated. Portions of the site beyond areas in which construction operations are indicated are not to be disturbed. Keep all driveways and entrances serving the premises clear at all time.
 - 1. The Owner will occupy the site and existing building during construction. Perform the Work so as not to interfere with the Owners operations and use by patrons and the public.
 - a. Notify Owner at least 48 hours before any temporary interruption of utilities, safety or support systems.
 - 2. Provisions are to be made for the convenience, safety and comfort within all designated usable areas when the building is in operations.
 - 3. Normal working hours for on-site activities shall be 7 AM to 4 PM, Monday through Friday unless otherwise coordinated with the Owner.
 - 4. Keep all driveways, entrances, pathways, and corridors serving the premises clear and available to the Owner. Do not use these areas for parking or material storage without Owner authorization. Schedule deliveries to minimize on-site storage of materials and equipment.
 - a. Construction parking and material storage will be in designated areas only. Location to be determined by owner.

5. Smoking is prohibited anywhere on the premise.
 6. Do not dispose of any material on site, either by burial or by burning.
- C. Use of Existing Building: Maintain building in a weather-tight condition throughout the construction period. Take all precautions necessary to protect the building and its occupants during construction. Repair damage caused by construction operations.
1. Provide dust-proof, insulated, secure barriers between occupied and work areas of building.
 2. Use of existing toilets, wash rooms and other facilities within the existing building will be allowed if authorized by the Owner.
 3. Use of Owners dumpsters will not be allowed.
 4. Keep all building entrances and hallways clear and accessible at all times.
- D. Owner Occupancy Requirements: The Owner will be responsible for operation, maintenance and custodial service for occupied portions of the building.
1. A Certificate of Substantial Completion will be executed for each specific portion of the Work to be occupied prior to Owner occupancy. Mechanical and electrical systems shall be inspected, tested and fully operational prior to occupancy.
 2. Contractor shall obtain a Certificate of Occupancy from local building officials prior to Owner occupancy, if required by local jurisdiction.

1.4 ALLOWANCES

- A. Selected materials and equipment, and in some cases, their installation, may be specified in the Contract Documents by allowances. Allowances are established to defer selection of actual materials and equipment to a later date. Additional requirements, if necessary, will be issued by Change Order.
1. Submit invoices or delivery slips to show quantities of materials delivered to the site for use in fulfilling each allowance.
- B. Contingency Allowances: Use contingency allowance only as directed for the Owner's purposes and only by Change Orders that indicate amounts to be charged to the allowance.
1. The Contractor's related costs for products and equipment ordered by the Owner under the contingency allowance, including delivery, installation, taxes, insurance, and similar costs, are not part of the Contract Sum.
 2. Change Orders authorizing use of funds from the contingency allowance will include Contractor's related costs and reasonable overhead and profit.
 3. At Project closeout, credit unused amounts remaining in the contingency allowance to Owner by Change Order.

1.5 UNIT PRICES

- A. A Unit Price is an amount requested by the Architect and proposed by Bidders on the Bid Form, or subsequently agreed upon, as a price per unit of measurement for materials or services that will be added to or deducted from the Contract Sum by appropriate modification, if the estimated quantities of Work required by the Contract Documents are increased or decreased.
1. Unit prices include all necessary material, plus costs for delivery, installation, insurance, overhead, profit, and applicable taxes.

- B. Measurement and Payment: Refer to individual Specifications for Work that requires establishment of unit prices. Methods of measurement and payment for unit prices are specified in those Specifications.
 - 1. The Owner reserves the right to reject the Contractor's measurement of work-in-place that involves use of established unit prices, and to have this work measured, at the Owner's expense, by an independent surveyor acceptable to the Contractor.
- C. Defect Assessment: If, in the opinion of the Architect, it is not practical to remove and replace Work not conforming to specified requirements, the Owner will direct one of the following remedies:
 - 1. The defective Work may remain, but the unit sum/price will be reduced 50 percent at the discretion of the Owner.
 - 2. The defective Work will be partially repaired to the instructions of the Architect, and the unit sum/price will be adjusted to a new sum/price at the discretion of the Owner.
 - 3. The authority of the Architect to assess the defect, and the Owner to identify payment adjustment, is final.
- D. Non-payment for Rejected Products: Payment will not be made for any of the following:
 - 1. Products wasted or disposed of in a manner that is not acceptable.
 - 2. Products determined as unacceptable before or after placement.
 - 3. Products not completely unloaded from the transporting vehicle.
 - 4. Products placed beyond the lines and levels of the required Work.
 - 5. Products remaining on hand after completion of the Work.
 - 6. Loading, hauling, and disposing of rejected Products.

1.6 APPLICATIONS FOR PAYMENT

- A. Schedule of Values: Submit the fully completed Schedule of Values in a format approved by the Architect to the Architect no later than 7 days before the date scheduled for submittal of the initial Application for Payment.
 - 1. Provide a breakdown of the Contract Sum and subcontract amounts in sufficient detail to facilitate continued evaluation of Applications for Payment, Waivers of Lien, and progress reports.
 - 2. Schedule Updating: Update and resubmit the Schedule of Values prior to the next Applications for Payment when Change Orders or Construction Change Directives result in a change in the Contract Sum.
- B. Applications for Payment: Progress payment dates and the period of construction Work covered by each Application for Payment are indicated in the Agreement.
 - 1. Submit Application for Payment to the Architect so that the Application will be received by the Architect no later than 10 days prior to the indicated date for each progress payment.
 - 2. Payment Application Forms: Use AIA Documents G702 Application and Certification for Payment and G703 Continuation Sheet or another form acceptable to the Architect. Provide documentation and verification as required by Owner.
 - 3. Transmittal: Submit three (3) signed and notarized original copies of each Application for Payment to the Architect by means ensuring receipt within 24 hours. Each copy shall be complete, including waivers of lien and similar attachments.
 - 4. Waivers of Mechanics Lien: With each Application for Payment, submit waivers of mechanics lien from every entity who is lawfully entitled to file a lien related to the Work covered by the Payment.

- a. Immediately upon receipt of each progress payment, Contractor shall execute waiver of mechanics lien for the period of construction covered by the application. Deliver so that Architect receives original executed waiver no later than three (3) days after receipt of payment by Contractor.
 - b. With each Application for Payment for a progress payment, excepting the Initial Application, submit partial waiver of mechanics liens from subcontractors or sub-subcontractors and suppliers for the construction period covered by the previous application.
 - c. When an application shows completion of an item, submit final or full waivers.
 - d. Submit final Application for Payment with or preceded by final waivers from every entity involved with the performance of the Work covered by the application who could lawfully be entitled to a lien.
 - 1) The total amount of each entity's final waiver of lien shall equal the contract sum for that entity including all additions and reductions thereto. Use AIA G706A Contractor's Affidavit of Payment of Release of Liens or another form acceptable to the Architect.
5. Initial Application for Payment: Administrative actions and submittals that must precede or coincide with submittal of the first Application for Payment include the following:
 - a. List of subcontractors, principal suppliers and fabricators.
 - b. Schedule of Values.
 - c. Contractor's Construction Schedule (preliminary if not final).
 - d. List of Contractor's staff assignments.
 - e. Copies of building permits, if required by local jurisdiction.
 - f. Copies of authorizations and licenses from governing authorities for performance of the Work.
 - g. Certificates of insurance and insurance policies.
 - h. Performance and payment bonds (if required).
 - i. Data needed to acquire Owner's insurance.
 - j. Initial settlement survey and damage report, if required.
6. Application for Payment at Substantial Completion: Following issuance of the Certificate of Substantial Completion, submit an Application for Payment. This application shall reflect any Certificates of Partial Substantial Completion issued previously for Owner occupancy of designated portions of the Work.
 - a. Administrative actions and submittals that shall proceed or coincide with this application include the following:
 - 1) Warranties (guarantees) and maintenance agreements.
 - 2) Occupancy permits and similar approvals, if required by local jurisdiction.
 - 3) Test/adjust/balance records.
 - 4) Maintenance instructions.
 - 5) Change-over information related to Owner's occupancy, use, operation and maintenance.
 - 6) Final cleaning.
 - 7) Application for reduction of retainage, and consent of surety.
 - 8) List of incomplete Work, recognized as exceptions to Architect's Certificate of Substantial Completion, if any.
7. Final Payment Application: This application shall reflect Certificates of Partial Substantial Completion issued previously for Owner occupancy of designated portions of the Work.
 - a. Administrative actions and submittals which must precede or coincide with submittal of the final Application for Payment include the following:
 - 1) Completion of Project closeout requirements.

- 2) Completion of items specified for completion after Substantial Completion.
- 3) Assurance that unsettled claims will be settled.
- 4) Assurance that Work not complete and accepted will be completed without undue delay.
- 5) Transmittal of required Project construction records including record drawings to Owner.
- 6) Proof that taxes, fees and similar obligations have been paid.
- 7) Removal of temporary facilities and services.
- 8) Removal of surplus materials, rubbish and similar elements.

1.7 ALTERNATES

- A. An Alternate is an amount proposed by Bidders and stated on the Bid Form for certain construction activities defined in the Bidding Requirements that may be added to or deducted from Base Bid amount if the Owner decides to accept a corresponding change in either the amount of construction to be completed, or in the products, materials, equipment, systems or installation methods described in Contract Documents.
 1. The cost or credit for each alternate is the net addition to or deduction from the Contract Sum to incorporate the Alternate into the Work. Include the net cost of adjusting or modifying adjacent or related Work. No other adjustments are made to the Contract Sum.
- B. Coordination: Coordinate related Work and modify or adjust adjacent Work as necessary to ensure that Work affected by each accepted Alternate is complete and fully integrated into the project.
 1. Include as part of each alternate, miscellaneous devices, accessory objects, and similar items incidental to or required for a complete installation whether or not mentioned as part of the Alternate.
- C. Notification: Immediately following the award of the Contract, prepare and distribute to each party involved, notification of the status of each Alternate. Indicate whether Alternates have been accepted, rejected or deferred for consideration at a later date. Include a complete description of negotiated modifications to Alternates.
- D. Schedule of Values: Submit revised Schedule of Values including adjustments to all Specifications affected by accepted Alternates.

1.8 MODIFICATION PROCEDURES

- A. Minor Changes in the Work
 1. Supplemental instructions authorizing minor changes in the Work, not involving an adjustment to the Contract Sum or Contract Time, may be issued by the Architect on AIA Document G710 Architect's Supplemental Instructions.
- B. Change Order Proposal Requests
 1. Owner-Initiated Proposals: The Architect will issue a detailed description of proposed changes in the Work that will require adjustment to the Contract Sum or Contract Time. If necessary, the description will include supplemental or revised Drawings and Specifications. Proposal requests issued by the Architect are for information only.
 - a. Unless otherwise indicated in the proposal request, within 10 days of receipt of the proposal request, submit to the Architect for the Owner's review an itemized estimate of cost including related costs necessary to execute the proposed change.

- 1) Include a statement indicating the effect the proposed change will have on the Contract Time.
2. Contractor-Initiated Proposal: When latent or other unforeseen conditions require modifications to the Contract, the Contractor may propose changes by submitting a request for a change to the Architect.
 - a. Provide a complete description of proposed change. Indicate the reasons for the change and the effect of the change on the Work. Indicate the effect of the proposed change on the Contract Sum and Contract Time.
 - b. Include an itemized list of products required and unit costs along with the total amount of purchases to be made. Where requested, furnish survey data to substantiate quantities. Indicate applicable taxes, delivery charges, equipment rental, and amounts of trade discounts.
 - c. Comply with requirements for product substitutions if the proposed change in the Work requires the substitution of one product or system for a product or system specified.
- C. Allowances: For allowance-cost adjustment, base Change Order Proposals on the difference between the purchase amount and the allowance, multiplied by the measurement for work-in-place. Allow for cutting losses, tolerances, mixing wastes, normal product imperfections and similar margins. Include installation costs only where indicated as part of the allowance.
 1. The Owner reserves the right to establish the actual quantity of work-in-place by independent quantity survey, measure, or count.
 2. Submit claims for increased costs because of a change in the scope or nature of the allowance, whether for purchase order amount or Contractor's handling, labor, installation, overhead and profit. Submit claims within 21 days of receipt of authorization to proceed. The Owner will reject claims submitted later than 21 days.
 - a. Do not include the Contractor's or Subcontractor's indirect expense in the cost amount except when it is clearly demonstrated that either the nature or scope of the Work required was changed from that which could be foreseen from the description of the allowance and other information in the Contract Documents.
 - b. No change to the Contractor's indirect expense is permitted for selection of higher- or lower-priced materials or systems of the same scope and nature as originally indicated.
- D. Construction Change Directive: When the Owner and Contractor are not in total agreement on the terms of a Change Order Proposal Request, the Architect may issue a Construction Change Directive on AIA G714 Construction Change Directive, instructing the Contractor to proceed with a change in the Work, for subsequent inclusion in a Change Order.
 1. Documentation: Maintain detailed records on a time and material basis of work required by the Construction Change Directive. After completion of the change, submit an itemized account and supporting data necessary to substantiate cost and time adjustments to the Contract.
- E. Change Order Procedures: Upon the Owner's approval of a Change Order Proposal Request, the Architect or the General Contractor if so required by the Architect, will issue a Change Order on AIA G701 Change Order for signatures of the Owner and Contractor, as provided in the Conditions of the Contract.
 1. Provide minimum of three (3) original copies with documentation, as required by Architect.

1.9 PROJECT COORDINATION

- A. Layout: The Contractor is responsible for all layout of all Work, even if such layout is done by others. The Contractor's responsibility includes but is not necessarily limited to levels, base lines, reference points, siting of building and other improvements, locations of components, fixtures, equipment, finishes, site improvements, etc.
- B. Coordination: The Contractor shall coordinate construction activities included under various Sections of these Specifications to assure efficient and orderly installation of each part of the Work. The Contractor shall also coordinate construction operations included under different Specifications that are dependent upon each other for proper installation, connection, inspections and approvals, accessibility and operation.
- C. Superintendent: The Contractor's superintendent shall be on site at any time Work is being done.
- D. On-Site Documents: The Contractor shall provide in a visible and accessible location on-site:
 - 1. Complete, currently updated set of Specifications and Drawings, Change Orders and other Modifications, approved Shop Drawings, Product Data, Samples and similar submittals.
 - 2. Permits and notifications required by law, regulation, etc.
 - 3. List of Owner, Architect, Contractor, superintendent, subcontractors, etc. Include name of contact person, telephone and email address. Include telephone numbers for police, ambulance and fire departments.
- E. Administrative Procedures: The Contractor shall coordinate scheduling and timing of required administrative procedures with other construction activities to avoid conflicts and ensure orderly progress of the Work.
- F. General Installation Provisions
 - 1. Inspection of Conditions: Require the Installer of each major component to inspect both the substrate and conditions under which Work is to be performed. Do not proceed until unsatisfactory conditions have been corrected to meet acceptable industry standards.
 - a. Should Contractor direct and require Installer to perform Work without correction of such unsatisfactory condition, Contractor shall be responsible for correction of any unacceptable Work resulting from conducting Work in such unsatisfactory condition.
 - 2. Recheck field measurements and dimensions, before starting each installation.
 - 3. Provide blocking, reinforcement, attachment and connection devices and methods necessary for securing Work. Secure Work true to line and level. Allow for expansion and building movement including any required expansion plate or device even if not detailed or shown.
 - 4. Mounting Heights: Where mounting heights are not indicated, install individual components at standard mounting heights recognized within the industry for the particular application indicated. Refer questionable mounting height decisions to the Architect for final decision.
 - a. Where required, mounting heights shall meet all requirements for the handicapped, as prescribed by the Americans with Disabilities Act (ADA).

5. Alteration Projects: Remove, cut, and patch Work in a manner to minimize damage, to provide smooth transitions, and to provide means of restoring Products and finishes to specified condition.
 - a. When finished surfaces are cut so that a smooth transition with new Work is not possible, terminate existing surface along a straight line at a natural line of division and submit recommendation to Architect/Engineer for review.
 - b. Patch or replace portions of existing surfaces which are damaged, lifted, discolored, or showing other imperfections.
6. During handling and installation, clean and protect construction in progress and adjoining materials in place. Apply protective covering where required to ensure protection from damage or deterioration at Substantial Completion.
 - a. Control accumulation of waste materials and rubbish. Remove from work areas at least daily.
 - b. Control dust and debris from construction work at all times so it will not adversely effect the condition of adjacent areas. Abutting areas and streets will be swept and kept clean of debris.
 - c. All temporary enclosures shall protect occupants, existing building and adjoining buildings, to minimize noise, dust, odors, rain, heat and cold from entering the existing buildings.
 - d. Clean and maintain completed construction as frequently as necessary through the remainder of the construction period. Adjust and lubricate operable components to ensure operability without damaging effects.
7. Limiting Exposures: Supervise construction activities to ensure that no part of the construction, completed or in progress, is subject to harmful, dangerous, damaging, or otherwise deleterious exposure during the construction period.

1.10 CUTTING AND PATCHING

- A. General: Employ skilled workmen to perform cutting and patching. Proceed with cutting and patching at the earliest feasible time and complete without delay. Cutting and patching is required for correction of installed work and repairs due to testing.
- B. Cutting and Patching Proposal: Where approval of procedures is required before proceeding, submit a proposal describing procedures in advance of the time cutting and patching will be performed and request approval to proceed.
 1. Approval by the Architect to proceed does not waive the Architect's right to later require complete removal and replacement of Work found to be unsatisfactory.
- C. Structural Work: Do not cut and patch structural elements in a manner that would reduce the load-carrying capacity or load deflection ratio. Obtain approval before cutting and patching structural elements.
- D. Operational and Safety Limitations: Do not cut and patch operating elements or safety components in a manner that would reduce their capacity to perform as intended, or would increase maintenance, or decrease operational life or safety. Obtain approval before cutting and patching operating elements or safety related systems.
- E. Visual Requirements: Do not cut and patch construction exposed on the exterior or in occupied spaces, in a manner that would, in the Architect's opinion, reduce the building's aesthetic qualities, or result in visual evidence of cutting and patching. Remove and replace Work cut and patched in a visually unsatisfactory manner.

- F. Materials: Use materials identical to existing materials. If identical materials are not available or cannot be used where exposed surfaces are involved, use materials that match existing adjacent surfaces to the fullest extent possible. Use materials whose performance will equal or surpass that of existing materials.
- G. Inspection: Before cutting existing surfaces, examine surfaces to be cut and patched and conditions under which cutting and patching is to be performed. Take corrective action before proceeding, if unsafe or unsatisfactory conditions are encountered.
 - 1. Beginning of cutting or patching means acceptance of existing conditions.
- H. Temporary Support: Provide temporary support of Work to be cut.
- I. Protection: Protect existing construction during cutting and patching to prevent damage. Provide protection from adverse weather conditions for portions of the Project that might be exposed during cutting and patching operations.
- J. Cutting: Cut existing construction using methods least likely to damage elements to be retained or adjoining construction. Where possible review procedures with the original installer; comply with the original installer's recommendations.
- K. Patching: Patch with durable seams that are as invisible as possible. Comply with specified tolerances.
 - 1. At penetrations of fire-rated walls, partitions, ceiling, or floor construction, completely seal voids with fire-rated or fire-resistant materials to full thickness of penetrated element.
- L. Cleaning: Thoroughly clean areas and spaces where cutting and patching is performed or used as access. Remove completely paint, mortar, oils, putty and similar items. Thoroughly clean piping, conduit and similar features before painting or finishing is applied. Restore damaged pipe covering to its original condition.

1.11 FIELD ENGINEERING

- A. The Architect has established such general reference or control points as will, in his judgment, enable the Contractor to proceed with the work.
- B. Contractor will be responsible for costs of survey work including but not necessarily limited to establishment of control points, additional base lines or levels, reference points, location of site improvements, etc.
- C. Verify layout information shown on the Drawings before proceeding to layout the Work. Locate and protect existing benchmarks and control points established by Owner. Preserve permanent reference points during construction.
- D. Existing utilities and equipment: The existence and location of underground and other utilities and construction indicated as existing are not guaranteed. Before beginning sitework, investigate and verify the existence and location of underground utilities and other construction.
 - 1. DigSafe: Contact DigSafe within 10 days of executing Contract and prior to any excavation Work on site.

- E. Building Lines and Levels: Set lines and levels at each story of construction floor and roof and elsewhere as needed to properly locate each element of the Project. Calculate and measure required dimensions within indicated or recognized tolerances. Do not scale Drawings to determine dimensions.
 - 1. Locate and lay out batter boards for structures, building foundations, column grids and locations, floor levels and control lines and levels required for mechanical and electrical Work.
- F. Site Improvements: Locate and lay out site improvements, including pavements, stakes for grading, fill and topsoil placement, utility slopes and invert elevations by instrumentation and similar appropriate means.
- G. Surveyor's Log: Maintain a surveyor's log of control and other survey Work. Make this log available for reference.
 - 1. Record deviations from required lines and levels, and advise the Architect when deviations that exceed indicated or recognized tolerances are detected. On Project Record Drawings, record deviations that are accepted and not corrected.

1.12 REFERENCE STANDARDS & DEFINITIONS

- A. General: Basic Contract definitions are included in the Conditions of the Contract. Definitions specific to individual Specifications are included in the appropriate Specification.
 - 1. Inspect. Inspection when used in conjunction with the Architect's activities is the visual observation of construction to permit the Architect to render his/her professional opinion as to whether the Contractor is performing the Work in a manner indicating that, when completed, the Work will be in accordance with the Contract Documents. Such observations shall not be relied upon by any party as acceptance of the Work, nor shall they relieve any party from fulfillment of customary and contractual responsibilities and obligations.
 - 2. Certify. Certification when used in conjunction with the Architect's observation of the Site and the work means the Architect's opinion based on his/her observation of conditions, knowledge, information and beliefs. It is expressly understood that the Architect's certification of a condition's existence relieves no other party of any responsibility or obligation he/she has accepted by contract or custom.
 - 3. Furnish means supply and deliver to the Project site, ready for unloading, unpacking, assembly, installation, and similar operations.
 - 4. Install describes operations at the Project site including the actual unloading, unpacking, assembly, erection, placing, anchoring, applying, working to dimension, finishing, curing, protecting, cleaning, and similar operations.
 - 5. Provide means to furnish and install, complete and ready for the intended use.
- B. Specifications
 - 1. References: Refer to references to specific Articles or Paragraphs of the Agreement or to related Specifications are provided as a convenience to the Contractor to facilitate locating of relevant requirements, procedures, or Work. The references given may not be complete or may not be the only ones affecting the particular Specification or Paragraph wherein the reference is located.
 - a. The Contractor remains responsible for locating and complying with all relevant requirements and procedures specified in the Contract Documents.
 - 2. Industry Standards: Except where the Contract Documents include more stringent requirements, applicable construction industry standards have the same force and effect

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

- a. Copies of Standards: Each entity engaged in construction on the Project is required to be familiar with industry standards applicable to its construction activity. Where copies of standards are needed to perform a required construction activity, each entity is responsible for obtaining copies of each standard from the publication source.
3. Governing Regulations and Regulations: The Architect has contacted authorities having jurisdiction where necessary to obtain information to prepare Contract Documents. Contact authorities having jurisdiction directly for information and decisions regarding the Work.
4. Permits, Licenses, and Certificates: For the Owner's records, submit copies of permits, licenses, certifications, inspection reports, releases, jurisdictional settlements, notices, receipts for fee payments, judgments, and similar documents, correspondence, and records established in conjunction with compliance with standards and regulations bearing upon performance of the Work.

1.13 PROJECT MEETINGS

- A. Preconstruction Conference: The General Contractor shall schedule a preconstruction conference and organizational meeting at the Project site or other convenient location no later than 15 days after the Notice to Proceed and prior to commencement of construction activities. Conduct the meeting to review responsibilities and personnel assignments. The Architect will review Contract requirements.
 1. Attendees: The Owner, Architect and their appropriate consultants, the General Contractor and his superintendent, major subcontractors, and other concerned parties shall each be represented at the conference by persons familiar with and authorized to conclude matters relating to the Work.
 2. Reporting: No later than 3 days after the Preconstruction Conference, the General Contractor shall submit a draft report to the Architect for review. After revision by the Architect, if any, the General Contractor shall distribute copies of minutes of the meeting to each party present and to other parties who should have been present.
- B. Pre-Installation Conferences: The General Contractor shall conduct a pre-installation conference at the site before each construction activity that requires coordination with other construction. The Installer and representatives of manufacturers and fabricators involved in or affected by the installation, and its coordination or integration with other materials and installations that have preceded or will follow, shall attend the meeting. Advise the Architect of scheduled meeting dates.
 1. The General Contractor shall record significant discussions and agreements and disagreements of each conference, along with the approved schedule, and then distribute the record of the meeting to everyone concerned, promptly, including the Owner and Architect.
 - a. Do not proceed if the conference cannot be successfully concluded. Initiate whatever actions are necessary to resolve impediments to performance of Work and reconvene the conference at the earliest feasible date.
- C. Progress Meetings: The General Contractor shall conduct progress meetings at the Project site at regularly scheduled intervals. Notify the Owner and Architect of scheduled meeting dates. Coordinate dates of meetings with preparation of the payment requests.

1. Attendees: In addition to representatives of the Owner and the Architect, each subcontractor, supplier or other entity concerned with current progress or involved in planning, coordination or performance of future activities shall be represented at these meetings by persons familiar with the Project and authorized to conclude matters relating to progress, as required by Agenda items.
 2. Agenda: Review and correct or approve minutes of the previous progress meeting. Review other items of significance that could affect progress, including items not resolved at previous meetings. Review the General Contractor's construction schedule. Include topics for discussion as appropriate to the current status of the Project.
 3. Reporting: No later than 3 days after each progress meeting date, the General Contractor shall submit a draft report to the Architect for review. After revision by Architect, if any, the General Contractor shall distribute copies of minutes of the meeting to each party present and to other parties who should have been present.
 - a. Include a brief summary, in narrative form, of progress of Work since the previous meeting and report.
 - b. Do not remove items from reports until they have been resolved.
 4. Schedule Updating: The General Contractor shall revise the construction schedule after each progress meeting where revisions to the schedule have been made or recognized, and issue the revised schedule concurrently with the report of each meeting.
- D. Special Attendance at Meetings: The Owner, Owner's Designated Representative or Architect may require the attendance of a particular party or parties at any project meeting or conference.

1.14 SUBMITTALS

- A. Submittal Procedures: The General Contractor will be responsible for the completeness of all submittals. Specified items shall be clearly marked and indicated of each submittal. Unnecessary, extraneous, superficial and otherwise unusable information shall be removed or clearly marked to indicate what is and is not intended as part of the submittal.
1. Do not proceed with Work requiring submittal and review of Shop Drawings, Product Data, Samples or similar submittals prior to receiving approval from the Architect.
 2. Forms: Use AIA forms as specified, or where specifically noted provide forms conveying the same information as the specified AIA form for approval of the Architect prior to any use.
 3. Coordination: Coordinate preparation and processing of submittals with performance of construction activities. Transmit each submittal sufficiently in advance of performance of related construction activities to avoid delay.
 4. Processing: Allow sufficient review time so that installation will not be delayed as a result of the time required to process submittals, including time for resubmittal.
 - a. No extension of Contract Time will be authorized because of failure to transmit submittals to the Architect sufficiently in advance of the Work to permit processing.
 5. Submittal Preparation: Place a permanent label or title block on each submittal for identification. Indicate the name of the entity that prepared each submittal on the label or title block.
 - a. Use arrows or similar means to designate items. Do not use highlighter as it does not copy or reproduce.
 6. Submittal Transmittal: Package each submittal appropriately for transmittal and handling. Transmit each submittal from General Contractor to Architect using a transmittal form. Submittals received from sources other than the General Contractor will be returned without action.

- a. Transmittal Form: Use AIA G810, or another form acceptable to the Architect.
 7. Resubmittals: Identify all changes made since previous submission.
 8. Prepare and submit submittals required by individual Specification Sections. Types of submittals are indicated in individual Specification Sections.
 9. Submit electronic submittals by either of the following methods:
 - a. Via email as PDF electronic file to constructadmin@harriman.com.
 - 1) Architect will return annotated file. Annotate and retain one copy of file as an electronic Project record document file.
 - b. Post electronic submittals as PDF electronic files directly to Architect's FTP site specifically established for Project.
 - 2) Architect will return annotated file. Annotate and retain one copy of file as an electronic Project record document file.
- B. General Contractor's Construction Schedule
1. Bar-Chart Schedule: Prepare a fully developed, simple, readable, horizontal bar-chart type General Contractor's construction schedule showing data for entire construction period in a format acceptable to the Architect. Submit within 15 days of the date established for Commencement of the Work.
 2. Distribution: Following response to the initial submittal, print and distribute copies to the Architect, Owner, subcontractors, and other parties required to comply with scheduled dates. Post copies in the Project meeting room and temporary field office.
 - a. When revisions are made, distribute to the same parties and post in the same locations. Delete parties from distribution when they have completed their assigned portion of the Work and are no longer involved in construction activities.
 3. Schedule Updating: Revise the schedule at appropriate intervals, where revisions have been recognized or made. Issue the updated schedule at the following meeting.
- C. Construction Reports
1. The General Contractor's superintendent shall maintain an on-site daily construction log, recording information concerning events at the site. Allow access to the Owner and Architect for review.
- D. Shop Drawings: Shop Drawings include fabrication and installation drawings, setting diagrams, schedules, patterns, templates and similar drawings.
1. Submit newly prepared information, drawn to accurate scale. Highlight, encircle, or otherwise indicate deviations from the Contract Documents. Do not reproduce Contract Documents or copy standard information as the basis of Shop Drawings. Standard information prepared without specific reference to the Project is not considered Shop Drawings.
- E. Electronic Submittals: Architect is using Newforma software to process electronic submittals. Submittals must be sent for review individually (one submittal per email). Identify and incorporate information in each electronic submittal file as follows:
1. Assemble complete submittal package into single files incorporating submittal requirements of a single specification section and transmittal form.
 - a. Provide a separate transmittal form for Product Data, a separate transmittal form for Shop Drawings, and a separate transmittal form for Informational Submittals required by each Specification Section.
 - b. Maximum File Size: A single file size, up to 18 MB can be received. Contact Architect for instructions if file exceeds 18 MB.

- c. For each transmittal, attach one single PDF only. Where multiple PDFs are required for a transmittal, utilize a combine feature to merge the PDFs into a single PDF.
 - 1) Unacceptable Formats: In order to process the transmittals in Newforma, the single PDF file protocol must be followed. Transmittals zip files or grouped PDFs cannot be electronically processed and will be returned without action for correction and resubmittal.
 - 2) Submittals will be returned without action for correction and resubmittal if:
 - a) Submittal does not have an electronic Transmittal Form.
 - b) Multiple specification sections are contained within a single Transmittal form. Submittals must be separated into individual Specification Sections.
 - c) Submittal does not include the Contractors' signed reviewed stamp
- F. Coordination Drawings: Coordination drawings are a special type of Shop Drawing that show the relationship and integration of different construction elements that require careful coordination during fabrication or installation to fit in the space provided or function as intended.
 - 1. Submit coordination Drawings for integration of different construction elements. Show sequences and relationships of separate components to avoid conflicts in use of space.
 - a. Submit three (3) black-line prints; two (2) will be returned.
- G. Approval Drawings: Whenever General Contractor or subcontractor is required to submit Shop Drawings to an authority having jurisdiction over the Project for review and approval of a particular component or system, prior to starting on-site work General Contractor shall submit to the Architect 1 copy of the approved Shop Drawing including the authorities stamp and approving signature.
- H. Record Drawings: Record drawings shall be required of all mechanical and electrical systems contractors and subcontractors, and other contractors as required by the Architect. Take special care to indicate all buried items such as connections, fittings, splices, etc.
 - 1. Mark drawings Record Drawings and include date, who by, and initials of persons making drawings.
 - 2. Submit one (1) reproducible print.
- I. Product Data
 - 1. Products Specified by Manufacturer and Model Number: For products specifically indicated by manufacturer and model number which will be provided as specified with no deviations, submit for approval a letter for each product certifying that it will be provided as specified with no deviations from Contract Documents. Also submit product data at time of Project completion as required for project closeout. For all other products, submit product data as required below.
 - 2. Collect Product Data into a single submittal for each element of construction or system. Product Data includes printed information such as manufacturer's installation instructions, catalog cuts, material test reports, standard color charts, roughing-in diagrams and templates, standard wiring diagrams and performance curves. Where Product Data must be specially prepared because standard printed data is not suitable for use, submit as Shop Drawings.
 - a. Mark each copy to show applicable choices and options. Where printed Product Data includes information on several products, some of which are not required, mark copies to indicate the applicable information.

- b. Distribution: Furnish copies of final submittal to installers, subcontractors, suppliers, manufacturers, fabricators, and others required for performance of construction activities. Show distribution on transmittal forms.
 - 1) Do not proceed with installation until an applicable copy of Product Data is in the installer's possession.
- J. Samples: Unless otherwise directed by the Architect, submit full-size, fully fabricated samples cured and finished as specified and physically identical with the material or product proposed. Samples include partial sections of manufactured or fabricated components, cuts or containers of materials, and color range sets showing color, texture and pattern.
 - 1. Submit Samples for review of kind, color, pattern, and texture, for a final check of these characteristics with other elements, and for a comparison of these characteristics between the final submittal and the actual component as delivered and installed.
 - a. Where variation in color, pattern, texture or other characteristics are inherent in the material or product represented, submit multiple units (not less than 3), that show approximate limits of the variations.
 - 2. Preliminary Samples: Where Samples are for selection of color, pattern, texture, or similar characteristics from a range of standard choices, submit a full set of choices for the material or product.
 - 3. Submittals: Except for Samples illustrating assembly details, workmanship, fabrication techniques, connections, operation and similar characteristics, submit four (4) sets; two (2) will be returned marked with the action taken.
 - a. Maintain sets of Samples, as returned, at the Project site, for quality comparisons throughout the course of construction.
 - b. Distribution of Samples: Prepare and distribute additional sets to subcontractors, manufacturers, fabricators, suppliers, installers, and others as required for performance of the Work. Show distribution on transmittal forms.
 - 4. Field Samples: Field Samples specified in individual Sections are special types of Samples. Field Samples are full-size examples erected on site to illustrate finishes, coatings, or finish materials and to establish the standard by which the Work will be judged.
 - a. Comply with submittal requirements to the fullest extent possible. Process transmittal forms to provide a record of activity.
- K. Manufacturer's Instructions: When specified in individual Specifications or specifically requested by Architect, submit printed instructions for delivery, storage, assembly, installation, start-up, adjusting and finishing, to Architect/Engineer in quantities specified for Product Data.
- L. Architect's Action: Except for submittals for record, information or similar purposes, where action and return is required or requested, the Architect will review each submittal, mark to indicate action taken, and return promptly.
- M. 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 appropriate mark to indicate status.
 - 1. The Architect's marking of "Reviewed, Furnish as Corrected or similar verbiage means submittal has been reviewed for general conformance to the contract documents only and does not mean unqualified acceptance. The Contractor is fully responsible for compliance with the contract documents.

- N. 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.
- O. Partial submittals prepared for a portion of the Work will be reviewed when use of partial submittals has received prior approval from Architect.
- P. Incomplete submittals are unacceptable, will be considered nonresponsive, and will be returned for resubmittal without review.
- Q. Submittals not required by the Contract Documents will be returned by the Architect without action.
- R. Quality control services include inspections and tests and related actions including reports, performed by independent agencies, governing authorities, and the General Contractor. They do not include Contract enforcement activities performed by the Architect.
- S. Inspection and testing services are required to verify compliance with requirements specified or indicated. These services do not relieve the General Contractor of responsibility for compliance with Contract Document requirements.
- T. Requirements of this Section relate to materials, fabrication and installation procedures that are customized to meet Project requirements, not production of standard products.
 - 1. Specific quality control requirements for individual construction activities are specified in the Sections that specify those activities. Those requirements, including inspections and tests, cover production of standard products as well as customized fabrication and installation procedures.
 - 2. Inspections, test and related actions specified are not intended to limit the General Contractor's quality control procedures that facilitate compliance with Contract Document requirements.
 - 3. Requirements for the General Contractor to provide quality control services required by the Architect, Owner, or authorities having jurisdiction are not limited by provisions of this Section.
- U. Responsibilities
 - 1. General Contractor Responsibilities: The General Contractor shall provide inspections, tests and similar quality control services, specified in individual Specifications and required by governing authorities including those specified to be performed by an independent agency and not by the General Contractor, except where they are specifically indicated to be the Owner's responsibility, or are provided by another identified entity. Costs for these services are included in the Contract Sum.
 - a. Retesting: The General Contractor is responsible for retesting where results of required inspections, tests or similar services prove unsatisfactory and do not indicate compliance with Contract Document requirements, regardless of whether the original test was the General Contractor's responsibility.
 - 1) Cost of retesting construction revised or replaced by the General Contractor is the General Contractor's responsibility, where required tests were performed on original construction.
 - b. Associated Services: The General Contractor shall cooperate with agencies performing required inspections, tests and similar services and provide reasonable

- auxiliary services as requested. Notify the agency sufficiently in advance of operations to permit assignment of personnel.
2. Owner Responsibilities: The Owner will provide inspections, tests and similar quality control services specified to be performed by independent agencies and not by the General Contractor, except where they are specifically indicated as the General Contractor's responsibility or are provided by another identified entity. Costs for these services are not included in the Contract Sum.
 - a. The Owner will engage and pay for the services of an independent agency, testing laboratory or other qualified firm to perform inspections and tests specified as the Owner's responsibility.
 - 1) Such inspections and tests may include, but may not be limited to the following:
 - a) Analysis of fill and topsoil materials.
 - b) Soils compaction.
 - c) Bituminous paving mix design and compaction.
 - d) Concrete reinforcement.
 - e) Cast-in-place concrete.
 - f) Mortar and grout.
 - g) Unit masonry.
 - h) Structural steel.
 - i) Roofing.
 - j) Other testing required under individual Specifications.
 3. Duties of the Testing Agency: The independent testing agency engaged to perform inspections, sampling and testing of materials and construction specified in individual Specifications shall cooperate with the Architect and General Contractor in performance of its duties, and shall provide qualified personnel to perform required inspections and tests.
 - a. The agency shall notify the Architect and General Contractor promptly of irregularities or deficiencies observed in the Work during performance of its services.
 - b. The agency is not authorized to release, revoke, alter or enlarge requirements of the Contract Documents, or approve or accept any portion of the Work.
 - c. The agency shall not perform any duties of the General Contractor.
 4. Coordination: The General Contractor and each testing agency shall coordinate the sequence of activities to accommodate required services with a minimum of delay and to avoid the necessity of removing and replacing construction to accommodate inspections and tests.
 - a. The Owner and General Contractor, in cooperation, are responsible for scheduling times for inspections, tests, taking samples and similar activities.
- V. Submittals: The independent testing agency shall submit certified written reports of each inspection, test or similar service, to the Architect and Structural Engineer, unless the General Contractor is responsible for the service. If the General Contractor is responsible for the service, submit a certified written report of each inspection, test or similar service through the General Contractor, in duplicate. The testing agency shall submit its report within twenty four (24) hours of the service provided.
- W. Qualification for Service Agencies: Engage inspection and testing service agencies, including independent testing laboratories, which are pre-qualified as complying with AREcommended Requirements for Independent Laboratory Qualification by the American Council of

Independent Laboratories, and which specializes in the types of inspections and tests to be performed.

1. Each independent inspection and testing agency engaged on the Project shall be authorized by authorities having jurisdiction to operate in the State in which the Project is located.

X. Repair and Protection: Upon completion of inspection, testing, sample-taking and similar services, the General Contractor shall repair damaged construction and restore substrates and finishes to eliminate deficiencies, including deficiencies in visual qualities of exposed finishes.

1. Protect construction exposed by or for quality control service activities, and protect repaired construction.
2. Repair and protection is the General Contractor's responsibility, regardless of the assignment of responsibility for inspection, testing or similar services.

1.15 TEMPORARY FACILITIES

A. Submittals: Submit reports of tests, inspections, meter readings and similar procedures performed on temporary utilities.

B. Quality Assurance

1. Regulations: Comply with industry standards and applicable laws and regulations of authorities having jurisdiction.
2. Standards: Comply with NFPA Code 241, Building Construction and Demolition Operations, ANSI-A10 Series standards for Safety Requirements for Construction and Demolition, and NECA 200-2106.
 - a. Electrical Service: Comply with NEMA, NECA and UL standards and regulations for temporary electric service. Install service in compliance with National Electric Code (NFPA 70) and utility company regulations.
3. Inspections: Arrange for authorities having jurisdiction to inspect and test each temporary utility before use. Obtain required certifications and permits.

C. Conditions of Use: Keep temporary services and facilities clean and neat in appearance. Operate in a safe and efficient manner. Take necessary fire prevention measures. Do not overload facilities, or permit them to interfere with progress. Do not allow hazardous dangerous or unsanitary conditions, or public nuisances to develop or persist on the site.

D. General Installation: Provide each facility ready for use when needed to avoid delay. Maintain and modify as required. Do not remove until facilities are no longer needed, or are replaced by authorized use of completed permanent facilities.

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

E. Temporary Utility Installation: Engage the appropriate local utility company to install temporary service or connect to existing service. Where the company provides only part of the service, provide the remainder with matching, compatible materials and equipment; comply with the company's recommendations.

1. Use Charges: Cost or use charges for temporary facilities are not chargeable to the Owner or Architect, and will not be accepted as a basis of claims for a Change Order.
2. Water Service: Contractor may use existing water service and use charges will be paid by Owner. Coordinate with Owner prior to connection.

3. Temporary Electric Power Service: Contractor may use existing electrical service and use charges will be paid by Owner. Coordinate with Owner prior to connection.
 4. Temporary Lighting: Install and operate temporary lighting that will fulfill security and protection requirements, without operating the entire system, and will provide adequate illumination for construction operations and traffic conditions.
- F. Temporary Construction and Support Facilities Installation: Locate facilities and other temporary construction and support facilities for easy access.
1. Temporary Heat: Provide temporary heat required by construction activities, for curing or drying of completed installations or protection of installed construction from adverse effects of low temperatures or high humidity. Select safe UL or FM labeled equipment that will not have a harmful effect on completed installations or elements being installed. Coordinate ventilation requirements to produce the ambient condition required and minimize consumption of energy.
 - a. Heating Facilities: Except where use of the permanent system is authorized, provide vented self-contained LP gas or fuel oil heaters with individual space thermostatic control.
 - 1) Prohibited Heaters: Use of gasoline-burning space heaters, open flame, or salamander type heating units is prohibited.
 2. Temporary Ventilation: Ventilate enclosed areas to achieve curing of materials, to dissipate humidity, and to prevent accumulation of dust, fumes, vapors, or gases.
 3. Parking: Arrange with Owner for temporary parking areas to accommodate construction personnel and visitors.
 4. Temporary Enclosures: Provide temporary enclosures for protection of construction in progress and completed, from exposure, foul weather, other construction operations and similar activities.
 - a. Where heat is needed and the permanent building enclosure is not complete, provide temporary enclosures where there is no other provision for containment of heat. Coordinate enclosure with ventilating and material drying or curing requirements to avoid dangerous conditions and effects.
 - b. Close openings through floor or roof decks and horizontal surfaces with load-bearing wood-framed construction.
 5. Temporary Lifts and Hoists: Provide facilities for hoisting materials and employees. Truck cranes and similar devices used for hoisting materials are considered "tools and equipment" and not temporary facilities.
 6. Project Identification and Temporary Signs: Prepare project identification and other signs of the size indicated. Do not permit installation of unauthorized signs.
 7. Collection and Disposal of Waste: Collect waste from construction areas and elsewhere daily. Comply with requirements of NFPA 241 for removal of combustible waste material and debris. Enforce requirements strictly. Handle hazardous, dangerous, or unsanitary waste materials separately from other waste by containerizing properly. Dispose of material in a lawful manner.
 - a. Empty dumpster when full. Do not overfill or allow debris to blow around area. Keep area around dumpster free of trash, glass, nails, etc.
 - b. Burying or burning of waste materials on the site will not be permitted. Washing waste materials down sewers or into drainage waterways will not be permitted.
- G. Security and Protection Facilities Installation
1. Except for use of permanent fire protection as soon as available, do not change over from use of temporary security and protection facilities to permanent facilities until Substantial Completion, or longer as requested by the Architect.

2. Temporary Fire Protection: Until fire protection needs are supplied by permanent facilities, install and maintain temporary fire protection facilities of the types needed to protect against reasonably predictable and controllable fire losses. Comply with NFPA 10 Standard for Portable Fire Extinguishers and NFPA 241 Standard for Safeguarding Construction, Alterations and Demolition Operations.
 - a. Locate fire extinguishers where convenient and effective for their intended purpose, but not less than one extinguisher on each floor at or near each usable stairwell.
 - b. Maintain unobstructed access to fire extinguishers, temporary fire protection facilities, stairways and other access routes for fighting fires.
3. Permanent Fire Protection: At the earliest feasible date in each area of the Project, complete installation of the permanent fire protection facility, including connected services, and place into operation and use. Instruct key personnel on use of facilities.
4. Partitions and Closures: Erect and maintain dust-proof partitions and closures as required to prevent spread of dust or fumes to occupied portions of the building(s) prior to beginning any demolition work. Temporary partitions and closures shall not block means of egress for existing buildings.
5. Barricades, Warning Signs and Lights: Comply with standards and code requirements for erection of structurally adequate barricades. Paint with appropriate colors, graphics and warning signs to inform personnel and the public of the hazard being protected against. Where appropriate and needed, provide lighting, including flashing red or amber lights.
6. Security Enclosure and Lockup: Install substantial temporary enclosure of partially completed areas of construction. Provide locking entrances to prevent unauthorized entrance, vandalism, theft and similar violations of security.
 - a. Storage: Where materials and equipment must be stored, and are of value or attractive for theft, provide a secure lockup. Enforce discipline in connection with the installation and release of material to minimize the opportunity for theft and vandalism.
7. Environmental Protection: Provide protection, operate temporary facilities and conduct construction in ways and by methods that comply with environmental regulations, and minimize the possibility that air, waterways and subsoil might be contaminated or polluted, or that other undesirable effects might result. Avoid use of tools and equipment which produce harmful noise. Restrict use of noise making tools and equipment to hours that will minimize complaints from persons or firms near the site.

H. Operation, Termination and Removal

1. Supervision: Enforce strict discipline in use of temporary facilities. Limit availability of temporary facilities to essential and intended uses to minimize waste and abuse.
2. Maintenance: Maintain facilities in good operating condition until removal. Protect from damage by freezing temperatures and similar elements.
3. Termination and Removal: Unless the Architect requests that it be maintained longer, remove each temporary facility when the need has ended, or when 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 the temporary facility. Repair damaged Work, clean exposed surfaces and replace construction that cannot be satisfactorily repaired.
 - a. Materials and facilities that constitute temporary facilities are property of the Contractor.
 - b. At Substantial Completion, clean and renovate permanent facilities that have been used during the construction period, including but not limited to:

1.16 MATERIALS AND EQUIPMENT

A. Submittals

1. Schedule of Long Lead Time Items: The General Contractor shall provide the Architect with a schedule of all long lead items for review and approval prior to ordering. Once approved, the General Contractor shall pre-order items in a timely manner as not to delay the progress of the Work.

B. Quality Assurance

1. Source Limitations: To the fullest extent possible, provide products of the same kind, from a single source.
2. Compatibility of Options: When the General Contractor is given the option of selecting between two or more products for use on the Project, the product selected shall be compatible with products previously selected, even if previously selected products were also options.
 - a. Provide interchangeable components of the same manufacture for components being replaced.
3. Nameplates: Except for required labels and operating data, do not attach or imprint manufacturer's or producer's nameplates or trademarks on exposed surfaces of products which will be exposed to view in occupied spaces or on the exterior.
 - a. Labels: Locate required product labels and stamps on a concealed surface or, where required for observation after installation, on an accessible surface that is not conspicuous.
 - b. Equipment Nameplates: Provide a permanent nameplate on each item of service-connected or power-operated equipment. Locate on an easily accessible surface which is inconspicuous in occupied spaces.

C. Product Delivery, Storage, and Handling: Deliver, store and handle products in accordance with the manufacturer's written recommendations, using means and methods that will prevent damage, deterioration and loss, including theft.

1. Coordinate delivery with installation time to ensure minimum holding time for items that are flammable, hazardous, easily damaged, or sensitive to deterioration, theft and other losses.
2. Deliver products to the site in the manufacturer's original sealed container or other packaging system, complete with labels and instructions for handling, storing, unpacking, protecting and installing.
3. Inspect products upon delivery to ensure compliance with the Contract Documents, and to ensure that quantities are correct and that products are undamaged and properly protected.
4. Store heavy materials away from the Project structure in a manner that will not endanger the supporting construction.
5. Inspect products for damage when removed from storage area. Repair or replace damaged products before installation. Manufacturer's representative shall certify all repairs as meeting manufacturer's original standards.
6. Provide storage areas in locations that will not interfere with the Work of any Contractor or Subcontractor.

D. General Product Requirements: Provide products that comply with the Contract Documents, that are undamaged and, unless otherwise indicated, unused at the time of installation.

1. Provide products complete with all accessories, trim, finish, safety guards and other devices and details needed for a complete installation and for the intended use and effect.

2. Standard Products: Where available, provide standard products of types that have been produced and used successfully in similar situations on other projects, except where otherwise specified.
- E. Product Selection Procedures: Product selection is governed by the Contract Documents and governing regulations, not by previous experience. Procedures governing product selection include the following:
1. Proprietary Specification Requirements: Where only a single product or manufacturer is named, provide the product indicated. No substitutions will be permitted.
 2. Semi-proprietary Specification Requirements: Where two or more products or manufacturers are named, provide one of the products indicated. No substitutions will be permitted.
 - a. Or Equal Specification Requirements: Where products or manufacturers are specified by name, accompanied by the term “or equal”, or “or approved equal” comply with the Contract Document provisions concerning substitutions or obtain approval for use of an unnamed product.
 3. Descriptive Specification Requirements: Where Specifications describe a product or assembly, listing exact characteristics required, with or without use of a brand or trade name, provide a product or assembly that provides the characteristics and otherwise complies with Contract requirements.
 4. Performance Specification Requirements: Where Specifications require compliance with performance requirements, provide products that comply with these requirements, and are recommended by the manufacturer for the application indicated. General overall performance of a product is implied where the product is specified for a specific application.
 - a. Manufacturer's written recommendations may be contained in published product literature, or by the manufacturer's certification of performance.
 5. Compliance with Standards, Codes and Regulations: Where the Specifications only require compliance with an imposed code, standard or regulation, select a product that complies with the standards, codes or regulations specified.
 6. Visual Matching: Where Specifications require matching an established Sample, the Architect's decision will be final on whether a proposed product matches satisfactorily.
 - a. Where no product available within the specified category matches satisfactorily and also complies with other specified requirements, comply with provisions of the Contract Documents concerning substitutions for selection of a matching product in another product category, or for noncompliance with specified requirements.
 7. Visual Selection: Where specified product requirements include the phrase “...as selected from manufacturer's standard colors, patterns, textures...” or a similar phrase, select a product and manufacturer that complies with other specified requirements. The Architect will select the color, pattern and texture from the product line selected.
- F. Installation of Products: Comply with manufacturer's written instructions and recommendations for installation of products in the applications indicated. Anchor each product securely in place, accurately located and aligned with other Work.
1. Clean exposed surfaces and protect as necessary to ensure freedom from damage and deterioration at time of Substantial Completion.

1.17 PRODUCT SUBSTITUTIONS

- A. Substitutions are requests for changes in products, materials, equipment, and methods of construction required by Contract Documents proposed by the General Contractor after the Notice to Proceed. The following are not considered substitutions:
1. Substitutions requested by Bidders during the bidding period, and accepted prior to the Notice to Proceed, are considered as included in the Contract Documents and are not subject to requirements specified in this Section for substitutions.
 2. Revisions to Contract Documents requested by the Owner or Architect.
 3. Specified options of products and construction methods included in Contract Documents.
 4. The General Contractor's determination of and compliance with governing regulations and orders issued by governing authorities.
- B. Substitution Request Submittal: Requests for substitution will be considered if, in the opinion of the Architect, such substitution will be of benefit to the Owner.
1. Submit requests in the form and in accordance with procedures required for Change Order proposals.
 - a. Attach completed Contractor/General Contractor's Substitutions Checklist to each request for substitution. Forms to be obtained from Architect.
 2. Identify the product, or the fabrication or installation method to be replaced in each request. Include related Specification and Drawing numbers. Provide complete documentation showing compliance with the requirements for substitutions, and the following information, as appropriate:
 - a. Product Data, including drawings, specification sheets, and descriptions of products, fabrication and installation procedures.
 - b. Samples, where applicable.
 - c. Product specifications and samples of the specified products for comparison.
 - d. A detailed comparison of significant qualities of the proposed substitution with those of the Work specified. Significant qualities may include elements such as size, weight, durability, performance and visual effect.
 - e. Coordination information, including a list of changes or modifications needed to other parts of the Work and to construction performed by the Owner and separate Contractors, that will become necessary to accommodate the proposed substitution.
 - f. A statement indicating the substitution's effect on the General Contractor's Construction Schedule compared to the schedule without approval of the substitution. Indicate the effect of the proposed substitution on overall Contract Time.
 - g. Cost information, including additional cost or savings in other parts of the Work resulting from the proposed substitution and a proposal of the net change, if any in the Contract Sum.
 - h. Certification by the General Contractor that the substitution proposed is equal-to or better in every significant respect to that required by the Contract Documents, and that it will perform adequately in the application indicated. Include the General Contractor's waiver of rights to additional payment or time, that may subsequently become necessary because of the failure of the substitution to perform adequately.
 3. Architect's Action: Within one week of receipt of the request for substitution, the Architect may request additional information or documentation necessary for evaluation of the request. Within 2 weeks of receipt of the request, or one week of receipt of the additional information or documentation, whichever is later, the Architect will notify the General Contractor of acceptance or rejection of the proposed substitution. If a decision on use of a proposed substitute cannot be made or obtained within the time allocated, use the product specified by name. Acceptance will be in the form of a Change Order.

- C. Conditions: The General Contractor's substitution request will be received and considered by the Architect when one or more of the following conditions are satisfied, as determined by the Architect; otherwise requests will be returned without action except to record noncompliance with these requirements.
1. Revisions to Contract Documents are not required.
 2. Proposed changes are in keeping with the general intent of Contract Documents.
 3. The request is timely, fully documented and properly submitted.
 4. The request is directly related to an or equal clause or similar language in the Contract Documents.
 5. The specified product or method of construction cannot be provided within the Contract Time. The request will not be considered if the product or method cannot be provided as a result of failure to pursue the Work promptly or coordinate activities properly.
 6. The specified product or method of construction cannot receive necessary approval by a governing authority, and the requested substitution can be approved.
 7. A substantial advantage is offered the Owner, in terms of cost savings, time savings, energy conservation or other considerations of merit, after deducting offsetting responsibilities the Owner may be required to bear.
 8. The specified product or method of construction cannot be provided in a manner that is compatible with other materials, and where the General Contractor certifies that the substitution will overcome the incompatibility.
 9. The specified product or method of construction cannot be coordinated with other materials, and where the General Contractor certifies that the proposed substitution can be coordinated.
 10. The specified product or method of construction cannot provide a warranty required by the Contract Documents and where the General Contractor certifies that the proposed substitution provide the required warranty.
- D. The General Contractor's submittal and Architect's acceptance of Shop Drawings, Product Data or Samples that relate to construction activities not complying with the Contract Documents does not constitute an acceptable or valid request for substitution, nor does it constitute approval.

1.18 STARTING OF EQUIPMENT AND SYSTEMS

- A. Starting Systems: Coordinate schedule for start-up of various equipment and systems.
1. Notify Architect seven days prior to start-up of each item.
 2. Verify that each piece of equipment or system has been checked for proper lubrication, drive rotation, belt tension, control sequence, and for conditions which may cause damage.
 3. Verify tests, meter readings, and specified electrical characteristics agree with those required by the equipment or system manufacturer.
 4. Verify that wiring and support components for equipment are complete and tested.
 5. Execute start-up under supervision of applicable manufacturer's representative and/or Contractors' personnel in accordance with manufacturers' instructions.
 6. When specified in individual Specifications, require manufacturer to provide authorized representative to be present at site to inspect, check, and approve equipment or system installation prior to start-up, and to supervise placing equipment or system in operation.
 7. Submit a written report that equipment or system has been properly installed and is functioning correctly.

- B. Demonstration and Instructions: Demonstrate operation and maintenance of products to Owner's personnel two weeks prior to date of final inspection or as specified in individual Specification sections.
1. For equipment or systems requiring seasonal operation, perform demonstration for other season within six months.
 2. Utilize operation and maintenance manuals as basis for instruction. Review contents of manual with Owners' personnel in detail to explain all aspects of operation and maintenance.
 3. Demonstrate start-up, operation, control, adjustment, trouble-shooting, servicing, maintenance, and shutdown of each item of equipment at scheduled time, at equipment location.
 4. Prepare and insert additional data in operations and maintenance manuals when need for additional data becomes apparent during instruction.
 5. The amount of time required for instruction on each item of equipment and system is that specified in individual sections.

1.19 PROJECT CLOSEOUT

A. Substantial Completion

1. Preliminary Procedures: Before requesting inspection for certification of Substantial Completion, complete the following. List exceptions in the request.
 - a. In the Application for Payment that coincides with, or first follows, the date Substantial Completion is claimed, show 100 percent (100%) completion for the portion of the Work claimed as substantially complete. Include supporting documentation for completion as indicated in these Contract Documents and a statement showing an accounting of changes to the Contract Sum.
 - 1) If 100 percent completion cannot be shown, include a list of incomplete items, the value of incomplete construction, and reasons the Work is not complete.
 - b. Advise Owner of pending insurance change-over requirements.
 - c. Submit specific warranties, workmanship bonds, maintenance agreements, final certifications and similar documents.
 - d. Obtain and submit releases enabling the Owner unrestricted use of the Work and access to services and utilities; include occupancy permits, operating certificates and similar releases.
 - e. Deliver tools, spare parts, extra stock, and similar items.
 - f. Make final change-over of permanent locks and transmit keys to the Owner. Advise the Owner's personnel of change-over in security provisions.
 - g. Complete start-up testing of systems, and instruction of the Owner's operating and maintenance personnel. Discontinue or change over and remove temporary facilities from the site, along with construction tools, mock-ups, and similar elements.
 - h. Complete final clean up requirements, including touch-up painting. Touch-up and otherwise repair and restore marred exposed finishes.
 - i. Secure Certificate of Occupancy from issuing authority having jurisdiction if required by local jurisdiction. Submit to Architect and Owner.
2. Submit written certification that Contract Documents have been reviewed, Work has been inspected, and that Work is complete in accordance with Contract Documents and ready for Architect's review.
3. Inspection Procedures: On receipt of a request for inspection, the Architect and Owner will either proceed with inspection or advise the General Contractor of unfilled

requirements. The Architect will prepare the AIA G704 Certification of Substantial Completion following inspection, or advise the General Contractor of construction that must be completed or corrected before the certificate will be issued.

- a. The Architect will repeat inspection when requested and assured that the Work has been substantially completed.
- b. Results of the completed inspection will form the basis of requirements for final acceptance.

B. Final Acceptance

1. Preliminary Procedures: Before requesting final inspection for certification of final acceptance and final payment, complete the following. List exceptions in the request.
 - a. Submit the final payment request with releases and supporting documentation not previously submitted and accepted. Include final waivers of lien, and certificates of insurance for products and completed operations where required.
 - b. Submit an updated final statement, accounting for final additional changes to the Contract Sum.
 - c. Submit a certified copy of the Architect's final inspection list of items to be completed or corrected, stating that each item has been completed or otherwise resolved for acceptance, and the list has been endorsed and dated by the Architect.
 - d. Submit record drawings, maintenance manuals, final project photographs, damage or settlement survey, property survey, and similar final record information.
 - e. Submit final meter readings for utilities if required, and similar data as of the date of Substantial Completion, or when the Owner took possession of and responsibility for corresponding elements of the Work.
 - f. Submit consent of surety to final payment on AIA G707 Consent of Surety to Final Payment.
 - g. Submit evidence of final, continuing insurance coverage complying with insurance requirements.
2. Reinspection Procedure: The Architect will reinspect the Work upon receipt of notice that the Work, including inspection list items from earlier inspections, has been completed, except items whose completion has been delayed because of circumstances acceptable to the Architect and Owner.
 - a. Upon completion of reinspection, the Architect will prepare a certificate of final acceptance, or advise the General Contractor of Work that is incomplete or of obligations that have not been fulfilled but are required for final acceptance.
 - b. If necessary, reinspection will be repeated. Cost of reinspection will be responsibility of Contractor.

C. Record Document Submittals

1. Record Drawings: Maintain a clean, undamaged set of blue or black line white-prints of Contract Drawings and Shop Drawings. Mark drawings to show conditions fully and accurately; where Shop Drawings are used, record a cross-reference at the corresponding location on the Contract Drawings. Give particular attention to concealed elements that would be difficult to measure and record at a later date.
 - a. Mark record sets with red non-erasable pencil and notes, details or sketches which are affected.
 - b. Mark new information that is important to the Owner, but was not shown on Contract Drawings or Shop Drawings.
 - c. Note related Change Order numbers where applicable.

- d. Organize record drawing sheets into manageable sets with durable paper cover sheets, and print suitable titles, dates and other identification on the cover of each set.
- 2. Miscellaneous Record Submittals: Refer to other Specifications for requirements of miscellaneous record-keeping and submittals in connection with actual performance of the Work. Immediately prior to the date or dates of Substantial Completion, complete miscellaneous records and place in good order, properly identified and bound or filed, ready for continued use and reference. Submit to the Architect for the Owner's records.
- D. Spare Parts and Maintenance Products: Provide spare parts, maintenance, and extra products in quantities specified in individual Specifications. Deliver to Project site and place in location as directed; obtain receipt prior to final payment.
- E. Operating and Maintenance Instructions: Arrange for each installer of equipment that requires regular maintenance to meet with the Owner's personnel to provide instruction in proper operation and maintenance. If installers are not experienced in procedures, provide instruction by manufacturer's representatives.
- F. Adjusting: Adjust operating products and equipment to ensure smooth and unhindered operation.
- G. Final Cleaning: Employ experienced workers or professional cleaners for final cleaning. Clean each surface or unit to the condition expected in a normal, 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.
 - a. Remove labels that are not permanent labels.
 - b. Clean transparent materials, including mirrors and glass in doors and windows. Remove glazing compound and other substances that are noticeable vision-obscuring materials. Replace chipped or broken glass and other damaged transparent materials.
 - c. Clean exposed exterior and interior hard-surfaced finishes to a dust-free condition, free of stains, films and similar foreign substances. Restore reflective surfaces to their original reflective condition. Leave concrete floors broom clean. Vacuum carpeted surfaces.
 - d. Wipe surfaces of mechanical and electrical equipment. Remove excess lubrication and other substances. Clean plumbing fixtures to a sanitary condition. Clean light fixtures and lamps. Replace burned-out lamps.
 - e. Clean the site, including landscape development areas, of rubbish, litter and other foreign substances. Sweep paved areas broom clean; remove stains, spills and other foreign deposits. Rake grounds that are neither paved nor planted, to a smooth even-textured surface.
- H. Removal of Protection: Remove temporary protection and facilities installed for protection of the Work during construction.
- I. Compliance: Comply with regulations of authorities having jurisdiction and safety standards for cleaning. Do not burn waste materials. Do not bury debris or excess materials on the Owner's property. Do not discharge volatile, harmful or dangerous materials into drainage systems. Remove waste materials from the site and dispose of in a lawful manner.

1.20 WARRANTIES AND BONDS

- A. Disclaimers and Limitations: Manufacturer's disclaimers and limitations on product warranties do not relieve the General Contractor of the warranty on the Work that incorporates the products, nor does it relieve suppliers, manufacturers, and subcontractors required to countersign special warranties with the General Contractor.
- B. Related Damages and Losses: When correcting warranted Work that has failed, remove and replace other Work that has been damaged as a result of such failure or that must be removed and replaced to provide access for correction of warranted Work.
- C. Reinstatement of Warranty: When Work covered by a warranty has failed and been corrected by replacement or rebuilding, reinstate the warranty by written endorsement. The reinstated warranty shall be equal to the original warranty with an equitable adjustment for depreciation.
- D. Replacement Cost: Upon determination that Work covered by a warranty has failed, replace or rebuild the Work to an acceptable condition complying with requirements of Contract Documents. The General Contractor is responsible for the cost of replacing or rebuilding defective Work regardless of whether the Owner has benefitted from use of the Work through a portion of its anticipated useful service life.
- E. Owner's Recourse: Written warranties made to the Owner are in addition to implied warranties, and shall not limit the duties, obligations, rights and remedies otherwise available under the law, nor shall warranty periods be interpreted as limitations on time in which the Owner can enforce such other duties, obligations, rights, or remedies.
 - 1. Rejection of Warranties: The Owner reserves the right to reject warranties and to limit selections to products with warranties not in conflict with requirements of the Contract Documents.
- F. Owner's Right of Refusal: The Owner reserves the right to refuse to accept Work for the Project where a special warranty, certification, or similar commitment is required on such Work or part of the Work, until evidence is presented that entities required to countersign such commitments are willing to do so.
- G. Commencement Date of Warranties: Date of Certificate of Substantial Completion designates a commencement date for warranties.

- H. Form of Submittal: At Final Completion compile two copies of each required warranty and bond properly executed by the General Contractor, or by the Contractor, subcontractor, supplier, or manufacturer. Organize the warranty documents into an orderly sequence based on the table of contents of the Project Manual.
1. Refer to individual Specifications for specific content requirements, and particular requirements for submittal of special warranties.
 2. Verify that documents are in proper form, contain full information, and are notarized. Co-execute submittals when required.
 3. When operating and maintenance manuals are required for warranted construction, provide additional copies of each required warranty, as necessary, for inclusion in each required manual.

END OF DIVISION 010000

**AGREEMENT BETWEEN HARRIMAN (ARCHITECT & ENGINEER OF RECORD)
AND OWNER OR CONTRACTOR
FOR RELEASE OF ELECTRONIC DOCUMENTS**

RECIPIENT:

Name: _____ Phone Number: _____

Address: _____

Email Address: _____ Date: _____

Project Name: _____ HA Project No.: _____

- This request to for Harriman to provide the following Electronic Documents (AutoCad file or Revit model), dated _____, for the project use by the Recipient:

(List requested documents clearly) _____

-
- Electronic Documents will be provided in the current software version used by Harriman at the time of the request. Alternate versions may be available at Harriman's discretion. Current software versions are AutoCAD 2023 and Autodesk Revit 2023.

Alternate Version Requested: _____

- Transfer method shall be by Electronic File Transfer to the email address provided above.
- A fee may be assessed for processing and distributing requested document. Recipient will be notified on any fees prior after receipt of this request document. Fees are payable prior to receiving requested documents.

TERMS AND CONDITIONS:

1. For the purpose of this document, both 2d CAD files and 3d Revit models shall be collectively defined as "Electronic Documents".
2. It is understood and agreed that all drawings, specifications, or other documents of any kind prepared by Harriman or its subconsultants, whether in hard copy or in electronic format including Electronic Documents (collectively "Harriman's Documents"), are instruments of their services prepared solely for use in connection with the single project for which they were prepared and that Harriman and its subconsultants retain all common law, statutory and other reserved rights, including the copyright. This agreement is not intended in any way to alter the respective interests of the parties in the Instruments of Service as set forth in the Owner/Architect Agreement, notwithstanding Harriman's agreement to release the Electronic Documents to Recipient.
3. The Electronic Documents are provided as a convenience to the Recipient for informational purposes only in connection with the Recipient's performance of its responsibilities and obligations relating to the Project. The Electronic Documents do not replace or supplement the paper copies of the Drawings and Specifications, which are, and remain, the Contract Documents for the Project. In all instances, it is the responsibility of the Recipient to ensure that the Electronic Documents are

consistent with the Contract Documents.

4. The parties agree that the Electronic Documents are not, nor shall they be construed to be, a product. It is expressly agreed by the Recipient that there are no warranties of any kind in such Electronic Documents or in the media in which they are contained, either expressed or implied.
5. Harriman makes no representation as to the compatibility of the Electronic Documents with any hardware or software.
6. Since the information set forth on the Electronic Documents can be modified unintentionally or otherwise, Harriman reserves the right to remove all indicia of its ownership and/or involvement from each electronic display.
7. If any differences exist between printed Instruments of Service and Electronic Documents, the information contained in the printed documents shall be presumed to be correct and take precedence over the Electronic Documents.
8. Recipient agrees not to add to, modify or alter in any way, or to allow others to add to, modify or alter in any way, the Electronic Documents or any printed copies thereof.
9. Revit models are Design Models and will only contain elements and content that Harriman deems necessary and appropriate to share. Not all objects in the models are 3d objects and no specific Level of Detail is implied or expected. Consequently, the models cannot be used to extract precise material or object quantities. The Recipient agrees that no proprietary Revit families or Revit content shall be removed from the model and/or used for any other purpose but to support this specific project.
10. The Electronic Documents are supplied in a translatable format. Any conversion of the format is solely the responsibility of the Recipient. Recipient understands and agrees that the conversion of hard copies of Instruments of Service into electronic format or the conversion of Electronic Documents from formats used by Harriman to some other format may introduce errors or other inaccuracies. Recipient agrees to accept all responsibility for any errors or inaccuracies and to release Harriman, and its subconsultants from any liability or claims for recovery of damages or expenses arising as the result of such errors or inaccuracies.
11. Where the Recipient has received specific permission to use the Electronic Documents in connection with the Recipient's obligation to prepare certain documents for Project, Recipient shall, in addition to the other obligations set forth therein, be obligated to remove Harriman's or its Consultant's title block from the copy of the Electronic Documents used by Recipient. It is understood and agreed that, without the separate express written permission of Harriman to do so, the Electronic Documents are not to be used by any contractor or any of its subcontractors of any tier of material supplier or vendor as a shop drawing or any other type of submittal or as the basis for preparing such shop drawing or submittal. The sole exception to this prohibition shall be that the Recipient may use the Electronic Documents as a clearly distinguishable separate background upon which to prepare its shop drawings or other submittal.
12. Recipient further agrees that Harriman's Documents were prepared for use in connection with this project only and that the Electronic Documents are supplied to Recipient for the limited use stated above only. Recipient agrees not to use, or to allow others to use, the Electronic Documents, in whole or in part, for any purpose other than as stated above.

13. Harriman believes that no licensing or copyright fees are due to others on account of the transfer of the Electronic Documents, but to the extent any are, the Contractor will pay the appropriate fees and hold Harriman harmless from such claims.
14. Any purchase order number provided by the Contractor is for Contractor's accounting purposes only. Purchase order terms and conditions are void and are not a part of this agreement.
15. Harriman has prepared these Electronic Documents for the sole purpose of plotting and printing a hard copy of the design documents. Harriman believes only the hard copy print to be the accurate representation of all drawing information. Hard copy written dimensions override electronic measured dimensions. User must verify computer data against hard copy prints.
16. Electronic Documents are an inherently unstable medium subject to "bugs," deterioration, modifications, and viruses. Electronic Documents are subject to inadvertent changes in the process of moving from one computer to another or by compressing/decompressing the data; or by moving from one software revision to another; or any kind of manipulation of the data will lead to defects.
17. This agreement shall be governed by the laws of the principal place of business of Harriman. Only printed copies of the Instrument of Service shall be signed and sealed.
18. Recipient agrees to waive any and all claims and liability against Harriman and its subconsultants resulting in any way from any failure by Recipient to comply with the requirements of this Agreement for the Delivery of Documents in Electronic Format.
19. The Recipient agrees that no third-party beneficiary status or any other right of action is created in favor of any contractor, subcontractor, materialmen or other third party against Harriman by virtue of this Agreement or in connection with its delivery of Electronic Documents, and no third-party beneficiary status is intended.
20. Recipient further agrees to indemnify and save harmless Harriman and its subconsultants and each of their partners, officers, shareholders, and directors and employees from any and all claims, judgments, suits, liabilities, damages, costs or expenses (including reasonable defense and attorney's fees including claims asserted in breach of contract, breach of warranty, negligence, or any other tort) arising as a result of either: 1) Recipient's failure to comply with any of the requirements of Agreement for the Delivery of Documents in Electronic Format; or 2) a defect, error or omission in the Electronic Documents or the information contained therein, which defect, error or omission was not contained in the Contract Documents as defined in Paragraph 2 or where the use of such Contract Documents would have prevented the claim, judgment, suit, liability, damage, cost, or expense.
21. Harriman reserves the right to deny a request to translate files.

AUTHORIZED ACCEPTANCE

By Recipient

By Harriman (Architect/Engineer of Record)

Signature

Signature

Print Name and Title

Print Name and Title

Date

Date

This page intentionally left blank.

SECTION 024119 - SELECTIVE DEMOLITION

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Demolition and removal of selected portions of building or structure.
 - 2. Demolition and removal of selected site elements.
 - 3. Salvage of existing items to be reused or recycled.

1.2 MATERIALS OWNERSHIP

- A. Unless otherwise indicated, demolition waste becomes property of Contractor.
- B. Historic items, relics, antiques, and similar objects including, but not limited to, cornerstones and their contents, commemorative plaques and tablets, and other items of interest or value to Owner that may be uncovered during demolition remain the property of Owner.
 - 1. Carefully salvage in a manner to prevent damage and promptly return to Owner.

1.3 PREINSTALLATION MEETINGS

- A. Predemolition Conference: Conduct conference at 250 Goddard Road, Lewiston, Maine.

1.4 INFORMATIONAL SUBMITTALS

- A. Engineering Survey: Submit engineering survey of condition of building.
- B. Proposed Protection Measures: Submit report, including Drawings, that indicates the measures proposed for protecting individuals and property for dust control and, for noise control. Indicate proposed locations and construction of barriers.
- C. Schedule of selective demolition activities with starting and ending dates for each activity.

1.5 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. 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. Storage or sale of removed items or materials on-site is not permitted.
- F. 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.
- G. Arrange selective demolition schedule so as not to interfere with Owner's operations.

PART 2 - PRODUCTS

2.1 PERFORMANCE 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/ASSP 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. Inventory and record the condition of items to be removed and salvaged.

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. Arrange to shut off utilities with utility companies.
 - 2. 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.
 - 3. Disconnect, demolish, and remove fire-suppression systems, plumbing, and HVAC systems, equipment, and components indicated on Drawings to be removed.
 - a. Piping to Be Removed: Remove portion of piping indicated to be removed and cap or plug remaining piping with same or compatible piping material.
 - b. Piping to Be Abandoned in Place: Drain piping and cap or plug piping with same or compatible piping material and leave in place.

- c. Equipment to Be Removed: Disconnect and cap services and remove equipment.
- d. Equipment to Be Removed and Reinstalled: Disconnect and cap services and remove, clean, and store equipment; when appropriate, reinstall, reconnect, and make equipment operational.
- e. Equipment to Be Removed and Salvaged: Disconnect and cap services and remove equipment and deliver to Owner.
- f. Ducts to Be Removed: Remove portion of ducts indicated to be removed and plug remaining ducts with same or compatible ductwork material.
- g. Ducts to Be Abandoned in Place: Cap or plug ducts with same or compatible ductwork material and leave in place.

3.3 PROTECTION

- A. Temporary Protection: Provide temporary barricades and other protection required to prevent injury to people and damage to adjacent buildings and facilities to remain.
- B. Temporary Shoring: Design, 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.
- C. Remove temporary barricades and protections where hazards no longer exist.

3.4 SELECTIVE DEMOLITION

- 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. 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. Temporarily cover openings to remain.
 - 2. Cut or drill from the exposed or finished side into concealed surfaces to avoid marring existing finished surfaces.
 - 3. 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.
 - 4. Maintain fire watch during and for at least 2 hours after flame-cutting operations.
 - 5. Locate selective demolition equipment and remove debris and materials so as not to impose excessive loads on supporting walls, floors, or framing.
 - 6. Dispose of demolished items and materials promptly.
- B. 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.
- C. Removed and Salvaged Items:
 - 1. Clean salvaged items.

2. Transport items to Owner's storage area designated by Owner.
 3. Protect items from damage during transport and storage.
- D. Removed and Reinstalled Items:
1. Clean and repair items to functional condition adequate for intended reuse.
 2. Protect items from damage during transport and storage.
 3. 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.
- E. 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 reinstalled in their original locations after selective demolition operations are complete.

3.5 CLEANING

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

END OF SECTION 024119

SECTION 061000 - ROUGH CARPENTRY

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Framing with dimension lumber.
 - 2. Wood blocking, cants, and nailers

1.2 ACTION SUBMITTALS

- A. Product Data:
 - 1. For each type of process and factory-fabricated product.

PART 2 - PRODUCTS

2.1 WOOD PRODUCTS, GENERAL

- A. Lumber: Comply with DOC PS 20 and applicable rules of grading agencies indicated. If no grading agency is indicated, comply with the applicable rules of any rules-writing agency certified by the ALSC Board of Review. Grade lumber 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:
 - 1. Boards: 19
 - 2. Dimension Lumber: 19 percent for 2-inch nominal (38-mm actual) thickness or less; 19 percent for more than 2-inch nominal (38-mm actual) thickness

2.2 PRESERVATIVE TREATMENT

- A. Preservative Treatment by Pressure Process: AWP A U1; Use Category UC2 for interior construction not in contact with ground, Use Category UC3b for exterior construction not in contact with ground, and Use Category UC4a for items in contact with ground.
 - 1. Preservative Chemicals: Acceptable to authorities having jurisdiction and containing no arsenic or chromium.
- B. Kiln-dry lumber after treatment to a maximum moisture content of 19 percent. Do not use material that is warped or that does not comply with requirements for untreated material.
- C. Mark lumber with treatment quality mark of an inspection agency approved by the ALSC Board of Review.

2.3 MISCELLANEOUS LUMBER

- A. Provide miscellaneous lumber indicated and lumber for support or attachment of other construction, including the following:
 - 1. Blocking.
 - 2. Nailers.
 - 3. Furring.
 - 4. Grounds.
- B. Dimension Lumber Items: construction or No. 2 grade lumber of any species.
- C. Concealed Boards: 15 percent maximum moisture content and any of the following species and grades:
 - 1. Mixed southern pine or southern pine; No. 2
 - 2. Eastern softwoods; No. 2 Common grade; NeLMA.
 - 3. Northern species; No. 2 3 Common grade; NLGA.
 - 4. Western woods; Construction or No. 2 Common grade; WCLIB or WWPA.

2.4 FASTENERS

- A. General: Fasteners shall be of size and type indicated and shall comply with requirements specified in this article for material and manufacture. Provide nails or screws, in sufficient length, to penetrate not less than 1-1/2 inches (38 mm) into wood substrate.
 - 1. Where rough carpentry is exposed to weather, in ground contact, pressure-preservative treated, or in area of high relative humidity, provide fasteners with hot-dip zinc coating complying with ASTM A153/A153M
- B. Power-Driven Fasteners: Fastener systems with an evaluation report acceptable to authorities having jurisdiction, based on ICC-ES AC70.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Framing Standard: Comply with AF&PA's WCD 1, "Details for Conventional Wood Frame Construction," unless otherwise indicated.
- B. Set work to required levels and lines, with members plumb, true to line, cut, and fitted. Fit rough carpentry accurately to other construction. Locate furring, nailers, blocking, grounds, and similar supports to comply with requirements for attaching other construction.
- C. Install metal framing anchors to comply with manufacturer's written instructions. Install fasteners through each fastener hole.
- D. Do not splice structural members between supports unless otherwise indicated.
- E. Comply with AWP A M4 for applying field treatment to cut surfaces of preservative-treated lumber.

- F. Securely attach rough 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 (IBC).

END OF SECTION 061000

This Page Left Intentionally Blank

SECTION 079200 - JOINT SEALANTS

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Silicone joint sealants.
 - 2. Mildew-resistant joint sealants.
 - 3. Latex joint sealants.

1.2 ACTION SUBMITTALS

- A. Product data.
- B. Samples: Manufacturer's standard color charts consisting of strips of cured sealants showing the full range of colors available for each product exposed to view.
- C. Joint-sealant schedule.

PART 2 - PRODUCTS

2.1 JOINT SEALANTS, GENERAL

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

2.2 SILICONE JOINT SEALANTS

- A. Silicone, Nonstaining, S, NS, 100/50, NT: Nonstaining, single-component, nonsag, plus 100 percent and minus 50 percent movement capability, nontraffic-use, neutral-curing silicone joint sealant; ASTM C920, Type S, Grade NS, Class 100/50, Use NT; SWRI validated.
 - 1. Basis-of-Design Product: Subject to compliance with requirements, provide Pecora Corporation; Pecora 890NST or comparable product by one of the following:
 - a. Sika Corporation - Building Components.
 - b. Tremco Incorporated.

2.3 MILDEW-RESISTANT JOINT SEALANTS

- A. Mildew-Resistant Joint Sealants: Formulated for prolonged exposure to humidity with fungicide to prevent mold and mildew growth.
- B. Silicone, Mildew Resistant, Acid Curing, S, NS, 25, NT: Mildew-resistant, single-component, nonsag, plus 25 percent and minus 25 percent movement capability, nontraffic-use, acid-curing silicone joint sealant; ASTM C920, Type S, Grade NS, Class 25, Use NT.

2.4 LATEX JOINT SEALANTS

- A. Acrylic Latex: Acrylic latex or siliconized acrylic latex, ASTM C834, Type OP, Grade NF.

2.5 JOINT-SEALANT BACKING

- A. Sealant Backing Material, General: Nonstaining; compatible with joint substrates, sealants, primers, and other joint fillers; and approved for applications indicated by sealant manufacturer based on field experience and laboratory testing.
- B. Cylindrical Sealant Backings: ASTM C1330, Type C (closed-cell material with a surface skin) and of size and density to control sealant depth and otherwise contribute to producing optimum sealant performance.
- C. Bond-Breaker Tape: Polyethylene tape or other plastic tape recommended by sealant manufacturer for preventing sealant from adhering to rigid, inflexible joint-filler materials or joint surfaces at back of joint. Provide self-adhesive tape where applicable.

2.6 MISCELLANEOUS MATERIALS

- A. Cleaners for Nonporous Surfaces: Chemical cleaners acceptable to manufacturers of sealants and sealant backing materials, free of oily residues or other substances capable of staining or harming joint substrates and adjacent nonporous surfaces in any way, and formulated to promote optimum adhesion of sealants to joint substrates.
- B. Masking Tape: Nonstaining, nonabsorbent material compatible with joint sealants and surfaces adjacent to joints.

PART 3 - EXECUTION

3.1 PREPARATION

- A. Surface Cleaning of Joints: Clean out joints immediately before installing joint sealants to comply with joint-sealant manufacturer's written instructions and the following requirements:
 - 1. Remove all foreign material from joint substrates that could interfere with adhesion of joint sealant, including dust, paints (except for permanent, protective coatings tested and approved for sealant adhesion and compatibility by sealant manufacturer), old joint sealants, oil, grease, waterproofing, water repellents, water, surface dirt, and frost.

2. Clean porous joint substrate surfaces by brushing, grinding, mechanical abrading, or a combination of these methods to produce a clean, sound substrate capable of developing optimum bond with joint sealants. Remove loose particles remaining after cleaning operations above by vacuuming or blowing out joints with oil-free compressed air. Porous joint substrates include the following:
 - a. Concrete.
 - b. Masonry.
 - c. Unglazed surfaces of ceramic tile.
 3. Remove laitance and form-release agents from concrete.
 4. Clean nonporous joint substrate surfaces with chemical cleaners or other means that do not stain, harm substrates, or leave residues capable of interfering with adhesion of joint sealants. Nonporous joint substrates include the following:
 - a. Metal.
 - b. Glass.
 - c. Porcelain enamel.
 - d. Glazed surfaces of ceramic tile.
- B. Joint Priming: Prime joint substrates where recommended by joint-sealant manufacturer or as indicated by preconstruction joint-sealant-substrate tests or prior experience. Apply primer to comply with joint-sealant manufacturer's written instructions. Confine primers to areas of joint-sealant bond; do not allow spillage or migration onto adjoining surfaces.
- C. Masking Tape: Use masking tape where required to prevent contact of sealant or primer with adjoining surfaces that otherwise would be permanently stained or damaged by such contact or by cleaning methods required to remove sealant smears. Remove tape immediately after tooling without disturbing joint seal.

3.2 INSTALLATION OF JOINT SEALANTS

- A. General: Comply with joint-sealant manufacturer's written installation instructions for products and applications indicated, unless more stringent requirements apply.
- B. Sealant Installation Standard: Comply with recommendations in ASTM C1193 for use of joint sealants as applicable to materials, applications, and conditions indicated.
- C. Install sealant backings of type indicated to support sealants during application and at position required to produce cross-sectional shapes and depths of installed sealants relative to joint widths that allow optimum sealant movement capability.
 1. Do not leave gaps between ends of sealant backings.
 2. Do not stretch, twist, puncture, or tear sealant backings.
 3. Remove absorbent sealant backings that have become wet before sealant application, and replace them with dry materials.
- D. Install sealants using proven techniques that comply with the following and at the same time backings are installed:
 1. Place sealants so they directly contact and fully wet joint substrates.
 2. Completely fill recesses in each joint configuration.
 3. Produce uniform, cross-sectional shapes and depths relative to joint widths that allow optimum sealant movement capability.

- E. Tooling of Nonsag Sealants: Immediately after sealant application and before skinning or curing begins, tool sealants in accordance with requirements specified in subparagraphs below to form smooth, uniform beads of configuration indicated; to eliminate air pockets; and to ensure contact and adhesion of sealant with sides of joint.
 - 1. Remove excess sealant from surfaces adjacent to joints.
 - 2. Use tooling agents that are approved in writing by sealant manufacturer and that do not discolor sealants or adjacent surfaces.
 - 3. Provide concave joint profile in accordance with Figure 8A in ASTM C1193 unless otherwise indicated.
- F. Clean off excess sealant or sealant smears adjacent to joints as the Work progresses by methods and with cleaning materials approved in writing by manufacturers of joint sealants and of products in which joints occur.
- G. Protect joint sealants during and after curing period from contact with contaminating substances and from damage resulting from construction operations or other causes so sealants are without deterioration or damage at time of Substantial Completion. If, despite such protection, damage or deterioration occurs, cut out, remove, and repair damaged or deteriorated joint sealants immediately so installations with repaired areas are indistinguishable from original work.

END OF SECTION 079200

SECTION 080671 – DOOR HARDWARE SCHEDULE

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. This Section references specification sections relating to commercial door hardware for the following:
 - 1. Swinging doors.
 - 2. Other doors to the extent indicated.
- B. Commercial door hardware includes, but is not necessarily limited to, the following:
 - 1. Mechanical door hardware.
 - 2. Cylinders specified for doors in other sections.
- C. Related Sections:
 - 1. Division 08 Section “Door Hardware”.
- D. Codes and References: Comply with the version adopted by the Authority Having Jurisdiction.
 - 1. ANSI A117.1 - Accessible and Usable Buildings and Facilities.
 - 2. ICC/IBC - International Building Code.
 - 3. NFPA 70 - National Electrical Code.
 - 4. NFPA 80 - Fire Doors and Windows.
 - 5. NFPA 101 - Life Safety Code.
 - 6. NFPA 105 - Installation of Smoke Door Assemblies.
 - 7. State Building Codes, Local Amendments.
- E. Standards: Reference Related Sections for requirements regarding compliance with applicable industry standards.

1.3 SUBMITTALS

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

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

1. Format: Comply with scheduling sequence and vertical format in DHI's "Sequence and Format for the Hardware Schedule."
2. Organization: Organize the Door Hardware Schedule into door hardware sets indicating complete designations of every item required for each door or opening. Organize door hardware sets in same order as in the Door Hardware Sets at the end of Part 3. Submittals that do not follow the same format and order as the Door Hardware Sets will be rejected and subject to resubmission.
3. Content: Include the following information:
 - a. Type, style, function, size, label, hand, and finish of each door hardware item.
 - b. Manufacturer of each item.
 - c. Fastenings and other pertinent information.
 - d. Location of door hardware set, cross-referenced to Drawings, both on floor plans and in door and frame schedule.
 - e. Explanation of abbreviations, symbols, and codes contained in schedule.
 - f. Mounting locations for door hardware.
 - g. Door and frame sizes and materials.
4. Submittal Sequence: Submit the final Door Hardware Schedule at earliest possible date, particularly where approval of the Door Hardware Schedule must precede fabrication of other work that is critical in the Project construction schedule. Include Product Data, Samples, Shop Drawings of other work affected by door hardware, and other information essential to the coordinated review of the Door Hardware Schedule.

- C. Keying Schedule: Prepared under the supervision of the Owner, separate schedule detailing final keying instructions for locksets and cylinders in writing. Include keying system explanation, door numbers, key set symbols, hardware set numbers and special instructions. Owner to approve submitted keying schedule prior to the ordering of permanent cylinders.
- D. Product Test Reports: Indicating compliance with cycle testing requirements, based on evaluation of comprehensive tests performed by manufacturer and witnessed by a qualified independent testing agency.
- E. Operating and Maintenance Manuals: Provide manufacturers operating and maintenance manuals for each item comprising the complete door hardware installation in quantity as required in Division 01, Closeout Submittals. The manual to include the name, address, and contact information of the manufacturers providing the hardware and their nearest service representatives. The final copies delivered after completion of the installation test to include "as built" modifications made during installation, checkout, and acceptance.
- F. Warranties and Maintenance: Special warranties and maintenance agreements specified in the Related Sections.

1.4 DELIVERY, STORAGE, AND HANDLING

- A. Inventory door hardware on receipt and provide secure lock-up and shelving for door hardware delivered to Project site. Do not store electronic access control hardware, software or accessories at Project site without prior authorization.

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

1.5 WARRANTY

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

1.6 MAINTENANCE SERVICE

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

PART 2 - PRODUCTS

2.1 SCHEDULED DOOR HARDWARE

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

PART 3 - EXECUTION

3.1 DOOR HARDWARE SETS

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

1. Section 08 71 00 – Door Hardware.

C. Manufacturer's Abbreviations:

1. MK - McKinney
2. PE - Pemko
3. RO - Rockwood
4. SA - SARGENT
5. NO - Norton Rixson
6. OT - Other

Set: 1.0

Doors: 104

3	Hinge, Full Mortise	TA2714-MCK [NRP]	US26D	MK	087100
1	Storage Lockset	8204 LNL	US26D	SA	087100
1	Surface Overhead Stop	10-X36	630	NO	087100
3	Silencer	608-RKW		RO	087100

END OF SECTION 080671

SECTION 081110 - HOLLOW METAL DOORS AND FRAMES

PART 1 - GENERAL

1.1 GENERAL PROVISIONS

- A. Attention is directed to the CONTRACT AND GENERAL CONDITIONS and all Sections within DIVISION 01 - GENERAL REQUIREMENTS which are hereby made a part of this Section of the Specifications.

1.2 DESCRIPTION OF WORK

- A. Work Included: Provide labor, materials and equipment necessary to complete the work of this Section, including but not limited to the following:
 - 1. Standard hollow-metal steel doors and frames.
- B. Related Work: The following items are not included in this Section and are specified under the designated Sections:
 - 1. Section 087100 - DOOR HARDWARE for door hardware for steel doors.
 - 2. Section 092900 - GYPSUM BOARD ASSEMBLIES for insulation.
 - 3. Section 099000 - PAINTING AND COATING for field painting steel doors and frames.

1.3 SUBMITTALS

- A. Product Data: Include construction details, material descriptions, core descriptions, label compliance, fire-resistance rating, temperature-rise ratings, and finishes for each type of steel door and frame specified.
- B. Shop Drawings:
 - 1. Elevations of each door design.
 - 2. Details of doors, including vertical and horizontal edge details and metal thicknesses.

3. Frame details for each frame type, including dimensioned profiles and metal thicknesses.
 4. Locations of reinforcement and preparations for hardware.
 5. Details of each different wall opening condition.
 6. Details of anchorages, joints, field splices, and connections.
 7. Details of accessories.
 8. Details of moldings, removable stops, and glazing.
 9. Details of conduit and preparations for power, signal, and control systems.
- C. Schedule: Provide a schedule of hollow metal work prepared by or under the supervision of supplier, using same reference numbers for details and openings as those on Drawings. Coordinate with door hardware schedule.
- D. Qualification Data: For Installer.
- E. Product Test Reports: Based on evaluation of comprehensive fire tests performed by a qualified testing agency, for each type of standard steel door and frame.

1.4 QUALITY ASSURANCE

- A. Installer Qualifications: An employer of workers trained and approved by manufacturer.
- B. Source Limitations: Obtain standard steel doors and frames through one source from a single manufacturer.
- C. Fire-Rated Door, Assemblies: Assemblies complying with NFPA 80 that are listed and labeled by a testing and inspecting agency acceptable to authorities having jurisdiction, for fire-protection ratings and temperature-rise limits indicated, based on testing at positive pressure according to NFPA 252 or UL 10C.
1. Smoke- and Draft-Control Assemblies: Provide an assembly with gaskets listed and labeled for smoke and draft control by a qualified testing agency acceptable to authorities having jurisdiction, based on testing according to UL 1784 and installed in compliance with NFPA 105.
- D. Fire-Rated, Borrowed-Light Assemblies (Including Sidelights and Transoms): Complying with NFPA 80 and listed and labeled by a testing and inspecting agency

acceptable to authorities having jurisdiction for fire-protection ratings indicated, based on testing according to NFPA 257 or UL 9.

- E. Preinstallation Conference: Conduct conference at Project site to comply with requirements in Division 01.

1.5 DELIVERY, STORAGE, AND HANDLING

- A. Deliver doors and frames palletized, wrapped, or crated to provide protection during transit and Project-site storage. Do not use nonvented plastic.
- B. Deliver welded frames with two removable spreader bars across bottom of frames, tack welded to jambs and mullions.
- C. Store hollow metal work under cover at Project site. Place in stacks of five units maximum in a vertical position with heads up, spaced by blocking, on minimum 4-inch-high wood blocking. Do not store in a manner that traps excess humidity.
 - 1. Provide minimum 1/4-inch space between each stacked door to permit air circulation.

1.6 PROJECT CONDITIONS

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

1.7 COORDINATION

- A. Coordinate installation of anchorages for hollow metal frames. Furnish setting drawings, templates, and directions for installing anchorages, including sleeves, concrete inserts, anchor bolts, and items with integral anchors. Deliver such items to Project site in time for installation.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

1. Ceco Door Products; an ASSA ABLOY Group Company.
2. CURRIES Company; an ASSA ABLOY Group Company.
3. J/R Metal Frames Manufacturing, Inc.
4. Steelcraft; an Allegion (formerly Ingersoll-Rand) company.

2.2 MATERIALS

- A. Cold-Rolled Steel Sheet: ASTM A 1008/A 1008M, Commercial Steel (CS), Type B; suitable for exposed applications.
- B. Hot-Rolled Steel Sheet: ASTM A 1011/A 1011M, Commercial Steel (CS), Type B; free of scale, pitting, or surface defects; pickled and oiled.
- C. Metallic-Coated, (Galvanized/Galvannealed) Steel Sheet: ASTM A 653/A 653M, Commercial Steel (CS), Type B; with minimum G60/A60 metallic coating.
- D. Frame Anchors: ASTM A 591/A 591M, Commercial Steel (CS), 40Z coating designation; mill phosphatized.
- E. Inserts, Bolts, and Fasteners: Hot-dip galvanized according to ASTM A 153/A 153M.
- F. Powder-Actuated Fasteners in Concrete: Fastener system of type suitable for application indicated, fabricated from corrosion-resistant materials, with clips or other accessory devices for attaching hollow metal frames of type indicated.
- G. Insulation: Comply with requirements in Section 092900 - GYPSUM BOARD ASSEMBLIES.
- H. Glazing: Comply with requirements in Division 08.

2.3 STANDARD STEEL DOORS

- A. General: Provide doors of design indicated, not less than thickness indicated; fabricated with smooth surfaces, without visible joints or seams on exposed faces, unless otherwise indicated. Comply with ANSI A250.8.
 - 1. Design: Flush panel.
 - 2. Core Construction: Manufacturer's standard kraft-paper honeycomb, polystyrene, polyurethane, mineral-board, or vertical steel-stiffener core that produces doors complying with ANSI A250.8.
 - 3. Top and Bottom Edges: Closed with flush or inverted 0.042-inch-thick end closures or channels of same material as face sheets.
 - 4. Tolerances: Comply with SDI 117, "Manufacturing Tolerances for Standard Steel Doors and Frames."
- B. Interior Doors: Face sheets fabricated from cold-rolled steel sheet. Provide doors complying with requirements indicated below by referencing ANSI A250.8 for level and model and ANSI A250.4 for physical-endurance level:
 - 1. Level 2 and Physical Performance Level B (Heavy Duty), Model 2 (Seamless), 1-3/4 inches thick.
- C. Hardware Reinforcement: Fabricate according to ANSI/SDI A250.6 with reinforcing plates from same material as door face sheets.
- D. Fabricate concealed stiffeners and hardware reinforcement from either cold- or hot-rolled steel sheet.

2.4 STANDARD STEEL FRAMES

- A. General: Comply with ANSI A250.8 and with details indicated for type and profile.
- B. Interior Frames: Fabricated from cold-rolled steel sheet.
 - 1. Fabricate frames with full profile welded joints.
 - 2. Frames for Level 2 Steel Doors: 0.053-inch-thick steel sheet.
- C. Hardware Reinforcement: Fabricate according to ANSI/SDI A250.6 with reinforcement plates from same material as frames.

2.5 FRAME ANCHORS

A. Jamb Anchors:

1. Stud-Wall Type: Designed to engage stud, welded to back of frames; not less than 0.042 inch thick.
2. Compression Type for Drywall Slip-on Frames: Adjustable compression anchors.
3. Postinstalled Expansion Type for In-Place Concrete or Masonry: Minimum 3/8-inch- diameter bolts with expansion shields or inserts. Provide pipe spacer from frame to wall, with throat reinforcement plate, welded to frame at each anchor location.

B. Floor Anchors: Formed from same material as frames, not less than 0.042 inch (1.0 mm) thick, and as follows:

1. Monolithic Concrete Slabs: Clip-type anchors, with two holes to receive fasteners.
2. Separate Topping Concrete Slabs: Adjustable-type anchors with extension clips, allowing not less than 2-inch height adjustment. Terminate bottom of frames at finish floor surface.

2.6 HOLLOW METAL PANELS

A. Provide hollow metal panels of same materials, construction, and finish as specified for adjoining hollow metal work.

2.7 STOPS AND MOLDINGS

A. Moldings for Glazed Lites in Doors: Minimum 0.032 inch thick, fabricated from same material as door face sheet in which they are installed.

B. Fixed Frame Moldings: Formed integral with hollow metal frames, a minimum of 5/8 inch high unless otherwise indicated.

C. Loose Stops for Glazed Lites in Frames: Minimum 0.032 inch thick, fabricated from same material as frames in which they are installed.

2.8 ACCESSORIES

- A. Mullions and Transom Bars: Join to adjacent members by welding or rigid mechanical anchors.
- B. Ceiling Struts: Minimum 1/4-inch-thick by 1-inch-wide steel.

2.9 FABRICATION

- A. Fabricate hollow metal work to be rigid and free of defects, warp, or buckle. Accurately form metal to required sizes and profiles, with minimum radius for thickness of metal. Where practical, fit and assemble units in manufacturer's plant. To ensure proper assembly at Project site, clearly identify work that cannot be permanently factory assembled before shipment.
- B. Tolerances: Fabricate hollow metal work to tolerances indicated in SDI 117.
- C. Hollow Metal Doors:
 - 1. Glazed Lites: Factory cut openings in doors.
 - 2. Astragals: Provide overlapping astragal on one leaf of pairs of doors where required by NFPA 80 for fire-performance rating or where indicated. Extend minimum 3/4 inch beyond edge of door on which astragal is mounted.
- D. Hollow Metal Frames: Where frames are fabricated in sections due to shipping or handling limitations, provide alignment plates or angles at each joint, fabricated of same thickness metal as frames.
 - 1. Full Profile Welded Frames: Weld joints continuously; grind, fill, dress, and make smooth, flush, and not visible.
 - 2. Provide countersunk, flat- or oval-head exposed screws and bolts for exposed fasteners unless otherwise indicated.
 - 3. Floor Anchors: Weld anchors to bottom of jambs and mullions with at least four spot welds per anchor.
 - 4. Jamb Anchors: Provide number and spacing of anchors as follows:
 - a. Stud-Wall Type: Locate anchors not more than 18 inches from top and bottom of frame. Space anchors not more than 32 inches o.c. and as follows:
 - 1) Three anchors per jamb up to 60 inches high.
 - 2) Four anchors per jamb from 60 to 90 inches high.
 - 3) Five anchors per jamb from 90 to 96 inches high.

- 4) Five anchors per jamb plus 1 additional anchor per jamb for each 24 inches or fraction thereof above 96 inches high.
 - 5) Two anchors per head for frames above 42 inches wide and mounted in metal-stud partitions.
- b. Compression Type: Not less than two anchors in each jamb.
 - c. Postinstalled Expansion Type: Locate anchors not more than 6 inches from top and bottom of frame. Space anchors not more than 26 inches o.c.
5. Door Silencers: Except on weather-stripped doors, drill stops to receive door silencers as follows. Keep holes clear during construction.
 - a. Single-Door Frames: Drill stop in strike jamb to receive three door silencers.
 - b. Double-Door Frames: Drill stop in head jamb to receive two door silencers.
- E. Fabricate concealed stiffeners, edge channels, and hardware reinforcement from either cold- or hot-rolled steel sheet.
- F. Hardware Preparation: Factory prepare hollow metal work to receive templated mortised hardware; include cutouts, reinforcement, mortising, drilling, and tapping according to the Door Hardware Schedule and templates furnished as specified in Section 087100 - DOOR HARDWARE.
 1. Locate hardware as indicated, or if not indicated, according to ANSI/SDI A250.8.
 2. Reinforce doors and frames to receive nontemplated, mortised and surface-mounted door hardware.
 3. Comply with applicable requirements in ANSI/SDI A250.6 and ANSI/DHI A115 Series specifications for preparation of hollow metal work for hardware.
 4. Coordinate locations of conduit and wiring boxes for electrical connections with Division 26 - ELECTRICAL.
- G. Stops and Moldings: Provide stops and moldings around glazed lites where indicated. Form corners of stops and moldings with butted or mitered hairline joints.
 1. Single Glazed Lites: Provide fixed stops and moldings welded on secure side of hollow metal work.
 2. Multiple Glazed Lites: Provide fixed and removable stops and moldings, so that each glazed lite is capable of being removed independently.
 3. Provide fixed frame moldings on secure side of interior doors and frames.
 4. Provide loose stops and moldings on inside of hollow metal work.

5. Coordinate rabbet width between fixed and removable stops with type of glazing and type of installation indicated.

2.10 STEEL FINISHES

- A. Prime Finish: Apply manufacturer's standard epoxy primer immediately after cleaning and pretreating.
 1. Shop Primer: Manufacturer's standard, fast-curing, lead- and chromate-free primer complying with ANSI/SDI A250.10 acceptance criteria; recommended by primer manufacturer for substrate; compatible with substrate and field-applied coatings despite prolonged exposure.
 2. Refer to Section 099000 – PAINTING AND COATING for field-applied coating.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of the Work.
- B. Examine roughing-in for embedded and built-in anchors to verify actual locations before frame installation.
- C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

- A. Remove welded-in shipping spreaders installed at factory. Restore exposed finish by grinding, filling, and dressing, as required to make repaired area smooth, flush, and invisible on exposed faces.
- B. Prior to installation, adjust and securely brace welded hollow metal frames for squareness, alignment, twist, and plumbness to the following tolerances:

1. Squareness: Plus or minus 1/16 inch, measured at door rabbet on a line 90 degrees from jamb perpendicular to frame head.
 2. Alignment: Plus or minus 1/16 inch, measured at jambs on a horizontal line parallel to plane of wall.
 3. Twist: Plus or minus 1/16 inch, measured at opposite face corners of jambs on parallel lines, and perpendicular to plane of wall.
 4. Plumbness: Plus or minus 1/16 inch, measured at jambs on a perpendicular line from head to floor.
- C. Drill and tap doors and frames to receive nontemplated, mortised, and surface-mounted door hardware.

3.3 INSTALLATION

- A. General: Install hollow metal work plumb, rigid, properly aligned, and securely fastened in place; comply with Drawings and manufacturer's written instructions.
- B. Hollow Metal Frames: Install hollow metal frames of size and profile indicated. Comply with ANSI/SDI A250.11.
1. Set frames accurately in position, plumbed, aligned, and braced securely until permanent anchors are set. After wall construction is complete, remove temporary braces, leaving surfaces smooth and undamaged.
 - a. At fire-protection-rated openings, install frames according to NFPA 80.
 - b. Where frames are fabricated in sections because of shipping or handling limitations, field splice at approved locations by welding face joint continuously; grind, fill, dress, and make splice smooth, flush, and invisible on exposed faces.
 - c. Install frames with removable glazing stops located on secure side of opening.
 - d. Remove temporary braces necessary for installation only after frames have been properly set and secured.
 - e. Check plumbness, squareness, and twist of frames as walls are constructed. Shim as necessary to comply with installation tolerances.
 2. Floor Anchors: Provide floor anchors for each jamb and mullion that extends to floor, and secure with postinstalled expansion anchors.

- a. Floor anchors may be set with powder-actuated fasteners instead of postinstalled expansion anchors if so indicated and approved on Shop Drawings.
 3. Metal-Stud Partitions: Solidly pack insulation behind frames.
 4. Masonry Walls: Coordinate installation of frames to allow for filling space between frames and masonry with insulation.
 5. Concrete Walls: Solidly fill space between frames and concrete with insulation.
 6. In-Place Concrete or Masonry Construction: Secure frames in place with postinstalled expansion anchors. Countersink anchors, and fill and make smooth, flush, and invisible on exposed faces.
 7. In-Place Gypsum Board Partitions: Secure frames in place with postinstalled expansion anchors through floor anchors at each jamb. Countersink anchors, and fill and make smooth, flush, and invisible on exposed faces.
 8. Ceiling Struts: Extend struts vertically from top of frame at each jamb to overhead structural supports or substrates above frame unless frame is anchored to masonry or to other structural support at each jamb. Bend top of struts to provide flush contact for securing to supporting construction. Provide adjustable wedged or bolted anchorage to frame jamb members.
 9. Installation Tolerances: Adjust hollow metal door frames for squareness, alignment, twist, and plumb to the following tolerances:
 - a. Squareness: Plus or minus 1/16 inch, measured at door rabbet on a line 90 degrees from jamb perpendicular to frame head.
 - b. Alignment: Plus or minus 1/16 inch, measured at jambs on a horizontal line parallel to plane of wall.
 - c. Twist: Plus or minus 1/16 inch, measured at opposite face corners of jambs on parallel lines, and perpendicular to plane of wall.
 - d. Plumbness: Plus or minus 1/16 inch, measured at jambs at floor.
- C. Hollow Metal Doors: Fit hollow metal doors accurately in frames, within clearances specified below. Shim as necessary.
1. Non-Fire-Rated Standard Steel Doors:
 - a. Jambs and Head: 1/8 inch plus or minus 1/16 inch.
 - b. Between Edges of Pairs of Doors: 1/8 inch plus or minus 1/16 inch.
 - c. Between Bottom of Door and Top of Threshold: Maximum 3/8 inch.
 - d. Between Bottom of Door and Top of Finish Floor (No Threshold): Maximum 3/4 inch.
 2. Fire-Rated Doors: Install doors with clearances according to NFPA 80.

3. Smoke-Control Doors: Install doors according to NFPA 105.

D. Glazing: Comply with hollow metal manufacturer's written instructions.

1. Secure stops with countersunk flat- or oval-head machine screws spaced uniformly not more than 9 inches o.c. and not more than 2 inches o.c. from each corner.

3.4 ADJUSTING AND CLEANING

- A. Final Adjustments: Check and readjust operating hardware items immediately before final inspection. Leave work in complete and proper operating condition. Remove and replace defective work, including hollow metal work that is warped, bowed, or otherwise unacceptable.
- B. Prime-Coat Touchup: Immediately after erection, sand smooth rusted or damaged areas of prime coat and apply touchup of compatible air-drying, rust-inhibitive primer.
- C. Metallic-Coated (Galvanized/Galvannealed) Surfaces: Clean abraded areas and repair with galvanizing repair paint according to manufacturer's written instructions.

END OF SECTION 081110

SECTION 083113 - ACCESS DOORS AND FRAMES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. This Section includes the following:
 - 1. Wall access doors and frames.
 - 2. Ceiling access doors and frames.
- B. Related Sections include the following:
 - 1. Divisions 21, 22, 23, and 26 for access of plumbing, HVAC systems, automatic fire protection systems, telecommunication systems, and electrical systems.

1.3 SUBMITTALS

- A. General: Submit in accordance with Division 01 Section "Submittal Procedures."
- B. Product Data: For each type of door and frame indicated. Include construction details, fire ratings, materials, individual components and profiles, and finishes.
- C. Shop Drawings: Show fabrication and installation details of access doors and frames for each type of substrate. Include plans, elevations, sections, details, and attachments to other Work.
- D. Access Door and Frame Schedule: Provide complete access door and frame schedule, including types, locations, sizes, latching or locking provisions, and other data pertinent to installation.

1.4 QUALITY ASSURANCE

- A. Source Limitations: Obtain access door(s) and frame(s) through one source from a single manufacturer.
- B. Fire-Rated Access Doors and Frames: Units complying with NFPA 80 that are identical to access door and frame assemblies tested for fire-test-response characteristics according to the following test method and that are labeled and listed by UL or another testing and inspecting agency acceptable to authorities having jurisdiction:
 - 1. NFPA 252 or UL 10B for fire-rated access door assemblies installed vertically.
 - 2. NFPA 288 for fire-rated access door assemblies installed horizontally.
- C. Size Variations: Obtain Architect's acceptance of manufacturer's standard-size units, which may vary slightly from sizes indicated.

1.5 COORDINATION

- A. Verification: Determine specific locations and sizes for access doors needed to gain access to concealed equipment. Coordinate with architectural, plumbing and mechanical drawings for locations of wall and ceiling access doors.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Products: Subject to compliance with requirements, provide one of the products listed in other Part 2 articles.

2.2 STEEL MATERIALS

- A. Steel Plates, Shapes, and Bars: ASTM A 36/A 36M.
 - 1. ASTM A 123/A 123M, for galvanizing steel and iron products.
 - 2. ASTM A 153/A 153M, for galvanizing steel and iron hardware.
- B. Steel Sheet: Uncoated cold-rolled steel sheet substrate complying with ASTM A 1008/A 1008M, Commercial Steel (CS), exposed.
- C. Steel Finishes: Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for recommendations for applying and designating finishes.
 - 1. Surface Preparation for Steel Sheet: Clean surfaces to comply with SSPC-SP 1, "Solvent Cleaning," to remove dirt, oil, grease, or other contaminants that could impair paint bond. Remove mill scale and rust, if present, from uncoated steel, complying with SSPC-SP 5/NACE No. 1, "White Metal Blast Cleaning," or SSPC-SP 8, "Pickling."
 - 2. Factory-Primed Finish: Apply shop primer immediately after cleaning and pretreating.
- D. Drywall Beads: Edge trim formed from 0.0299-inch zinc-coated steel sheet formed to receive joint compound and in size to suit thickness of gypsum board.

2.3 STAINLESS-STEEL MATERIALS

- A. Stainless-Steel Sheet, Strip, Plate, and Flat Bars: ASTM A 666, Type 304. Remove tool and die marks and stretch lines or blend into finish.
 - 1. Finish: Directional Satin Finish, No. 4.

2.4 PAINT

- A. Shop Primer for Ferrous Metal: Fast-curing, lead- and chromate-free, universal modified-alkyd primer complying with performance requirements in FS TT-P-664; selected for good resistance to normal atmospheric corrosion, compatibility with finish paint systems indicated, and capability to provide a sound foundation for field-applied topcoats despite prolonged exposure.

2.5 ACCESS DOORS AND FRAMES

- A. Flush, Insulated, Fire-Rated Access Doors and Trim-less Frames for Drywall: Fabricated from steel sheet, except as noted. Provide stainless steel sheet for units in walls within kitchens, restrooms, toilet rooms, and janitor's closets and for units adjacent to sinks, water closets,

urinals and similar fixtures that could cause fluids to come into contact with access door and frame.

1. Locations: Gypsum board wall and ceiling surfaces.
2. Fire-Resistance Rating: Not less than that of adjacent construction.
3. Door: Flush panel with a core of mineral-fiber insulation enclosed in sheet metal with a minimum thickness of 0.036 inch (20 gage).
4. Frame: Minimum 0.060-inch- (16 gage) thick sheet metal with drywall bead.
5. Hinges: Concealed pin type or continuous piano hinge (stainless steel for stainless steel units).
6. Automatic Closer: Spring type.
7. Latch: Self-latching bolt operated by flush screwdriver with interior release.
8. Lock: Self-latching device with cylinder lock in locations accessible by the public.
9. Products:
 - a. J. L. Industries, Inc.; FDWB.
 - b. Karp Associates, Inc.; KRP-350 FR.
 - c. The Williams Brothers Corporation of America; WB-FR Standard for drywall.
 - d. Provide comparable products where stainless steel units are indicated.

- B. Flush Access Doors and Trimless Frames for Drywall: Fabricated from steel sheet, except as noted. Provide stainless steel sheet for units in walls within kitchens, toilet rooms, and janitor's closets and for units adjacent to sinks, water closets, urinals and similar fixtures that could cause fluids to come into contact with access door and frame.

1. Locations: Gypsum board wall and ceiling surfaces.
2. Door: Minimum 0.070-inch- thick (14 gage) sheet metal, set flush with surrounding finish surfaces.
3. Frame: Minimum 0.060-inch- thick (16 gage) sheet metal with drywall bead.
4. Hinges: Spring-loaded concealed pin type continuous piano hinge (stainless steel for stainless steel units).
5. Latch: Screwdriver- operated cam latch.
6. Lock: Key-operated cylinder lock in locations accessible by the public.
7. Products:
 - a. J. L. Industries, Inc.; Model WB.
 - b. Karp Associates, Inc.; KDW.
 - c. The Williams Brothers Corporation of America; WB-DW.
 - d. Provide comparable products where stainless steel units are indicated.

2.6 FABRICATION

- A. General: Provide access door and frame assemblies manufactured as integral units ready for installation.
- B. Metal Surfaces: For metal surfaces exposed to view in the completed Work, provide materials with smooth, flat surfaces without blemishes. Do not use materials with exposed pitting, seam marks, roller marks, rolled trade names, or roughness.
- C. Steel Doors and Frames: Grind exposed welds smooth and flush with adjacent surfaces. Furnish attachment devices and fasteners of type required to secure access panels to types of supports indicated.
1. Exposed Flanges: Nominal 1 to 1-1/2 inches wide around perimeter of frame.
 2. For trimless frames with drywall bead for installation in gypsum board assembly, provide edge trim for gypsum board securely attached to perimeter of frames.

3. Provide mounting holes in frames to attach frames to metal framing.
- D. Latching Mechanisms: Furnish number required to hold doors in flush, smooth plane when closed.
 1. For cylinder lock, furnish two keys per lock and key all locks alike.

2.7 FINISHES, GENERAL

- A. Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for recommendations for applying and designating finishes.
- B. Finish metal fabrications after assembly.

2.8 STEEL FINISHES

- A. Surface Preparation: Prepare uncoated ferrous-metal surfaces to comply with minimum requirements indicated below for SSPC surface-preparation specifications and environmental exposure conditions of installed metal fabrications:
 1. Interiors (SSPC Zone 1A): SSPC-SP 3, "Power Tool Cleaning."
- B. Apply shop primer to uncoated surfaces of metal fabrications. Comply with SSPC-PA 1, "Paint Application Specification No. 1," for shop painting.

2.9 STAINLESS-STEEL FINISHES

- A. Remove tool and die marks and stretch lines or blend into finish.
- B. Grind and polish surfaces to produce uniform, directionally textured, polished finish indicated, free of cross scratches. Run grain with long dimension of each piece.
- C. Bright, Directional Polish: No. 4 finish.
 1. When polishing is completed, passivate and rinse surfaces. Remove embedded foreign matter and leave surfaces chemically clean.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Comply with manufacturer's written instructions for installing access doors and frames.
- B. Set frames accurately in position and attach securely to supports with plane of face panels aligned with adjacent finish surfaces.
- C. Install access doors with trim-less frames flush with adjacent finish surfaces or recessed to receive finish material.

3.2 ADJUSTING AND CLEANING

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

- B. Remove and replace doors and frames that are warped, bowed, or otherwise damaged.

END OF SECTION 083113

This Page Left Intentionally Blank

SECTION 087100 - DOOR HARDWARE

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. This Section includes commercial door hardware for the following:
 - 1. Swinging doors.
- B. Door hardware includes, but is not necessarily limited to, the following:
 - 1. Mechanical door hardware.
- C. Related Sections:
 - 1. Division 01 Section "General Conditions".
 - 2. Division 08 Section "Operations and Maintenance".
 - 3. Division 08 Section "Hollow Metal Doors and Frames".
- D. Codes and References: Comply with the version adopted by the Authority Having Jurisdiction.
 - 1. ANSI A117.1 - Accessible and Usable Buildings and Facilities.
 - 2. ICC/IBC - International Building Code.
 - 3. NFPA 70 - National Electrical Code.
 - 4. NFPA 80 - Fire Doors and Windows.
 - 5. NFPA 101 - Life Safety Code.
 - 6. NFPA 105 - Installation of Smoke Door Assemblies.
 - 7. State Building Codes, Local Amendments.
- E. Standards: All hardware specified herein shall comply with the following industry standards as applicable. Any undated reference to a standard shall be interpreted as referring to the latest edition of that standard:
 - 1. ANSI/BHMA Certified Product Standards - A156 Series.
 - 2. UL10C - Positive Pressure Fire Tests of Door Assemblies.
 - 3. ANSI/UL 294 - Access Control System Units.
 - 4. UL 305 - Panic Hardware.

1.3 SUBMITTALS

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

1.4 CLOSEOUT SUBMITTALS

- A. Operating and Maintenance Manuals: Provide manufacturers operating and maintenance manuals for each item comprising the complete door hardware installation in quantity as required in Division 01, Closeout Procedures.
- B. Project Record Documents: Provide record documentation of as-built door hardware sets in digital format (.pdf, .docx, .xlsx, .csv) and as required in Division 01, Project Record Documents.

1.5 QUALITY ASSURANCE

- A. Manufacturers Qualifications: Engage qualified manufacturers with a minimum 5 years of documented experience in producing hardware and equipment similar to that indicated for this Project and that have a proven record of successful in-service performance.
- B. Certified Products: Where specified, products must maintain a current listing in the Builders Hardware Manufacturers Association (BHMA) Certified Products Directory (CPD).
- C. Installer Qualifications: A minimum 3 years documented experience installing both standard and electrified door hardware similar in material, design, and extent to that indicated for this Project and whose work has resulted in construction with a record of successful in-service performance.
- D. Door Hardware Supplier Qualifications: Experienced commercial door hardware distributors with a minimum 5 years documented experience supplying both mechanical and electromechanical hardware installations comparable in material, design, and extent to that indicated for this Project. Supplier recognized as a factory direct distributor by the manufacturers of the primary materials with a warehousing facility in Project's vicinity. Supplier to have on staff a certified Architectural Hardware Consultant (AHC) available during the course of the Work to consult with Contractor, Architect, and Owner concerning both standard and electromechanical door hardware and keying.
- E. Source Limitations: Obtain each type and variety of door hardware specified in this section from a single source unless otherwise indicated.
 - 1. Electrified modifications or enhancements made to a source manufacturer's product line by a secondary or third party source will not be accepted.
- F. Each unit to bear third party permanent label indicating compliance with the referenced testing standards.
- G. Keying Conference: Conduct conference to comply with requirements in Division 01 Section "Project Meetings." Keying conference to incorporate the following criteria into the final keying schedule document:
 - 1. Function of building, purpose of each area and degree of security required.
 - 2. Plans for existing and future key system expansion.
 - 3. Requirements for key control storage and software.

4. Installation of permanent keys, cylinder cores and software.
 5. Address and requirements for delivery of keys.
- H. Pre-Submittal Conference: Conduct coordination conference in compliance with requirements in Division 01 Section "Project Meetings" with attendance by representatives of Supplier(s), Installer(s), and Contractor(s) to review proper methods and the procedures for receiving, handling, and installing door hardware.
1. Prior to installation of door hardware, conduct a project specific training meeting to instruct the installing contractors' personnel on the proper installation and adjustment of their respective products. Product training to be attended by installers of door hardware (including electromechanical hardware) for aluminum, hollow metal and wood doors. Training will include the use of installation manuals, hardware schedules, templates and physical product samples as required.
 2. Inspect and discuss electrical roughing-in, power supply connections, and other preparatory work performed by other trades.
 3. Review sequence of operation narratives for each unique access controlled opening.
 4. Review and finalize construction schedule and verify availability of materials.
 5. Review the required inspecting, testing, commissioning, and demonstration procedures
- I. At completion of installation, provide written documentation that components were applied according to manufacturer's instructions and recommendations and according to approved schedule.

1.6 DELIVERY, STORAGE AND HANDLING

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

1.7 COORDINATION

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

1.8 WARRANTY

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

PART 2 - PRODUCTS

2.1 MATERIALS

- A. Hardware shall not have any visible manufacturer names on exposed materials, except cylinders, when the door is in a closed position.

2.2 BUTT HINGES

- A. Hinges: ANSI/BHMA A156.1 butt hinges with number of hinge knuckles and other options as specified in the Door Hardware Sets.
 - 1. Quantity: Provide the following hinge quantity:
 - a. Two Hinges: For doors with heights up to 60 inches.
 - b. Three Hinges: For doors with heights 61 to 90 inches.
 - c. Four Hinges: For doors with heights 91 to 120 inches.
 - d. For doors with heights more than 120 inches, provide 4 hinges, plus 1 hinge for every 30 inches of door height greater than 120 inches.
 - 2. Hinge Size: Provide the following, unless otherwise indicated, with hinge widths sized for door thickness and clearances required:
 - a. Widths up to 3'0": 4-1/2" standard or heavy weight as specified.
 - b. Sizes from 3'1" to 4'0": 5" standard or heavy weight as specified.
 - 3. Hinge Weight and Base Material: Unless otherwise indicated, provide the following:

- a. Exterior Doors: Heavy weight, non-ferrous, ball bearing or oil impregnated bearing hinges unless Hardware Sets indicate standard weight.
 - b. Interior Doors: Standard weight, steel, ball bearing or oil impregnated bearing hinges unless Hardware Sets indicate heavy weight.
- 4. Hinge Options: Comply with the following:
 - a. Non-removable Pins: With the exception of electric through wire hinges, provide set screw in hinge barrel that, when tightened into a groove in hinge pin, prevents removal of pin while door is closed; for all out-swinging lockable doors.
- 5. Manufacturers:
 - a. McKinney (MK) - TA/T4A Series, 5-knuckle.

2.3 CYLINDERS AND KEYING

- A. General: Cylinder manufacturer to have minimum (10) years experience designing secured master key systems and have on record a published security keying system policy.
 - 1. Manufacturers:
 - a. Sargent Manufacturing (SA).
- B. Cylinder Types: Original manufacturer cylinders able to supply the following cylinder formats and types:
 - 1. Threaded mortise cylinders with rings and cams to suit hardware application.
 - 2. Rim cylinders with back plate, flat-type vertical or horizontal tailpiece, and raised trim ring.
 - 3. Bored or cylindrical lock cylinders with tailpieces as required to suit locks.
 - 4. Tubular deadlocks and other auxiliary locks.
 - 5. Mortise and rim cylinder collars to be solid and recessed to allow the cylinder face to be flush and be free spinning with matching finishes.
 - 6. Keyway: Manufacturer's Standard.
- C. Small Format Interchangeable Cores: Provide small format interchangeable cores (SFIC) as specified, core insert, removable by use of a special key; usable with other manufacturers' cylinders.
- D. Keying System: Each type of lock and cylinders to be factory keyed.
 - 1. Supplier shall conduct a "Keying Conference" to define and document keying system instructions and requirements.
 - 2. Furnish factory cut, nickel-silver large bow permanently inscribed with a visual key control number as directed by Owner.
 - 3. New System: Key locks to a new key system as directed by the Owner.
- E. Key Quantity: Provide the following minimum number of keys:

1. Change Keys per Cylinder: Two (2)
2. Master Keys (per Master Key Level/Group): Five (5).
3. Construction Keys (where required): Ten (10).

F. Construction Keying: Provide construction master keyed cylinders.

G. Key Registration List (Bitting List):

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

2.4 KEY CONTROL

A. Key Control Cabinet: Provide a key control system including envelopes, labels, and tags with self-locking key clips, receipt forms, 3-way visible card index, temporary markers, permanent markers, and standard metal cabinet. Key control cabinet shall have expansion capacity of 150% of the number of locks required for the project.

1. Manufacturers:

- a. Lund Equipment (LU).
- b. MMF Industries (MM).
- c. Telkee (TK).

2.5 MORTISE LOCKS AND LATCHING DEVICES

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

1. Manufacturers:

- a. Corbin Russwin Hardware (RU) - ML2000 Series.
- b. Sargent Manufacturing (SA) - 8200 Series.

2.6 LOCK AND LATCH STRIKES

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

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

B. Standards: Comply with the following:

1. Strikes for Mortise Locks and Latches: BHMA A156.13.
2. Strikes for Bored Locks and Latches: BHMA A156.2.
3. Strikes for Auxiliary Deadlocks: BHMA A156.36.
4. Dustproof Strikes: BHMA A156.16.

2.7 CONVENTIONAL EXIT DEVICES

A. General Requirements: All exit devices specified herein shall meet or exceed the following criteria:

1. Exit devices shall have a five-year warranty.
2. At doors not requiring a fire rating, provide devices complying with NFPA 101 and listed and labeled for "Panic Hardware" according to UL305. Provide proper fasteners as required by manufacturer including sex nuts and bolts at openings specified in the Hardware Sets.
3. Where exit devices are required on fire rated doors, provide devices complying with NFPA 80 and with UL labeling indicating "Fire Exit Hardware". Provide devices with the proper fasteners for installation as tested and listed by UL. Consult manufacturer's catalog and template book for specific requirements.
4. Except on fire rated doors, provide exit devices with hex key dogging device to hold the pushbar and latch in a retracted position. Provide optional keyed cylinder dogging on devices where specified in Hardware Sets.
5. Devices must fit flat against the door face with no gap that permits unauthorized dogging of the push bar. The addition of filler strips is required in any case where the door light extends behind the device as in a full glass configuration.
6. Lever Operating Trim: Where exit devices require lever trim, furnish manufacturer's heavy duty escutcheon trim with threaded studs for thru-bolts.
 - a. Lock Trim Design: As indicated in Hardware Sets, provide finishes and designs to match that of the specified locksets.
 - b. Where function of exit device requires a cylinder, provide a cylinder (Rim or Mortise) as specified in Hardware Sets.
7. Vertical Rod Exit Devices: Where surface or concealed vertical rod exit devices are used at interior openings, provide as less bottom rod (LBR) unless otherwise indicated. Provide dust proof strikes where thermal pins are required to project into the floor.
8. Narrow Stile Applications: At doors constructed with narrow stiles, or as specified in Hardware Sets, provide devices designed for maximum 2" wide stiles.
9. Dummy Push Bar: Nonfunctioning push bar matching functional push bar.
10. Rail Sizing: Provide exit device rails factory sized for proper door width application.
11. Through Bolt Installation: For exit devices and trim as indicated in Door Hardware Sets.

B. Conventional Push Rail Exit Devices (Heavy Duty): ANSI/BHMA A156.3, Grade 1 Certified Products Directory (CPD) listed exit devices. Listed manufacturers shall meet all functions and features as specified herein.

1. Manufacturers:

- a. Corbin Russwin Hardware (RU) - ED4000 / ED5000 Series.
- b. Sargent Manufacturing (SA) - 80 Series.

2.8 ARCHITECTURAL TRIM AND ACCESSORIES

- A. Door, Frame and Wall Protective Trim: ANSI/BHMA A156.6, protective products as specified in the hardware sets. Door protection plates shall be not more than 2" less than door width on stop side and 1" less door width on the pull side or on stop side of pairs of doors. Listed manufacturers shall meet all functions and features as specified herein.

- 1. Provide protective trim with functions and features as follows:

- a. Meets ADA requirements for smooth bottom door surfaces.
- b. UL Classified options for use on fire-rated doors up to 3 hours.
- c. Fabricated from stainless steel, brass, bronze, aluminum, or high-impact plastic.
- d. Available in a variety of sizes, finishes, and profiles to suit aesthetic and functional requirements.
- e. Designed to protect doors, frames, and adjacent walls from damage due to impact, abrasion, or traffic.
- f. Fasteners included; adhesive-backed options available for select models.
- g. Ten-year limited warranty.

- 2. Manufacturers:

- a. Hiawatha, Inc. (HI).
- b. Ives (IV).
- c. Rockwood (RO).

2.9 DOOR STOPS AND HOLDERS

- A. Door Stops and Bumpers: ANSI/BHMA A156.16, Grade 1 door stops and wall bumpers. Provide wall bumpers, either convex or concave types with anchorage as indicated, unless floor or other types of door stops are specified in Hardware Sets. Do not mount floor stops where they will impede traffic. Where floor or wall bumpers are not appropriate, provide overhead type stops and holders.

- 1. Manufacturers:

- a. Hiawatha, Inc. (HI).
- b. Ives (IV).
- c. Rockwood (RO).

- B. Overhead Door Stops and Holders: ANSI/BHMA A156.8, Grade 1 Certified Products Directory (CPD) listed overhead stops and holders to be surface or concealed types as indicated in Hardware Sets. Track, slide, arm and jamb bracket to be constructed of extruded bronze and shock absorber spring of heavy tempered steel. Provide non-handed design with mounting brackets as required for proper operation and function.

- 1. Manufacturers:

- a. Norton Rixson (NO).
- b. Rockwood (RO).
- c. Sargent Manufacturing (SA).

2.10 ARCHITECTURAL SEALS

- A. General: Thresholds, weatherstripping, and gasket seals to be of type and design as specified below or in the Hardware Sets. Provide continuous weatherstrip gasketing on exterior doors and provide smoke, light, or sound gasketing on interior doors where indicated. At exterior applications provide non-corrosive fasteners and elsewhere where indicated.
- B. Smoke Labeled Gasketing: Assemblies complying with NFPA 105 that are listed and labeled by a testing and inspecting agency acceptable to authorities having jurisdiction, for smoke control ratings indicated, based on testing according to UL 1784.
 - 1. Provide smoke labeled perimeter gasketing at all smoke labeled openings.
- C. Fire Labeled Gasketing: Assemblies complying with NFPA 80 that are listed and labeled by a testing and inspecting agency acceptable to authorities having jurisdiction, for fire ratings indicated, based on testing according to UL-10C.
 - 1. Provide intumescent seals as indicated to meet UL10C Standard for Positive Pressure Fire Tests of Door Assemblies, and NFPA 252, Standard Methods of Fire Tests of Door Assemblies.
- D. Sound-Rated Gasketing: Assemblies that are listed and labeled by a testing and inspecting agency, for sound ratings indicated.
- E. Replaceable Seal Strips: Provide only those units where resilient or flexible seal strips are easily replaceable and readily available from stocks maintained by manufacturer.
- F. Manufacturers:
 - 1. National Guard Products (NG).
 - 2. Pemko (PE).
 - 3. Reese Enterprises, Inc. (RE).

2.11 FABRICATION

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

2.12 FINISHES

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

- B. Provide quality of finish, including thickness of plating or coating (if any), composition, hardness, and other qualities complying with manufacturer's standards, but in no case less than specified by referenced standards for the applicable units of hardware
- C. Protect mechanical finishes on exposed surfaces from damage by applying a strippable, temporary protective covering before shipping.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine scheduled openings, with Installer present, for compliance with requirements for installation tolerances, labeled fire door assembly construction, wall and floor construction, and other conditions affecting performance.
- B. Notify architect of any discrepancies or conflicts between the door schedule, door types, drawings and scheduled hardware. Proceed only after such discrepancies or conflicts have been resolved in writing.

3.2 PREPARATION

- A. Hollow Metal Doors and Frames: Comply with ANSI/DHI A115 series.
- B. Wood Doors: Comply with ANSI/DHI A115-W series.

3.3 INSTALLATION

- A. Install each item of mechanical and electromechanical hardware and access control equipment to comply with manufacturer's written instructions and according to specifications.
 - 1. Installers are to be trained and certified by the manufacturer on the proper installation and adjustment of fire, life safety, and security products including: hanging devices; locking devices; closing devices; and seals.
- B. Mounting Heights: Mount door hardware units at heights indicated in following applicable publications, unless specifically indicated or required to comply with governing regulations:
 - 1. Standard Steel Doors and Frames: DHI's "Recommended Locations for Architectural Hardware for Standard Steel Doors and Frames."
 - 2. DHI TDH-007-20: Installation Guide for Doors and Hardware.
 - 3. Where indicated to comply with accessibility requirements, comply with ANSI A117.1 "Accessibility Guidelines for Buildings and Facilities."
 - 4. Provide blocking in drywall partitions where wall stops or other wall mounted hardware is located.
- C. Retrofitting: Install door hardware to comply with manufacturer's published templates and written instructions. Where cutting and fitting are required to install door hardware onto or into surfaces that are later to be painted or finished in another way, coordinate removal, storage, and

reinstallation of surface protective trim units with finishing work specified in Division 9 Sections. Do not install surface-mounted items until finishes have been completed on substrates involved.

- D. Push Plates and Door Pulls: When through-bolt fasteners are in the same location as a push plate, countersink the fasteners flush with the door face allowing the push plate to sit flat against the door.
- E. Thresholds: Set thresholds for exterior and acoustical doors in full bed of sealant complying with requirements specified in Division 7 Section "Joint Sealants."
- F. Storage: Provide a secure lock up for hardware delivered to the project but not yet installed. Control the handling and installation of hardware items so that the completion of the work will not be delayed by hardware losses before and after installation.

3.4 FIELD QUALITY CONTROL

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

3.5 ADJUSTING

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

3.6 CLEANING AND PROTECTION

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

3.7 DEMONSTRATION

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

3.8 DOOR HARDWARE SETS

- A. The hardware sets represent the design intent and direction of the owner and architect. They are a guideline only and should not be considered a detailed hardware schedule. Discrepancies, conflicting hardware and missing items should be brought to the attention of the architect with corrections made prior to the bidding process. Omitted items not included in a hardware set should be scheduled with the appropriate additional hardware required for proper application and functionality.
 - 1. Quantities listed are for each pair of doors, or for each single door.
 - 2. The supplier is responsible for handing and sizing all products.
 - 3. Where multiple options for a piece of hardware are given in a single line item, the supplier shall provide the appropriate application for the opening.
 - 4. At existing openings with new hardware the supplier shall field inspect existing conditions prior to the submittal stage to verify the specified hardware will work as required. Provide alternate solutions and proposals as needed.
- B. Refer to Section 080671, Door Hardware Sets, for hardware sets.

END OF SECTION 087100

This Page Left Intentionally Blank

SECTION 092900 – GYPSUM BOARD ASSEMBLIES

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Interior gypsum board.

1.2 ACTION SUBMITTALS

- A. Product data.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

- A. Fire-Resistance-Rated Assemblies: For fire-resistance-rated assemblies, provide materials and construction identical to those tested in assembly indicated in accordance with ASTM E119 by an independent testing agency.
- B. STC-Rated Assemblies: For STC-rated assemblies, provide materials and construction identical to those tested in assembly indicated in accordance with ASTM E90 and classified in accordance with ASTM E413 by an independent testing agency.

2.2 GYPSUM BOARD, GENERAL

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

2.3 INTERIOR GYPSUM BOARD

- A. Gypsum Board, Type X: ASTM C1396/C1396M.
 - 1. Thickness: 5/8 inch (15.9 mm).
 - 2. Long Edges: Tapered
- B. Gypsum Ceiling Board: ASTM C1396/C1396M.
 - 1. Thickness: 1/2 inch (12.7 mm).
 - 2. Long Edges: Tapered.
- C. Mold-Resistant Gypsum Board: ASTM C1396/C1396M. With moisture- and mold-resistant core and paper surfaces.
 - 1. Core: 5/8 inch (15.9 mm), Type X.
 - 2. Long Edges: Tapered.

3. Mold Resistance: ASTM D3273, score of 10 as rated in accordance with ASTM D3274.

2.4 TRIM ACCESSORIES

- A. Interior Trim: ASTM C1047.
 1. Material: Galvanized or aluminum-coated steel sheet, rolled zinc, plastic, or paper-faced galvanized-steel sheet
 2. Shapes:
 - a. Cornerbead.
 - b. Bullnose bead.
 - c. LC-Bead: J-shaped; exposed long flange receives joint compound.
 - d. L-Bead: L-shaped; exposed long flange receives joint compound.
 - e. U-Bead: J-shaped; exposed short flange does not receive joint compound.
 - f. Expansion (control) joint.
 - g. Curved-Edge Cornerbead: With notched or flexible flanges.

2.5 JOINT TREATMENT MATERIALS

- A. General: Comply with ASTM C475/C475M.
- B. Joint Tape:
 1. Interior Gypsum Board: Paper.
 2. Tile Backing Panels: As recommended by panel manufacturer.
- C. Joint Compound for Interior Gypsum Board: For each coat, use formulation that is compatible with other compounds applied on previous or for successive coats.
 1. Prefilling: At open joints, rounded or beveled panel edges, and damaged surface areas, use setting-type taping compound.
 2. Embedding and First Coat: For embedding tape and first coat on joints, fasteners, and trim flanges, use setting-type taping] compound.
 - a. Use setting-type compound for installing paper-faced metal trim accessories.
 3. Fill Coat: For second coat, use setting-type, sandable topping compound.
 4. Finish Coat: For third coat, use setting-type, sandable topping compound.
 5. Skim Coat: For final coat of Level 5 finish, use setting-type, sandable topping compound

2.6 AUXILIARY MATERIALS

- A. Provide auxiliary materials that comply with referenced installation standards and manufacturer's written instructions.
- B. Steel Drill Screws: ASTM C1002 unless otherwise indicated.
 1. Use screws complying with ASTM C954 for fastening panels to steel members from 0.033 to 0.112 inch (0.84 to 2.84 mm) thick.
 2. For fastening cementitious backer units, use screws of type and size recommended by panel manufacturer.

- C. Sound-Attenuation Blankets: ASTM C665, Type I (blankets without membrane facing) produced by combining thermosetting resins with mineral fibers manufactured from glass, slag wool, or rock wool.
 - 1. Fire-Resistance-Rated Assemblies: Comply with mineral-fiber requirements of assembly.
- D. Acoustical Sealant: As specified in Section 079200 "Joint Sealants."

PART 3 - EXECUTION

3.1 INSTALLATION OF PANELS

- A. Examine panels before installation. Reject panels that are wet, moisture damaged, and mold damaged.
- B. Comply with ASTM C840.
- C. For trim with back flanges intended for fasteners, attach to framing with same fasteners used for panels. Otherwise, attach trim according to manufacturer's written instructions.

3.2 FINISHING OF GYPSUM BOARD

- A. Prefill open joints, rounded or beveled edges, and damaged surface areas.
- B. Apply joint tape over gypsum board joints, except for trim products specifically indicated as not intended to receive tape.
- C. Gypsum Board Finish Levels: Finish panels to levels indicated below and in accordance with ASTM C840:
 - 1. Level 1: Ceiling plenum areas, concealed areas, and where indicated.
 - 2. Level 2: Panels that are substrate for tile
 - 3. Level 4: At panel surfaces that will be exposed to view unless otherwise indicated
 - a. Primer and its application to surfaces are specified in Division 09.
- D. Cementitious Backer Units: Finish according to manufacturer's written instructions.

3.3 PROTECTION

- A. Protect installed products from damage from weather, condensation, direct sunlight, construction, and other causes during remainder of the construction period.
- B. Remove and replace panels that are wet, moisture damaged, and mold damaged.

END OF SECTION 092900

This Page Left Intentionally Blank

SECTION 095100 - ACOUSTICAL CEILINGS

PART 1 - GENERAL

1.1 GENERAL PROVISIONS

- A. Attention is directed to the CONTRACT AND GENERAL CONDITIONS and all Sections within DIVISION 01 - GENERAL REQUIREMENTS which are hereby made a part of this Section of the Specifications.

1.2 DESCRIPTION OF WORK

- A. Work Included: Provide labor, materials and equipment necessary to complete the work of this Section, including but not limited to the following:
 - 1. Acoustical ceiling tiles and panels.
 - a. Mineral fiber acoustical ceiling tiles.
 - 2. Suspension systems, grid systems and ceiling hangers.
 - 3. Acoustical sealant at edge moldings at acoustical ceilings.
- B. Related Work: The following items are not included in this Section and are specified under the designated Sections:
 - 1. Section 092110 - GYPSUM BOARD ASSEMBLIES for gypsum board ceilings and soffits.
 - 2. Division 23 - HEATING, VENTILATING AND AIR CONDITIONING for air handling and distribution components located in ceilings.
 - 3. Division 26 - ELECTRICAL for light fixture and alarm system components located in ceilings.

1.3 SUBMITTALS

- A. Product Data: For each type of product indicated.
- B. Coordination Drawings: Reflected ceiling plans drawn to scale and coordinating penetrations and ceiling-mounted items. Show the following:
 - 1. Ceiling suspension members.
 - 2. Method of attaching hangers to building structure. Furnish layouts for cast-in-place anchors, clips, and other ceiling attachment devices whose installation is specified in other Sections.
 - 3. Ceiling-mounted items including lighting fixtures, diffusers, grilles, speakers, sprinklers, access panels, and special moldings.
 - 4. Minimum Drawing Scale: 1/4 inch = 1 foot.
- C. 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 12 inch long Samples of each type, finish, and color.

- D. Asbestos Certification: Manufacturer's written certification that acoustical ceiling products contain no asbestos (0.0000%). Product labels indicating that it is the user's responsibility to test the products for asbestos are unacceptable and sufficient cause for rejection of the product on site.
- E. Maintenance Data: For finishes to include in maintenance manuals.

1.4 QUALITY ASSURANCE

- A. Source Limitations:
 - 1. Acoustical Ceiling Panels: Obtain each type through one source from a single manufacturer.
 - 2. Suspension Systems: Obtain each type through one source from a single manufacturer.
- B. Fire-Test-Response Characteristics: Provide acoustical panel ceilings that comply with the following requirements:
 - 1. Fire-Resistance Characteristics: Where indicated, provide acoustical panel ceilings identical to those of assemblies tested for fire resistance per ASTM E 119 by UL or another testing and inspecting agency acceptable to authorities having jurisdiction.
 - a. Fire-Resistance Ratings: Indicated by design designations from UL's "Fire Resistance Directory" or from the listings of another testing and inspecting agency.
 - b. Identify materials with appropriate markings of applicable testing and inspecting agency.
 - 2. Surface-Burning Characteristics: Provide acoustical panels complying with ASTM E 1264 for Class A materials as determined by testing identical products per ASTM E 84.
- C. Mockups: Build mockups to verify selections made under sample Submittals and to demonstrate aesthetic effects and qualities of materials and execution.
 - 1. Approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.
- D. Preinstallation Conference: Conduct conference at Project site to comply with requirements in Division 01.

1.5 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 stabilized moisture content.
- C. Handle acoustical panels carefully to avoid chipping edges or damaging units in any way.

1.6 PROJECT 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.

1.7 COORDINATION

- A. Coordinate layout and installation of acoustical panels and suspension system with other construction that penetrates ceilings or is supported by them, including light fixtures, HVAC equipment, fire-suppression system, and partition assemblies.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
 - 1. Armstrong Ceilings.
 - 2. CertainTeed Ceilings.
 - 3. USG.

2.2 ACOUSTICAL PANELS, GENERAL

- A. Acoustical Ceiling Type ACT1: Fissured Mineral.
 - 1. Manufacturer and Model Number:
 - a. Armstrong, Fine Fissured High Acoustics No. 1754, Basis of Design.
 - b. CertainTeed Ceilings, Fine Fissured High NRC, HHF-457 HNRC.
 - c. USG, Radar Climaplus High CAC, High NRC
 - 2. Panel Size: 24 inches by 24 inches by 5/8 inch.
 - 3. Panel Mounting: Flush with grid.
 - 4. Ceiling Attenuation Class (CAC): Not less than 35.
 - 5. Noise Reduction (NRC): Not be less than 0.70.
 - 6. Light Reflectance: Not be less than 82%.
 - 7. Mold and Mildew: Complying with ASTM D 3273.
 - 8. Moisture Resistant of Non-Directional Fissures: Complying with ASTM E 1264.
 - 9. Color: White.
 - 10. Grid Material: Painted steel with aluminum cap.
 - 11. Grid Face Width: 15/16 inch.

2.3 METAL SUSPENSION SYSTEMS

- 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.
 - 1. Structural Classification: Intermediate-duty system.
 - 2. End Condition of Cross Runners: Override (stepped) or butt-edge type.
 - 3. Face Design: Flat, flush.
 - 4. Cap Material: Steel or aluminum cold-rolled sheet.
 - 5. Color: White, prefinished.
 - 6. Grid Face Width: As specified with ACT type.
- B. Type B: Wide-Face, Aluminum Capped, Double Web, Hot-Dip Galvanized G60, Steel Suspension System. Main and cross runners roll formed cold-rolled steel sheet, hot-dip galvanized ASTM A 653/A 653 M, G60 coating, with prefinished, cold-rolled, 16/15 inch wide aluminum caps on flanges.
 - 1. Structural Classification: Intermediate duty system.

2. Face Design: Flat, flush.
 3. Face Finish: Painted white.
 4. Locations: For use with ACT-3.
 5. Products:
 - a. Armstrong World Industries, Inc.; Prelude XL, 301WA Series.
 - b. Chicago Metallic Corporation; Fire Front 1030 System.
 - c. USG Interiors, Inc.; ZXLA System.
- C. Attachment Devices: Size for five times the design load indicated in ASTM C 635, Table 1, "Direct Hung," unless otherwise indicated.
1. Anchors in Concrete: Anchors 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 per ASTM E 488 or ASTM E 1512 as applicable, conducted by a qualified testing and inspecting agency; zinc-plated for Class SC1 service.
 2. 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 per ASTM E 1190, conducted by a qualified testing and inspecting agency.
- D. 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, Table 1, "Direct Hung") will be less than yield stress of wire, but provide not less than 0.106 diameter wire.
- E. Hold-Down Clips: At vestibules and areas subject to wind uplift, provide manufacturer's standard hold-down clips spaced 24 inches on all cross tees.

2.4 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 fit acoustical panel edge details and suspension systems indicated; formed from sheet metal of same material, finish, and color as that used for exposed flanges of suspension system runners.
1. For lay-in panels with reveal edge details, provide stepped edge molding that forms reveal of same depth and width as that formed between edge of panel and flange at exposed suspension member.
 2. For circular penetrations of ceiling, provide edge moldings fabricated to diameter required to fit penetration exactly.
 3. For narrow-face suspension systems, provide suspension system and manufacturer's standard edge moldings that match width and configuration of exposed runners.
- B. Suspension Trim: Subject to compliance with requirements, provide one of the following:
1. Armstrong World Industries, Inc.; Axiom.
 2. CertainTeed Ceilings; Approved equal.
 3. USG Interiors, Inc.; Compasso.

2.5 ACOUSTICAL SEALANT

- A. Acoustical Sealant, for Concealed Joints: Manufacturer's standard nondrying, nonhardening, nonskinning, nonstaining, gunnable, joint sealant, recommended for sealing interior concealed joints to reduce airborne sound transmission.

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. 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 per manufacturer's written instructions and Cisca's "Ceiling Systems Handbook."
- B. Suspend ceiling hangers from building's structural members and as follows:
 - 1. 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.
 - 2. Splay hangers only where required to miss obstructions; offset resulting horizontal forces by bracing, countersplaying, or other equally effective means.
 - 3. 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. Size supplemental suspension members and hangers to support ceiling loads within performance limits established by referenced standards and publications.
 - 4. 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.
 - 5. 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.
 - 6. Do not attach hangers to steel deck tabs.
 - 7. Space hangers not more than 48 o.c. along each member supported directly from hangers, unless otherwise indicated; provide hangers not more than 8 inches from ends of each member.
- C. Install edge moldings and trim of type indicated at perimeter of acoustical ceiling area and where necessary to conceal edges of acoustical panels.

1. Apply acoustical sealant in a continuous ribbon concealed on back of vertical legs of moldings before they are installed.
 2. Screw 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.
 3. Do not use exposed fasteners, including pop rivets, on moldings and trim.
- D. Install suspension system runners so they are square and securely interlocked with one another. Remove and replace dented, bent, or kinked members.
- E. 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. 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.
 2. Install hold-down clips in areas indicated, in areas required by authorities having jurisdiction, and for fire-resistance ratings; space as recommended by panel manufacturer's written instructions, unless otherwise indicated.

3.4 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.

END OF SECTION 095100

SECTION 096510 - RESILIENT FLOORING AND ACCESSORIES

PART 1 - GENERAL

1.1 GENERAL PROVISIONS

- A. Attention is directed to the CONTRACT AND GENERAL CONDITIONS and all Sections within DIVISION 01 - GENERAL REQUIREMENTS which are hereby made a part of this Section of the Specifications.

1.2 DESCRIPTION OF WORK

- A. Work Included: Provide labor, materials and equipment necessary to complete the work of this Section, including but not limited to the following:
 - 1. Resilient flooring.
 - 2. Resilient wall base and accessories.
 - 3. Substrate preparation for resilient flooring and accessories.
- B. Related Work: The following items are not included in this Section and are specified under the designated Sections:
 - 1. Division 09 – CARPET TILE

1.3 PERFORMANCE REQUIREMENTS

- A. Wet Dynamic Coefficient of Friction: For flooring exposed as a walking surface, provide products with the following values as determined by testing identical products per ANSI/ NFSI B101.3 - 2012 Test Method for Measuring Wet DCOF of Common Hard-Surface Floor Materials, or ANSI 326.3 - American National Standard Test Method for Measuring Dynamic Coefficient of Friction of Hard Surface Materials - 2017. Testing by other methods or earlier editions of the specified test method is not acceptable.
 - 1. Wet Dynamic Coefficient of Friction: Not less than 0.43.

1.4 SUBMITTALS

- A. Product Data: For each type of product indicated.
- B. Shop Drawings: For each type of floor covering. Include floor covering layouts, locations of seams, edges, columns, doorways, enclosing partitions, built-in furniture, cabinets, and cutouts.
 - 1. Show details of special patterns.
- C. Samples for Verification: Full-size units of each color and pattern of resilient flooring required.
 - 1. Resilient Tile Flooring: For heat-welding bead, manufacturer's standard-size Samples, but not less than 9 inches long, of each color required.
 - 2. Resilient Wall Base and Accessories: Manufacturer's standard-size Samples, but not less than 12 inches long, of each resilient product color and pattern required.
- D. Seam Samples for Sheet Flooring: For seamless-installation technique indicated and for each floor covering product, color, and pattern required; with seam running lengthwise and in center of 6-by-9-inch. Sample applied to a rigid backing and prepared by Installer for this Project.

- E. Maintenance Data: For resilient products to include in maintenance manuals.
- F. Substitutions: All substitutions to the specified product must be approved by the architect during bidding.

1.5 QUALITY ASSURANCE

- A. Fire-Test-Response Characteristics: Provide products identical to those tested for fire-exposure behavior per test method indicated by a testing and inspecting agency acceptable to authorities having jurisdiction.

1.6 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. Store tiles on flat surfaces.

1.7 PROJECT CONDITIONS

- A. Maintain 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 postinstallation period, maintain temperatures within range recommended by manufacturer, but not less than 55 deg F or more than 95 deg F.
- C. Close spaces to traffic during floor covering installation.
- D. Close spaces to traffic for 48 hours after floor covering installation.
- E. Install resilient products after other finishing operations, including painting, have been completed.

PART 2 - PRODUCTS

2.1 RESILIENT TILE FLOORING

- A. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
 - 1. Nora, Castello, Basis of Design.
 - 2. Size: 1004 millimeters by 1004 millimeters.
 - 3. Thickness: 3.6mm (~0.14in).
 - 4. Slip Resistance: ASTM D2047, Minimum 0.5 SCOF, Minimum
 - 5. Flammability: ASTM E 648/NFPA 253: Class 1.
 - 6. Smoke Density: ASTM E 662/NFPA 258, less than 450.
 - 7. Style and Colors: As indicated on the Materials Legend -RT1.

2.2 RESILIENT WALL BASE

- A. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

1. Tarkett Inc., (formerly Johnsonite).
- B. Basis of Design: Tarkett; Johnsonite Millwork, Thermoset Rubber Wall Base.
- C. Resilient Wall Base: ASTM F 1861, Type TS (rubber, vulcanized thermoset), Group I (solid, homogeneous). PVC-free.
 1. Shape: Straight (toeless)
 2. Minimum Thickness: 0.25 inch.
 3. Height: 6 inches.
 4. Lengths: Cut lengths 96 inches long or coils in manufacturer's standard length.
 5. Outside Corners: Premolded.
 6. Inside Corners: Premolded.
 7. Surface: Smooth.
 8. Style and Colors: As indicated on the Materials Legend -RB1.

2.3 RESILIENT MOLDING ACCESSORY

- A. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
 1. Johnsonite, a division of Tarkett, Basis of Design.
- B. Types Include the Following as Applicable: Carpet edge for glue-down applications, nosing for carpet, nosing for resilient floor covering, reducer strip for resilient floor covering, joiner for tile and carpet.
 1. Material: Rubber. PVC-free.
 2. Profile and Dimensions: As indicated.

2.4 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.
 1. Basis of Design: Mapei; Mapecem Premix.
- B. Adhesives: Water-resistant type recommended by manufacturer to suit resilient products and substrate conditions indicated.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates, with Installer present, for compliance with requirements for installation tolerances, moisture content, and other conditions affecting performance.
 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.
 2. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

- A. Prepare substrates according to manufacturer's written recommendations 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. Alkalinity and Adhesion Testing: Perform tests recommended by flooring manufacturer. Proceed with installation only after substrate alkalinity falls within a range on pH scale not less than 5 or more than 9 pH, or as otherwise required in writing by manufacturer of flooring.
 - 3. Moisture Vapor Emission Testing:
 - a. Perform anhydrous calcium chloride test, ASTM F 1869. Proceed with installation only after substrates have maximum moisture-vapor-emission rate of 3 lb of water/1000 sq. ft. in 24 hours, or as otherwise required in writing by manufacturer of flooring.
 - 4. Relative Humidity Testing:
 - a. Perform relative humidity test, ASTM F 2170. Proceed with installation only after substrates have a maximum relative humidity level of 75 percent, or as otherwise required in writing by manufacturer of flooring.
 - 5. Perform tests indicated above and as recommended by flooring manufacturer. Proceed with installation only after substrates pass testing.
- C. Remove substrate coatings and other substances that are incompatible with adhesives and that contain soap, wax, oil, or silicone, using mechanical methods recommended by manufacturer. Do not use solvents.
- D. Use trowelable leveling and patching compound to fill cracks, holes, and depressions in substrates.
 - 1. Slope floor where indicated on Drawings.
- E. Move resilient products and installation materials into spaces where they will be installed at least 48 hours in advance of installation.
 - 1. Do not install resilient products until they are same temperature as space where they are to be installed.
- F. Sweep and vacuum clean substrates to be covered by resilient products immediately before installation. After cleaning, examine substrates for moisture, alkaline salts, carbonation, and dust. Proceed with installation only after unsatisfactory conditions have been corrected.

3.3 TILE INSTALLATION

- A. Lay out 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 in pattern indicated.
- B. Match 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.
- C. Scribe, cut, and fit tiles to butt neatly and tightly to vertical surfaces and permanent fixtures including built-in furniture, cabinets, pipes, outlets, edgings, doorframes, thresholds, and nosings.

- D. Extend tiles into toe spaces, door reveals, closets, and similar openings.
- E. Maintain reference markers, holes, and openings that are in place or marked for future cutting by repeating on floor tiles as marked on substrates. Use chalk or other nonpermanent, nonstaining marking device.
- F. Install tiles on covers for telephone and electrical ducts and similar items in finished floor areas. Maintain overall continuity of color and pattern with pieces of tile installed on covers. Tightly adhere tile edges to substrates that abut covers and to cover perimeters.
- G. Adhere tiles to flooring substrates using a full spread of adhesive applied to substrate to produce a completed installation without open cracks, voids, raising and puckering at joints, telegraphing of adhesive spreader marks, and other surface imperfections.

3.4 RESILIENT WALL BASE INSTALLATION

- A. Apply wall base to walls, columns, pilasters, casework and cabinets in toe spaces, and other permanent fixtures in rooms and areas where base is required.
- B. Install wall base in lengths as long as practicable without gaps at seams and with tops of adjacent pieces aligned.
- C. Tightly adhere wall base to substrate throughout length of each piece, with base in continuous contact with horizontal and vertical substrates.
- D. Do not stretch wall base during installation.
- E. On masonry surfaces or other similar irregular substrates, fill voids along top edge of wall base with manufacturer's recommended adhesive filler material.
- F. Premolded Corners: Install premolded corners before installing straight pieces.

3.5 RESILIENT ACCESSORY INSTALLATION

- A. Resilient Molding Accessories: Butt to adjacent materials and tightly adhere to substrates throughout length of each piece. Install reducer strips at edges of floor coverings that would otherwise be exposed.

3.6 CLEANING AND PROTECTION

- A. Perform the following operations immediately after completing resilient product installation:
 1. Remove adhesive and other blemishes from exposed surfaces.
 2. Sweep and vacuum surfaces thoroughly.
 3. Damp-mop surfaces to remove marks and soil.
 - a. Do not wash surfaces until after time period recommended by manufacturer.
- B. Protect resilient products from mars, marks, indentations, and other damage from construction operations and placement of equipment and fixtures during remainder of construction period. Use protection methods recommended in writing by manufacturer.
 1. Do not apply protective floor polish.

2. Cover products installed on horizontal surfaces with undyed, untreated building paper until Substantial Completion.
3. Do not move heavy and sharp objects directly over surfaces. Place hardboard or plywood panels over flooring and under objects while they are being moved. Slide or roll objects over panels without moving panels.

END OF SECTION 096510

SECTION 096810 - TILE CARPETING

PART 1 - GENERAL

1.1 GENERAL PROVISIONS

- A. Attention is directed to the CONTRACT AND GENERAL CONDITIONS and all Sections within DIVISION 01 - GENERAL REQUIREMENTS which are hereby made a part of this Section of the Specifications.

1.2 DESCRIPTION OF WORK

- A. Work Included: Provide labor, materials and equipment necessary to complete the work of this Section, including but not limited to the following:
 - 1. Carpet tile.
 - 2. Walk off Mat Tile
 - 3. Carpet accessories.
 - 4. Substrate preparation for carpet and accessories.
- B. Related Work: The following items are not included in this Section and are specified under the designated Sections:
 - 1. Section 096510 - RESILIENT FLOORING AND ACCESSORIES for resilient wall base and accessories installed with carpet.

1.3 SUBMITTALS

- A. Product Data: For each type of product indicated.
 - 1. Include manufacturer's written data on physical characteristics, durability, and fade resistance. Include installation recommendations for each type of substrate required.
- B. Shop Drawings: Show the following:
 - 1. Columns, doorways, enclosing walls or partitions, built-in cabinets, and locations where cutouts are required in carpet.
 - 2. Carpet type, color, and dye lot.
 - 3. Seam locations, types, and methods.
 - 4. Type of subfloor.
 - 5. Type of installation.
 - 6. Pattern type, repeat size, location, direction, and starting point.
 - 7. Pile direction.
 - 8. Type, color, and location of insets and borders.
 - 9. Type, color, and location of edge, transition, and other accessory strips.
 - 10. Transition details to other flooring materials.
- C. Samples: For each of the following products and for each color and texture required. Label each Sample with manufacturer's name, material description, color, pattern, and designation indicated on Drawings and in schedules.
 - 1. Carpet Tile: Full-size Sample.
 - 2. Exposed Edge, Transition, and other Accessory Stripping: 12-inch-long Samples.

- D. Product Schedule: Use same room and product designations indicated on Drawings and in schedules.
- E. Sample Warranties: For special warranties.
- F. Maintenance Data: For carpet to include in maintenance manuals specified in Division 01. Include the following:
 - 1. Methods for maintaining carpet, including cleaning and stain-removal products and procedures and manufacturer's recommended maintenance schedule.
 - 2. Precautions for cleaning materials and methods that could be detrimental to carpet.

1.4 QUALITY ASSURANCE

- A. Carpeting Standard: Comply with the Carpet and Rug Institute's "CRI Carpet Installation Standard," 2011 edition, formerly CRI 104 "Standard For Installation Specification Of Commercial Carpet."
- B. Installer Qualifications: An experienced installer who is certified by the Floor Covering Installation Board or who can demonstrate compliance with its certification program requirements.
- C. Mockups: Before installing carpet, build mockups to verify selections made under sample submittals and to demonstrate aesthetic effects and set quality standards for materials and execution.
 - 1. Approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

1.5 DELIVERY, STORAGE, AND HANDLING

- A. General: Comply with CRI Carpet Installation Standard, Section 5, "Storage and Handling."
- B. Deliver carpet in original mill protective covering with mill register numbers and tags attached.

1.6 PROJECT CONDITIONS

- A. General: Comply with CRI Carpet Installation Standard, Section 7, "Site Conditions."
- B. Environmental Limitations: Do not install carpet until wet work in spaces is complete and dry, and ambient temperature and humidity conditions are maintained at the levels indicated for Project when occupied for its intended use.
- C. Do not install carpet over concrete slabs until slabs have cured and are sufficiently dry to bond with adhesive and concrete slabs have pH range recommended by carpet manufacturer.
- D. Where demountable partitions, equipment, or other items are indicated for installation on top of carpet, install carpet before installing these items.

1.7 WARRANTY

- A. General Warranty: Special warranty specified in this Article shall not deprive the Owner of other rights the Owner may have under other provisions of the Contract Documents and shall be

in addition to, and run concurrent with, other warranties made by Contractor under requirements of the Contract Documents.

- B. Special Carpet Warranty: Written warranty, signed by carpet manufacturer agreeing to replace carpet that does not comply with requirements or that fails within specified warranty period. Warranty does not include deterioration or failure of carpet due to unusual traffic, failure of substrate, vandalism, or abuse. Failures include, but are not limited to, more than 10 percent loss of face fiber, edge raveling, snags, runs, and delamination.
 - 1. Warranty Period: Ten years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 CARPET

- A. Carpet Products: Subject to compliance with requirements, provide one of the following:
 - 1. Carpet Types: Refer to Materials Legend and Room Finish Schedule on drawings.

2.2 WALK OFF MAT

- A. Walk off Mat Products: Subject to compliance with requirements, provide one of the following:
 - 1. Walk off Mat Types: Refer to Materials Legend and Room Finish Schedule on drawings.

2.3 INSTALLATION ACCESSORIES

- A. Trowelable Leveling and Patching Compounds: Latex-modified, hydraulic-cement-based formulation provided by or recommended by the carpet manufacturer.
- B. Adhesives: Water-resistant, mildew-resistant, nonstaining type to suit products and subfloor conditions indicated, that complies with flammability requirements for installed carpet and that is recommended by carpet manufacturer.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements for maximum moisture content, alkalinity range, installation tolerances, and other conditions affecting carpet performance. Verify that substrates and conditions are satisfactory for carpet installation and comply with requirements specified.
- B. Examine carpet for type, color, pattern, and potential defects.
- C. Concrete Subfloors: Comply with CRI Carpet Installation Standard, Section 9, "Testing Concrete Substrates." Verify that concrete slabs comply with ASTM F 710 and the following:
 - 1. Slab substrates are dry and free of curing compounds, sealers, hardeners, and other materials that may interfere with adhesive bond. Determine adhesion and dryness characteristics by performing bond and moisture tests recommended by the carpet manufacturer.
 - 2. Subfloors are free of cracks, ridges, depressions, scale, and foreign deposits.
- D. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

- A. General: Comply with CRI Carpet Installation Standard, Section 7.3, "Site Conditions; Floor Preparation," and carpet manufacturer's written installation instructions for preparing substrates indicated to receive carpet installation.
- B. Concrete Substrates: Prepare according to ASTM F 710.
 - 1. Verify that substrates are dry and free of curing compounds, sealers, and hardeners.
 - 2. Alkalinity and Adhesion Testing: Perform tests recommended by flooring manufacturer. Proceed with installation only after substrate alkalinity falls within a range on pH scale not less than 5 or more than 9 pH, or as otherwise required in writing by manufacturer of flooring.
 - 3. Moisture Vapor Emission Testing:
 - a. Perform anhydrous calcium chloride test, ASTM F 1869. Proceed with installation only after substrates have maximum moisture-vapor-emission rate of 3 lb of water/1000 sq. ft. in 24 hours, or as otherwise required in writing by manufacturer of flooring.
 - 4. Relative Humidity Testing:
 - a. Perform relative humidity test, ASTM F 2170. Proceed with installation only after substrates have a maximum relative humidity level of 75 percent, or as otherwise required in writing by manufacturer of flooring.
 - 5. Perform tests indicated above and as recommended by flooring manufacturer. Proceed with installation only after substrates pass testing.
- C. Use trowelable leveling and patching compounds, according to manufacturer's written instructions, to fill cracks, holes, and depressions in substrates.
- D. Broom and vacuum clean substrates to be covered immediately before installing carpet. After cleaning, examine substrates for moisture, alkaline salts, carbonation, or dust. Proceed with installation only after unsatisfactory conditions have been corrected.

3.3 INSTALLATION

- A. Carpet Tile: Comply with CRI Carpet Installation Standard, Section 18, "Modular Carpet," and with carpet tile manufacturer's written installation instructions.
 - 1. Installation Method, for Adhesive: Partial glue down; install periodic tiles with releasable, pressure-sensitive adhesive.
 - 2. Installation Method, for Adhesive Film: Free lay; apply adhesive film squares at corners of tiles.
 - a. Do not install tiles with adhesive film at stair and ramp locations.
 - b. Do not install tiles with adhesive film over existing carpets.
 - 3. Installation Method, for No Adhesives: Free lay; press tiles firmly.
 - a. Do not install tiles without adhesive at stair and ramp locations.
 - b. Do not install tiles without adhesive over existing carpets.
 - 4. Carpet Tile Pattern: As directed by Architect.
 - 5. Maintain dye lot integrity. Do not mix dye lots in same area.
- B. Walk Off Mat Tile: Comply with CRI Carpet Installation Standard, Section 18, "Modular Carpet," and with carpet tile manufacturer's written installation instructions.
 - 1. Installation Method, for Adhesive: Partial glue down; install periodic tiles with releasable, pressure-sensitive adhesive.

2. Installation Method, for Adhesive Film: Free lay; apply adhesive film squares at corners of tiles.
 - a. Do not install tiles with adhesive film at stair and ramp locations.
 - b. Do not install tiles with adhesive film over existing carpets.
 3. Installation Method, for No Adhesives: Free lay; press tiles firmly.
 - a. Do not install tiles without adhesive at stair and ramp locations.
 - b. Do not install tiles without adhesive over existing carpets.
 4. Carpet Tile Pattern: As directed by Architect.
 5. Maintain dye lot integrity. Do not mix dye lots in same area.
- C. Install pattern parallel to walls and borders.
- D. Do not bridge building expansion joints with carpet.
- E. Cut and fit carpet to butt tightly to vertical surfaces, permanent fixtures, and built-in furniture including cabinets, pipes, outlets, edgings, thresholds, and nosings. Bind or seal cut edges as recommended by carpet manufacturer.
- F. Extend carpet into toe spaces, door reveals, closets, open-bottomed obstructions, removable flanges, alcoves, and similar openings.
- G. Maintain reference markers, holes, and openings that are in place or marked for future cutting by repeating on finish flooring as marked on subfloor. Use nonpermanent, nonstaining marking device.

3.4 CLEANING AND PROTECTION

- A. Perform the following operations immediately after installing carpet:
1. Remove excess adhesive, seam sealer, and other surface blemishes using cleaner recommended by carpet manufacturer.
 2. Remove yarns that protrude from carpet surface.
 3. Vacuum carpet using commercial machine with face-beater element and HEPA filter.
- B. Protect installed carpet to comply with CRI Carpet Installation Standard, Section 20, "Protecting Indoor Installations."
- C. Protect carpet against damage from construction operations and placement of equipment and fixtures during the remainder of construction period. Use protection methods indicated or recommended in writing by carpet manufacturer.

END OF SECTION 096810

This Page Intentionally Left Blank.

SECTION 098433 - ACOUSTIC WALL UNITS

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 shop-fabricated, acoustical panel units tested for acoustical performance, including the following:

Acoustic wall panels.

1.3 DEFINITIONS

- A. NRC: Noise Reduction Coefficient.
- B. SAA: Sound Absorption Average.

1.4 PREINSTALLATION MEETINGS

- A. Preinstallation Conference: Conduct conference at 250 Goddard Road Lewiston, Maine.

1.5 ACTION SUBMITTALS

- A. Product Data: For each type of product.
 - 1. Include panel, panel edge, and mounting indicated.
- B. Sustainable Design Submittals:
 - 1. Minimum 60% Recycled Content
- C. Shop Drawings: For unit assembly and installation.
 - 1. Include plans, elevations, sections, and mounting devices and details.
 - 2. Include details at panel head, base, joints, and corners; and details at ceiling, floor base, and wall intersections. Indicate panel edge profile and core materials.
 - 3. Include details at cutouts and penetrations for other work.

1.6 CLOSEOUT SUBMITTALS

- A. Maintenance Data: For each type of unit to include in maintenance manuals. Include fabric manufacturers' written cleaning and stain-removal instructions.

1.7 QUALITY ASSURANCE

- A. Mockups: Build mockups to verify selections made under Sample submittals, to demonstrate aesthetic effects, and to set quality standards for materials, fabrication, and installation.
 - 1. Subject to compliance with requirements, approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

1.8 DELIVERY, STORAGE, AND HANDLING

- A. Comply with fabric and unit manufacturers' written instructions for minimum and maximum temperature and humidity requirements for shipment, storage, and handling.
- B. Deliver materials and units in unopened bundles and store in a temperature-controlled dry place with adequate air circulation.

1.9 FIELD CONDITIONS

- A. Environmental Limitations: Do not install units until spaces are enclosed and weathertight, wet-work in spaces is complete and dry, work at and above ceilings is complete, and ambient temperature and humidity conditions are maintained at the levels indicated for Project when occupied for its intended use.
- B. Air-Quality Limitations: Protect units from exposure to airborne odors, such as tobacco smoke, and install units under conditions free from odor contamination of ambient air.

1.10 WARRANTY

- A. Special Warranty: Manufacturer agrees to repair or replace units and components that fail in materials or workmanship within specified warranty period.
 - 1. Failures include, but are not limited to the following:
 - a. Acoustical performance.
 - b. Fabric sagging, distorting, or releasing from panel edge.
 - c. Warping of core.
 - 2. Warranty Period: Twenty years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Source Limitations: Obtain wall units specified in this Section from single source from single manufacturer.

2.2 PERFORMANCE REQUIREMENTS

- A. Certified Red List Free
- B. Minimum 60% Recycled Content
- C. Fire-Test-Response Characteristics: Units shall comply with "Surface-Burning Characteristics" or "Fire Growth Contribution" Subparagraph below, or both, as determined by testing identical products by UL or another testing and inspecting agency acceptable to authorities having jurisdiction:
 - 1. Surface-Burning Characteristics: Comply with ASTM E84 or UL 723; testing by a qualified testing agency. Identify products with appropriate markings of applicable testing agency.
 - a. Flame-Spread Index: 25 or less.
 - b. Smoke-Developed Index: 450 or less.
 - 2. Fire Growth Contribution: Comply with acceptance criteria of local code and authorities having jurisdiction when tested according to NFPA 265 Method B Protocol or NFPA 286.

2.3 ACOUSTIC WALL UNITS

- A. Acoustic Wall Panel AWP1: Manufacturer's standard panel construction consisting of polyester felt.
 - 1. Acoufelt Quietform, Basis of Design
 - 2. Panel Shape: Rectangular in Elevation, Scalloped in Plan
 - 3. Mounting: Back mounted with manufacturer approved construction adhesive.
 - 4. Edge Construction: Manufacturer's standard Reveals between Panels: as indicated on drawings
 - 5. Acoustical Performance: Sound absorption NRC of not less than .45
 - 6. Nominal Overall Panel Thickness: 12mm
 - 7. Panel Width: 48 inches (1220 mm)

8. Panel Height: As indicated on Drawings

2.4 MATERIALS

- A. Materials: Manufacturer's Standard FilaSorb Polyester Felt
- B. Mounting Devices: Concealed on back of unit, recommended by manufacturer to support weight of unit, and as follows:
 1. Construction Adhesive: Manufacturer Approved Construction Adhesive

2.5 FABRICATION

- A. Standard Construction: Use manufacturer's standard construction unless otherwise indicated; with facing material applied to face, edges, and back border of dimensionally stable core; and with rigid edges to reinforce panel perimeter against warpage and damage.
 - 1.
- B. Dimensional Tolerances of Finished Units: Plus or minus 1/16 inch (1.6 mm) for the following:
 1. Thickness.
 2. Edge straightness.
 3. Overall length and width.
 4. Squareness from corner to corner.
 5. Chords, radii, and diameters.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine fabric, fabricated units, substrates, areas, and conditions for compliance with requirements, installation tolerances, and other conditions affecting unit performance.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

- A. Install units in locations indicated. Unless otherwise indicated, install units with vertical surfaces and edges plumb, top edges level and in alignment with other units, faces flush, and scribed to fit adjoining work accurately at borders and at penetrations.
- B. Comply with manufacturer's written instructions for installation of units using type of mounting devices indicated. Mount units securely to supporting substrate.

3.3 INSTALLATION TOLERANCES

- A. Variation from Plumb and Level: Plus or minus 1/16 inch in 48 inches, noncumulative.
- B. Variation of Joint Width: Not more than 1/16-inch variation from hairline in 48 inches, noncumulative.

3.4 CLEANING

- A. Clip loose threads; remove pills and extraneous materials.
- B. Clean panels on completion of installation to remove dust and other foreign materials according to manufacturer's written instructions.

END OF SECTION 098433

This Page Left Intentionally Blank

SECTION 099000 - PAINTING AND COATING

PART 1 - GENERAL

1.1 GENERAL PROVISIONS

- A. Attention is directed to the CONTRACT AND GENERAL CONDITIONS and all Sections within DIVISION 01 - GENERAL REQUIREMENTS which are hereby made a part of this Section of the Specifications.

1.2 DESCRIPTION OF WORK

- A. Work Included: Provide labor, materials and equipment necessary to complete the work of this Section, including but not limited to the following:
 - 1. Field painting of exposed interior items and surfaces.
 - 2. Field painting of exposed exterior items and surfaces.
 - 3. Surface preparation for painting.
- B. Related Work: The following items are not included in this Section and are specified under the designated Sections:
 - 1. Division 06 for shop priming interior architectural woodwork.
 - 2. Section 081110 - HOLLOW METAL DOORS AND FRAMES for factory priming steel doors and frames.
 - 3. Section 092900 - GYPSUM BOARD ASSEMBLIES for surface preparation of gypsum board.

1.3 DEFINITIONS AND EXTENT

- A. General: Standard coating terms defined in ASTM D 16 apply to this Section.
 - 1. Flat refers to a lusterless or matte finish with a gloss range below 15 when measured at an 85-degree meter.
 - 2. Eggshell refers to low-sheen finish with a gloss range between 20 and 35 when measured at a 60-degree meter.
 - 3. Semigloss refers to medium-sheen finish with a gloss range between 35 and 70 when measured at a 60-degree meter.

4. Full gloss refers to high-sheen finish with a gloss range more than 70 when measured at a 60-degree meter.
- B. This Section includes surface preparation and field painting of exposed exterior and interior items and surfaces.
1. Surface preparation, priming, and finish coats specified in this Section are in addition to shop priming and surface treatment specified in other Sections.
- C. Paint exposed surfaces, except where these Specifications indicate that the surface or material is not to be painted or is to remain natural. If an item or a surface is not specifically mentioned, paint the item or surface the same as similar adjacent materials or surfaces. If a color of finish is not indicated, Architect will select from standard colors and finishes available.
1. Painting includes field painting of exposed bare and covered pipes and ducts (including color coding), hangers, exposed steel and iron supports, and surfaces of mechanical and electrical equipment that do not have a factory-applied final finish.
- D. Do NOT paint prefinished items, concealed surfaces, finished metal surfaces, operating parts, and labels.
1. Prefinished items include the following factory-finished components:
 - a. Architectural woodwork.
 - b. Acoustical wall panels.
 - c. Toilet enclosures.
 - d. Metal lockers.
 - e. Kitchen appliances.
 - f. Finished mechanical and electrical equipment.
 - g. Light fixtures.
 2. Concealed surfaces include walls or ceilings in the following generally inaccessible spaces:
 - a. Foundation spaces.
 - b. Furred areas.
 - c. Ceiling plenums.
 - d. Utility tunnels.
 - e. Pipe spaces.
 - f. Duct shafts.

3. Finished metal surfaces include the following:
 - a. Anodized aluminum.
 - b. Stainless steel.
 - c. Chromium plate.
 - d. Copper and copper alloys.
 - e. Bronze and brass.
4. Operating parts include moving parts of operating equipment and the following:
 - a. Valve and damper operators.
 - b. Linkages.
 - c. Sensing devices.
 - d. Motor and fan shafts.
5. Labels: Do not paint over UL, FMG, or other code-required labels or equipment name, identification, performance rating, or nomenclature plates.

1.4 SUBMITTALS

- A. Product Data: For each paint system indicated. Include block fillers and primers.
 1. Material List: An inclusive list of required coating materials. Indicate each material and cross-reference specific coating, finish system, and application. Identify each material by manufacturer's catalog number and general classification.
 2. Manufacturer's Information: Manufacturer's technical information, including label analysis and instructions for handling, storing, and applying each coating material.
- B. Samples for Verification: For each color and material to be applied, with texture to simulate actual conditions, on representative Samples of the actual substrate.
 1. Provide stepped Samples, defining each separate coat, including block fillers and primers. Use representative colors when preparing Samples for review. Resubmit until required sheen, color, and texture are achieved.
 2. Provide a list of materials and applications for each coat of each Sample. Label each Sample for location and application.
 3. Submit two 8 inch by 12 inch Samples for each type of finish coating for Architect's review of color and texture only.
- C. Qualification Data: For Applicator.

1.5 QUALITY ASSURANCE

- A. **Applicator Qualifications:** A firm or individual experienced in applying paints and coatings 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 and primers for each coating system from the same manufacturer as the finish coats.
- C. **Mockups:** Provide a full-coat benchmark finish sample for each type of coating and substrate required. Comply with procedures specified in PDCA P5. Duplicate finish of approved sample Submittals.
 - 1. Architect will select one room or surface to represent surfaces and conditions for application of each type of coating and substrate.
 - a. **Wall Surfaces:** Provide samples on at least 100 sq. ft.
 - b. **Small Areas and Items:** Architect will designate items or areas required.
 - 2. Apply benchmark samples, according to requirements for the completed Work, after permanent lighting and other environmental services have been activated. Provide required sheen, color, and texture on each surface.
 - a. After finishes are accepted, Architect will use the room or surface to evaluate coating systems of a similar nature.
 - 3. Final approval of colors will be from benchmark samples.

1.6 DELIVERY, STORAGE, AND HANDLING

- A. Deliver materials to Project site in manufacturer's original, unopened packages and containers bearing manufacturer's name and label and the following information:
 - 1. Product name or title of material.
 - 2. Product description (generic classification or binder type).
 - 3. Manufacturer's stock number and date of manufacture.
 - 4. Contents by volume, for pigment and vehicle constituents.
 - 5. Thinning instructions.
 - 6. Application instructions.
 - 7. Color name and number.
 - 8. VOC content.

- B. Store materials not in use in tightly covered containers in a well-ventilated area at a minimum ambient temperature of 45 deg F. Maintain storage containers in a clean condition, free of foreign materials and residue.
 - 1. Protect from freezing. Keep storage area neat and orderly. Remove oily rags and waste daily.

1.7 PROJECT CONDITIONS

- A. Apply waterborne paints only when temperatures of surfaces to be painted and surrounding air are between 50 and 90 deg F.
- B. Apply solvent-thinned paints only when temperatures of surfaces to be painted and surrounding air are between 45 and 95 deg F.
- C. Do not apply paint in snow, rain, fog, or mist; or when relative humidity exceeds 85 percent; or at temperatures less than 5 deg F above the dew point; or to damp or wet surfaces.
 - 1. Painting may continue during inclement weather if surfaces and areas to be painted are enclosed and heated within temperature limits specified by manufacturer during application and drying periods.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Available Products: Subject to compliance with requirements, products that may be incorporated into the Work are listed in the Finish Schedule at the end of this Section.

2.2 PAINT MATERIALS, GENERAL

- A. Material Compatibility: Provide block fillers, primers, and finish-coat materials that are compatible with one another and with the substrates indicated under conditions of service and application, as demonstrated by manufacturer based on testing and field experience.

- B. Material Quality: Provide manufacturer's best-quality paint material of the various coating types specified that are factory formulated and recommended by manufacturer for application indicated. Paint-material containers not displaying manufacturer's product identification will not be acceptable.
 - 1. Proprietary Names: Use of manufacturer's proprietary product names to designate colors or materials is not intended to imply that products named are required to be used to the exclusion of equivalent products of other manufacturers. Furnish manufacturer's material data and certificates of performance for proposed substitutions.
- C. Paint Colors (P#): Refer to Materials Schedule in the Construction Documents.,.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates, areas, and conditions, with Applicator present, for compliance with requirements for paint application.
 - 1. Proceed with paint application only after unsatisfactory conditions have been corrected and surfaces receiving paint are thoroughly dry.
 - 2. Start of painting will be construed as Applicator's acceptance of surfaces and conditions within a particular area.
- B. Coordination of Work: Review other Sections in which primers are provided to ensure compatibility of the total system for various substrates. On request, furnish information on characteristics of finish materials to ensure use of compatible primers.
 - 1. Notify Architect about anticipated problems when using the materials specified over substrates primed by others.

3.2 PREPARATION

- A. General: Remove hardware and hardware accessories, plates, machined surfaces, lighting fixtures, and similar items already installed that are not to be painted. If removal is impractical or impossible because of size or weight of the item, provide surface-applied protection before surface preparation and painting.

1. After completing painting operations in each space or area, reinstall items removed using workers skilled in the trades involved.
- B. Cleaning: Before applying paint or other surface treatments, clean substrates of substances that could impair bond of the various coatings. Remove oil and grease before cleaning.
1. Schedule cleaning and painting so dust and other contaminants from the cleaning process will not fall on wet, newly painted surfaces.
- C. Surface Preparation: Clean and prepare surfaces to be painted according to manufacturer's written instructions and technical bulletins for each particular substrate condition and as specified.
1. Provide barrier coats over incompatible primers or remove and reprime.
 2. Cementitious Materials: Prepare concrete, concrete unit masonry, cement plaster, and mineral-fiber-reinforced cement panel surfaces to be painted. Remove efflorescence, chalk, dust, dirt, grease, oils, and release agents. Roughen as required to remove glaze. If hardeners or sealers have been used to improve curing, use mechanical methods of surface preparation.
 - a. Use abrasive blast-cleaning methods if recommended by paint manufacturer.
 - b. Determine alkalinity and moisture content of surfaces by performing appropriate tests. If surfaces are sufficiently alkaline to cause the finish paint to blister and burn, correct this condition before application. Do not paint surfaces if moisture content exceeds that permitted in manufacturer's written instructions.
 - c. Clean concrete floors to be painted with a 5 percent solution of muriatic acid or other etching cleaner. Flush the floor with clean water to remove acid, neutralize with ammonia, rinse, allow to dry, and vacuum before painting.
 3. Wood: Clean surfaces of dirt, oil, and other foreign substances with scrapers, mineral spirits, and sandpaper, as required. Sand surfaces exposed to view smooth and dust off.
 - a. Scrape and clean small, dry, seasoned knots, and apply a thin coat of white shellac or other recommended knot sealer before applying primer. After priming, fill holes and imperfections in finish surfaces with putty or plastic wood filler. Sand smooth when dried.
 - b. Prime, stain, or seal wood to be painted immediately on delivery. Prime edges, ends, faces, undersides, and back sides of wood, including cabinets, counters, cases, and paneling.

- c. If transparent finish is required, backprime with spar varnish.
 - d. Backprime paneling on interior partitions where masonry, plaster, or other wet wall construction occurs on back side.
 - e. Seal tops, bottoms, and cutouts of unprimed wood doors with a heavy coat of varnish or sealer immediately on delivery.
 - 4. Ferrous Metals: Clean ungalvanized ferrous-metal surfaces that have not been shop coated; remove oil, grease, dirt, loose mill scale, and other foreign substances. Use solvent or mechanical cleaning methods that comply with SSPC's recommendations.
 - a. Exterior Exposed Steel: Clean steel surfaces in accordance with SSPC-SP 6/NACE No. 3 Commercial Blast Cleaning. Abrasive blast cleaned surfaces shall exhibit a uniform, angular profile of 1.5-3.0 mils. Prime cleaned surfaces within 8 hours and prior to surface rusting.
 - b. Interior Exposed Steel, in Humid Environments: Clean steel surfaces in accordance with SSPC-SP 6/NACE No. 3 Commercial Blast Cleaning. Abrasive blast cleaned surfaces shall exhibit a uniform, angular profile of 1.5-3.0 mils. Prime cleaned surfaces within 8 hours and prior to surface rusting.
 - c. Interior Exposed Steel, in Dry Environments: Clean steel surfaces in accordance with SSPC-SP2 or SP3 Hand or Power Tool Cleaning.
 - 5. Galvanized Surfaces: Clean galvanized surfaces in accordance with SSPC-SP16 Brush off Blast Cleaning of Galvanized Steel and NonFerrous Metals, to achieve a minimum 1 mil anchor profile.
- D. Material Preparation: Mix and prepare paint materials according to manufacturer's written instructions.
- 1. Maintain containers used in mixing and applying paint in a clean condition, free of foreign materials and residue.
 - 2. Stir material before application to produce a mixture of uniform density. Stir as required during application. Do not stir surface film into material. If necessary, remove surface film and strain material before using.
 - 3. Use only thinners approved by paint manufacturer and only within recommended limits.
- E. Tinting: Tint each undercoat a lighter shade to simplify identification of each coat when multiple coats of same material are applied. Tint undercoats to match the color of the finish coat, but provide sufficient differences in shade of undercoats to distinguish each separate coat.

3.3 APPLICATION

- A. General: Apply paint according to manufacturer's written instructions. Use applicators and techniques best suited for substrate and type of material being applied.
1. Paint colors, surface treatments, and finishes are indicated in the paint schedules.
 2. Do not paint over dirt, rust, scale, grease, moisture, scuffed surfaces, or conditions detrimental to formation of a durable paint film.
 3. Provide finish coats that are compatible with primers used.
 4. The term "exposed surfaces" includes areas visible when permanent or built-in fixtures, grilles, convector covers, covers for finned-tube radiation, and similar components are in place. Extend coatings in these areas, as required, to maintain system integrity and provide desired protection.
 5. Paint surfaces behind movable equipment and furniture the same as similar exposed surfaces. Before final installation of equipment, paint surfaces behind permanently fixed equipment or furniture with prime coat only.
 6. Paint interior surfaces of ducts with a flat, nonspecular black paint where visible through registers or grilles.
 7. Paint backsides of access panels and removable or hinged covers to match exposed surfaces.
 8. Finish exterior doors and doors in wet areas on tops, bottoms, and side edges the same as exterior faces.
 9. Sand lightly between each succeeding enamel or varnish coat.
- B. Scheduling Painting: Apply first coat to surfaces that have been cleaned, pretreated, or otherwise prepared for painting as soon as practicable after preparation and before subsequent surface deterioration.
1. The number of coats and film thickness required are the same regardless of application method. Do not apply succeeding coats until previous coat has cured as recommended by manufacturer. If sanding is required to produce a smooth, even surface according to manufacturer's written instructions, sand between applications.
 2. Omit primer over metal surfaces that have been shop primed and touchup painted.
 3. If undercoats, stains, or other conditions show through final coat of paint, apply additional coats until paint film is of uniform finish, color, and appearance. Give special attention to ensure that edges, corners, crevices, welds, and exposed fasteners receive a dry film thickness equivalent to that of flat surfaces.
 4. Allow sufficient time between successive coats to permit proper drying. Do not recoat surfaces until paint has dried to where it feels firm, and does not deform or

feel sticky under moderate thumb pressure, and until application of another coat of paint does not cause undercoat to lift or lose adhesion.

- C. Application Procedures: Apply paints and coatings by brush, roller, spray, or other applicators according to manufacturer's written instructions.
 - 1. Brushes: Use brushes best suited for type of material applied. Use brush of appropriate size for surface or item being painted.
 - 2. Rollers: Use rollers of carpet, velvet-back, or high-pile sheep's wool as recommended by manufacturer for material and texture required.
 - 3. Spray Equipment: Use airless spray equipment with orifice size as recommended by manufacturer for material and texture required.
- D. Minimum Coating Thickness: Apply paint materials no thinner than manufacturer's recommended spreading rate to achieve dry film thickness indicated. Provide total dry film thickness of the entire system as recommended by manufacturer.
- E. Mechanical and Electrical Work: Painting of mechanical and electrical work is limited to items exposed in equipment rooms and occupied spaces.
- F. Mechanical items to be painted include, but are not limited to, the following:
 - 1. Uninsulated metal piping.
 - 2. Uninsulated plastic piping.
 - 3. Pipe hangers and supports.
 - 4. Tanks that do not have factory-applied final finishes.
 - 5. Visible portions of internal surfaces of metal ducts, without liner, behind air inlets and outlets.
 - 6. Duct, equipment, and pipe insulation having "all-service jacket" or other paintable jacket material.
 - 7. Mechanical equipment that is indicated to have a factory-primed finish for field painting.
- G. Electrical items to be painted include, but are not limited to, the following:
 - 1. Switchgear.
 - 2. Panelboards.
 - 3. Electrical equipment that is indicated to have a factory-primed finish for field painting.

- H. Block Fillers: Apply block fillers to concrete masonry block at a rate to ensure complete coverage with pores filled.
- I. Prime Coats: Before applying finish coats, apply a prime coat, as recommended by manufacturer, to material that is required to be painted or finished and that has not been prime coated by others. Recoat primed and sealed surfaces where evidence of suction spots or unsealed areas in first coat appears, to ensure a finish coat with no burn-through or other defects due to insufficient sealing.
- J. Pigmented (Opaque) Finishes: Completely cover surfaces as necessary to provide a smooth, opaque surface of uniform finish, color, appearance, and coverage. Cloudiness, spotting, holidays, laps, brush marks, runs, sags, ropiness, or other surface imperfections will not be acceptable.
- K. Transparent (Clear) Finishes: Use multiple coats to produce a glass-smooth surface film of even luster. Provide a finish free of laps, runs, cloudiness, color irregularity, brush marks, orange peel, nail holes, or other surface imperfections.
 - 1. Provide satin finish for final coats.
- L. Completed Work: Match approved samples for color, texture, and coverage. Remove, refinish, or repaint work not complying with requirements.

3.4 FIELD QUALITY CONTROL

- A. The Owner reserves the right to invoke the following test procedure at any time and as often as the Owner deems necessary during the period when paint is being applied:
 - 1. The Owner will engage a qualified independent testing agency to sample paint material being used. Samples of material delivered to Project will be taken, identified, sealed, and certified in the presence of Contractor.
 - 2. Testing agency will perform appropriate tests for the following characteristics as required by the Architect.
 - 3. The Architect may direct Contractor to stop painting if test results show material being used does not comply with specified requirements. Contractor shall remove noncomplying paint from Project site, pay for testing, and repaint surfaces previously coated with the noncomplying paint. If necessary, Contractor may be required to remove noncomplying paint from previously painted surfaces if, on repainting with specified paint, the two coatings are incompatible.

3.5 CLEANING

- A. Cleanup: At the end of each workday, remove empty cans, rags, rubbish, and other discarded paint materials from Project site.
 - 1. After completing painting, clean glass and paint-spattered surfaces. Remove spattered paint by washing and scraping without scratching or damaging adjacent finished surfaces.

3.6 PROTECTION

- A. Protect work of other trades, whether being painted or not, against damage from painting. Correct damage by cleaning, repairing or replacing, and repainting, as approved by Architect.
- B. Provide "Wet Paint" signs to protect newly painted finishes. After completing painting operations, remove temporary protective wrappings provided by others to protect their work.
 - 1. After work of other trades is complete, touch up and restore damaged or defaced painted surfaces. Comply with procedures specified in PDCA P1.

3.7 PAINT SCHEDULE

- A. Schedule: Provide products and number of coats specified. Use of manufacturer's proprietary product names to designate colors, materials, generic class, standard of quality and performance criteria and is not intended to imply that products named are required to be used to the exclusion of equivalent performing products of other manufacturers.
- B. Interior Paint Schedule, Typical:
 - 1. Interior Gypsum Wallboard and Plaster, Latex Paint Finish:
 - a. One Coat, Primer:
 - 1) Imperial Paints ECOS Interior Wall Primer.
 - 2) Moore Ultra Spec 500 Interior Latex Primer 534.
 - 3) PPG Speedhide Zero VOC Interior Primer 6-4900XI.
 - 4) S-W Harmony Interior Primer B11 series.

- 5) S-W ProMar 200 HP Zero VOC Interior Primer.
- b. And Two Coats, Flat Finish: At ceilings and elsewhere as indicated.
 - 1) Imperial Paints ECOS Interior Flat.
 - 2) Moore Ultra Spec 500 Interior Latex Flat 536.
 - 3) PPG Speedhide Zero VOC Interior Latex Flat 6-4110XI.
 - 4) S-W ProMar 400 HP Zero VOC Interior Flat.
- c. And Two Coats, Eggshell Finish: At walls and elsewhere as indicated.
 - 1) Imperial Paints ECOS Interior Eggshell.
 - 2) Moore Ultra Spec 500 Interior Latex Low Sheen 537.
 - 3) PPG Speedhide Zero VOC Interior Latex Eggshell 6-4310XI.
 - 4) S-W ProMar 200 HP Zero VOC Interior Eg-Shel.
- d. And Two Coats, Semi-Gloss Finish: At toilet rooms, other wet areas, and elsewhere as indicated.
 - 1) Imperial Paints ECOS Interior Satin.
 - 2) Moore Ultra Spec 500 Interior Latex Semi-Gloss 539.
 - 3) PPG Speedhide Zero VOC Interior Latex Semi-Gloss 6-4510XI.
 - 4) S-W ProMar 200 HP Zero VOC Interior Semi-Gloss.
2. Interior Metals (Not specified to receive other coating systems/not shop finished), Acrylic Paint Finish:
 - a. One Coat: Approved primer, in shop under other Sections (where specified). If not shop primed, provide primer recommended by finish coating manufacturer.
 - b. And Two Coats:
 - 1) Moore Ultra Spec 500 Interior Latex Semi-Gloss 539.
 - 2) PPG Speedhide Zero VOC Interior Latex Semi-Gloss 6-4510XI.
 - 3) S-W ProMar 200 HP Zero VOC Interior Semi-Gloss.
3. Interior Exposed Steel, Joists, Ductwork, Conduit and Similar Items (where indicated), Dry-Fall or Dry-Fog Painted System:
 - a. One Coat:
 - 1) Moore Latex Dry Fall Flat 395 at 2.5 to 3.0 mils DFT.
 - 2) PPG Speedhide Super Tech WB Interior Dry-Fog Latex 6-725XI Flat at 2.0 to 2.5 mils DFT.

- 3) S-W WB Pro Industrial Waterborne Acrylic Dryfall Flat B42 series at 2.5 to 3.0 mils DFT.
 - 4) Tnemec 115 WB Unibond at 2.5 to 3.0 mils DFT.
- 4. Interior Concrete Floor, Clear Exposed Sealer (Silicate type):
 - a. One Coat:
 - 1) Curecrete Chemical; Ashford Formula.
 - 2) Tnemec (Chem Probe); Series 629 CT Densifyer.
 - 3) WR Meadows; Liqui-Hard.
 - 4) Laticrete; L&M Seal Hard.
 - 5) Prosoco; Consolideck LS.
- C. Mechanical and Electrical Work: Paint all exposed items throughout the project except factory finished items with factory-applied baked enamel finishes which occur in mechanical rooms or areas, and excepting chrome or nickel plating, stainless steel, and aluminum other than mill finished. Paint all exposed ductwork and inner portion of all ductwork. Same as specified for other interior metals, hereinabove.

END OF SECTION 099000

SECTION 122400 - SHADES

PART 1 - GENERAL

1.1 GENERAL PROVISIONS

- A. Attention is directed to the CONTRACT AND GENERAL CONDITIONS and all Sections within DIVISION 01 - GENERAL REQUIREMENTS which are hereby made a part of this Section of the Specifications.

1.2 DESCRIPTION OF WORK

- A. Work Included: Provide labor, materials and equipment necessary to complete the work of this Section, including but not limited to the following:
 - 1. Roller shades with manual shade operators.
- B. Related Work: The following items are not included in this Section and are specified under the designated Sections:
 - 1. Section 061000 - ROUGH CARPENTRY for wood blocking and grounds for mounting roller shades and accessories.

1.3 SUBMITTALS

- A. Product Data: For each type of product indicated.
 - 1. Include styles, material descriptions, construction details, dimensions of individual components and profiles, features, finishes, and operating instructions.
- B. Shop Drawings: Show location and extent of roller shades. Include elevations, sections, details, and dimensions not shown in Product Data. Show installation details, mountings, attachments to other work, operational clearances, and relationship to adjoining work.
- C. Coordination Drawings: Reflected ceiling plans, drawn to scale, on which the following items are shown and coordinated with each other, based on input from installers of the items involved:
 - 1. Ceiling suspension system members and attachment to building structure.
 - 2. Ceiling-mounted or penetrating items including light fixtures, air outlets and inlets, speakers, sprinklers, recessed shades, and special moldings at walls, column penetrations, and other junctures of acoustical ceilings with adjoining construction.
 - 3. Shade mounting assembly and attachment.
 - 4. Size and location of access to shade operator and adjustable components.
 - 5. Minimum Drawing Scale: 1/4 inch = 1 foot.
- D. Samples for Initial Selection: For each colored component of each type of shade indicated.
 - 1. Include similar Samples of accessories involving color selection.
- E. Samples for Verification:
 - 1. Complete, full-size operating unit not less than 16 inches wide for each type of roller shade indicated.
 - 2. For the following products:

- a. Shade Material: Not less than 12-inch- square section of fabric, from dye lot used for the Work, with specified treatments applied. Show complete pattern repeat. Mark top and face of material.
 - b. Valance: Full-size unit, not less than 12 inches long.
- F. Window Treatment Schedule: For roller shades. Use same designations indicated on Drawings.
- G. Product Certificates: For each type of roller shade, signed by product manufacturer.
- H. Qualification Data: For Installer.
- I. Product Test Reports: For each type of roller shade.
- J. Maintenance Data: For roller shades to include in maintenance manuals. Include the following:
 - 1. Methods for maintaining roller shades and finishes.
 - 2. Precautions about cleaning materials and methods that could be detrimental to fabrics, finishes, and performance.
 - 3. Operating hardware.
- 1.4 QUALITY ASSURANCE
 - A. Installer Qualifications: Fabricator of products.
 - B. Source Limitations: Obtain roller shades through one source from a single manufacturer.
 - C. Fire-Test-Response Characteristics: Provide roller shade band materials with the fire-test-response characteristics indicated, as determined by testing identical products per test method indicated below by UL or another testing and inspecting agency acceptable to authorities having jurisdiction:
 - 1. Flame-Resistance Ratings: Passes NFPA 701.
 - D. Mockups: Build mockups to verify selections made under sample submittals and to demonstrate aesthetic effects and set quality standards for materials and execution.
 - 1. Approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.
- 1.5 DELIVERY, STORAGE, AND HANDLING
 - A. Deliver shades in factory packages, marked with manufacturer and product name, fire-test-response characteristics, and location of installation using same designations indicated on Drawings and in a window treatment schedule.
- 1.6 PROJECT CONDITIONS
 - A. Environmental Limitations: Do not install roller shades until construction and wet and dirty finish work in spaces, including painting, is complete and ambient temperature and humidity conditions are maintained at the levels indicated for Project when occupied for its intended use.
 - B. Field Measurements: Where roller shades are indicated to fit to other construction, verify dimensions of other construction by field measurements before fabrication and indicate

measurements on Shop Drawings. Allow clearances for operable glazed units' operation hardware throughout the entire operating range. Notify Architect of discrepancies. Coordinate fabrication schedule with construction progress to avoid delaying the Work.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- 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. Draper Inc.
 - 2. MechoShade Systems, Inc.
- B. Basis-of-Design: MechoShade; Mecho/5 Manual Shade System.
- C. Basis-of-Design: MechoShade; ElectroShade Motorized Shade System.

2.2 ROLLER SHADES

- A. Shadecloth: 100% polyester or PLA biopolymer fabric, PVC-free.
 - 1. Basis of Design, Transparent/Solar Control: MechoShade; EcoVeil Sheer, 6850 and 6750 Series.
 - 2. Fire-Test-Response Characteristics: Passes NFPA 701, without banned chemical flame retardants.
 - 3. Bottom Hem: Straight.
 - 4. Colors: To be selected by Architect from manufacturer's full range.
- B. Rollers: Electrogalvanized or epoxy primed steel or extruded-aluminum tube of diameter and wall thickness required to support and fit internal components of operating system and the weight and width of shade band material without sagging; designed to be easily removable from support brackets; with removable spline fitting integral channel in tube for attaching shade material.
 - 1. Direction of Roll: Regular, from back of roller
- C. Mounting Brackets: Galvanized or zinc-plated steel.
- D. Fascia: L-shaped, formed-steel sheet or extruded aluminum; long edges returned or rolled; continuous panel concealing front and bottom of shade roller, brackets, and operating hardware and operators; length as indicated on Drawings removable design for access.
- E. Top/Back Cover: L-shaped; material and finish to match fascia; combining with fascia and end caps to form a six-sided headbox enclosure sized to fit shade roller and operating hardware inside.
- F. Pocket-Style Headbox: U-shaped, formed-steel sheet or extruded aluminum; long edges returned or rolled; with a bottom cover consisting of slot opening of minimum dimension to allow lowering and raising of shade and a removable or an openable, continuous metal access panel concealing shade roller, brackets, and operating hardware and operators within.

- G. Bottom Bar: Steel or extruded aluminum. Provide concealed, by pocket of shade material, internal-type bottom bar with concealed weight bar as required for smooth, properly balanced shade operation.
- H. Mounting: As indicated on Drawings, mounting permitting easy removal and replacement without damaging roller shade or adjacent surfaces and finishes.
- I. Hold-Down Brackets and Hooks or Pins: Manufacturer's standard for anchoring roller shade bottom in place and keeping shade band material taut.

2.3 ROLLER SHADE FABRICATION

- A. Product Description: Roller shade consisting of a roller, a means of supporting the roller, a flexible sheet or band of material carried by the roller, a means of attaching the material to the roller, a bottom bar, and an operating mechanism that lifts and lowers the shade.
- B. Concealed Components: Noncorrodible or corrosion-resistant-coated materials.
 - 1. Lifting Mechanism: With permanently lubricated moving parts.
- C. Unit Sizes: Obtain units fabricated in sizes to fill window and other openings as follows, measured at 74 deg F:
 - 1. Shade Units Installed between (Inside) Jambs: Edge of shade not more than 1/4 inch from face of jamb. Length equal to head to sill dimension of opening in which each shade is installed.
 - 2. Shade Units Installed Outside Jambs: Width and length as indicated, with terminations between shades of end-to-end installations at centerlines of mullion or other defined vertical separations between openings.
- D. Installation Brackets: Designed for easy removal and reinstallation of shade, for supporting fascia, roller, and operating hardware and for hardware position and shade mounting method indicated.
- E. Installation Fasteners: No fewer than two fasteners per bracket, fabricated from metal noncorrosive to shade hardware and adjoining construction; type designed for securing to supporting substrate; and supporting shades and accessories under conditions of normal use.
- F. Color-Coated Finish: For metal components exposed to view, apply manufacturer's standard baked finish complying with manufacturer's written instructions for surface preparation including pretreatment, application, baking, and minimum dry film thickness.

2.4 MANUALLY OPERATED SHADES WITH SINGLE ROLLERS

- A. Chain-and-Clutch Operating Mechanisms: With continuous-loop bead chain and clutch that stops shade movement when bead chain is released; permanently adjusted and lubricated.
 - 1. Bead Chains: Manufacturer's standard.
 - a. Loop Length: Full length of roller shade.
 - b. Limit Stops: Provide upper and lower ball stops.
- B. Comply with NFPA 70.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements for installation tolerances, operational clearances, other conditions affecting performance.
 - 1. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 ROLLER SHADE INSTALLATION

- A. Install roller shades level, plumb, and aligned with adjacent units according to manufacturer's written instructions, and located so shade band is not closer than 2 inches to interior face of glass. Allow clearances for window operation hardware.

3.3 ADJUSTING

- A. Adjust and balance roller shades to operate smoothly, easily, safely, and free from binding or malfunction throughout entire operational range.

3.4 CLEANING AND PROTECTION

- A. Clean roller shade surfaces after installation, according to manufacturer's written instructions.
- B. Provide final protection and maintain conditions, in a manner acceptable to manufacturer and Installer, that ensure that roller shades are without damage or deterioration at time of Substantial Completion.
- C. Replace damaged roller shades that cannot be repaired, in a manner approved by Architect, before time of Substantial Completion.

3.5 DEMONSTRATION

- A. Engage a factory-authorized service representative to train Owner's maintenance personnel to adjust, operate, and maintain roller shades. Refer to Division 01 Sections for contract closeout procedures.

END OF SECTION 122400

This Page Left Intentionally Blank

SECTION 230500 – COMMON WORK RESULTS FOR HVAC

PART 1 - GENERAL

1.1 SECTION INCLUDES

- A. Provide labor, materials, accessories, and other related items as required to complete operations in connection with the complete installation of the HVAC and mechanical systems as indicated on the Drawings and as specified herein.

1.2 RELATED REQUIREMENTS

- A. Conditions of the Contract apply to the work, including the work of this Division. Examine Contract Documents for requirements affecting the work.
- B. Provide cooperation with, and assistance to, the Testing and Balancing (TAB) Agent specified in Division 23 Section “Testing, Adjusting, and Balancing for Mechanical Systems.”

1.3 MECHANICAL PRE-CONSTRUCTION MEETING

- A. Conduct a mechanical conference at Project site to comply with requirements of Division 01 Section “Project Management and Coordination” and the following:
 - 1. At least 14 days prior to beginning of mechanical work, conduct a meeting to review detailed requirements for mechanical systems installation and testing requirements. Review mechanical Drawings and Specifications, discuss project specific details and requirements, and review and discuss expectations for quality control. Establish preliminary work progress schedule and procedures for materials inspection, testing, and certifications. Require representatives of each entity directly concerned with mechanical systems installation to attend conference, including, but not limited to, the following:
 - a. General Contractor's superintendent.
 - b. Mechanical Subcontractors' project managers.
 - c. Mechanical Subcontractors' job foremen.
 - d. Sheetmetal job foreman.
 - e. Plumbing job foreman.
 - f. Controls job foreman.
 - g. Project mechanical Engineer/designer.
 - h. Job clerk.
 - i. Architect's construction administrator.

1.4 CONTRACT DOCUMENTS

- A. The general location of the apparatus and the details of the work are indicated on the Drawings. Exact locations not indicated shall be determined at the site as the work progresses and shall be subject to the Architect's approval.
- B. It is not intended that the Drawings shall show every pipe, pipe rise, pipe drop, duct rise, duct drop, pipe fitting, duct fitting, or appliance, but it shall be a requirement to furnish, without additional expense, material and labor necessary to complete the systems in accordance with the design intent and with the highest possible quality available.

- C. The Contractor shall take no advantage of any apparent error or omission in the Drawings and Specifications, and the Designer shall be permitted to make such corrections and interpretations as may be deemed necessary for the fulfillment of the intent of the Drawings and Specifications. Where errors or omissions appear in the Contract Documents, the Contractor shall promptly notify the Designer in writing of such errors or omissions. Inconsistencies in the contract documents are to be reported before proposals are received, whenever found.
- D. Should the Drawings or the Specifications disagree in themselves or with each other, the Contractor shall provide the better quality or greater quantity of work and/or materials unless otherwise directed by written addendum to the Contract Documents.

1.5 ALTERATIONS

- A. Execute alterations, additions, removals, relocations, new work, and other related items as indicated or required to provide a complete installation in accordance with the intent of the Contract Documents, including changes required by building alterations.
- B. Existing work disturbed or damaged by the alterations or the new work shall be repaired or replaced to the Architect's satisfaction and at no additional cost to the Owner.
- C. Existing ductwork, piping, and other systems indicated to be removed, shall be removed from the site. Cap off existing services remaining. The Owner retains the right to ownership of heating and ventilating equipment scheduled to be removed; store such equipment where requested by the Owner. Material not retained by the Owner shall be removed from the site.

1.6 CONTINUITY OF SERVICE

- A. Arrange to execute the work at such times and in such locations as may be required to provide uninterrupted service for the building or any of its locations. Any unavoidable conditions requiring reduced building capacity shall be arranged for by programming with the Owner's duly authorized representative at the building subject to the Architect's approval. If necessary, temporary work shall be installed to provide for the condition. Authorization for interrupting service shall be obtained in writing from the Owner. Any interruption of normal service shall be performed during an overtime period to be scheduled with the Owner. Costs for overtime work shall be included in the Bid.

1.7 REQUIREMENTS

- A. Installation Instructions: Obtain manufacturer's printed installation instructions to aid in properly executing work on major pieces of equipment. Install equipment in accordance with manufacturer's recommendations.
- B. Objectionable Noise, Fumes and Vibration:
 - 1. Mechanical and electrical equipment shall operate without creating objectionable noise, fumes, or vibration, as determined by the Architect.
 - 2. If such objectionable noise, fumes, or vibration is produced and transmitted to occupied portions of building by apparatus, piping, ducts, or any other part of mechanical and electrical work, make necessary changes and additions, as approved, without extra cost to Owner.

- C. Equipment Design and Installation:
 - 1. Uniformity: Unless otherwise specified, equipment or material of same type or classification, used for same purposes, shall be product of same manufacturer.
 - 2. Design: Equipment and accessories not specifically described or identified by manufacturer's catalog number shall be designed in conformity with ASME, IEEE, or other applicable technical standards, suitable for maximum working pressure, and with neat and finished appearance.
 - 3. Installation: Erect equipment aligned, level, and adjusted for satisfactory operation. Install so that connecting and disconnecting of piping and accessories can be made readily, and so that parts are easily accessible for inspection, operation, maintenance and repair. Minor deviations from indicated arrangements may be made, as approved.
- D. Hanging of Equipment, Ductwork and Piping:
 - 1. Attach supports only to structural framing members and non-metal deck concrete slabs.
 - 2. Support equipment, ductwork, and piping from the top chord of bar joists at the "Panel Points" or from the top flange of beams. Provide intermediate support consisting of steel angle or equal as required where supports are installed between joist spaces.
 - 3. Piping 2-inch (50 mm) nominal and smaller may be supported from the bottom chord of the bar joists at the "Panel Points" or from the bottom flange of the beams.
 - 4. Do not anchor supports to metal decking with or without a concreted slab.
- E. Protection of Equipment and Materials: Responsibility for care and protection of materials and mechanical work rests with the Contractor until the entire project has been completed, tested and the project is accepted by the Owner.
- F. Ceiling Mounting: Where ceiling mounting is indicated or specified, use suspended platform, threaded rod, or strap hangers, bracket or shelf, whichever is most suitable for equipment and its location. Construct of structural steel members, steel plates, or rods, as required; brace and fasten to building structure or to inserts as approved, or as detailed.

1.8 ELECTRIC WORK

- A. Provide motors, pilot lights, controllers, limit switches, and other related items for equipment provided under Division 23.
- B. Except as noted, required line switches, fused switches, and other related items and necessary wiring to properly connect equipment to motors and switches shall be furnished and installed under Division 26, Electric.
- C. Provide complete wiring system for automatic temperature controls as specified under Section Division 23 Section "Instrumentation and Controls for Mechanical Systems."
- D. Wiring shall conform to the requirements of the National Electrical Code.

1.9 FIRESTOPPING

- A. Firestopping for penetrations of ductwork, piping and equipment through fire rated and smoke rated building assemblies, including but not limited to partitions, walls, floors, ceilings, and roofs, shall be provided by **Division 07 Section "Through Penetration Firestop Systems."**
- B. Selection of firestopping materials and installation of firestopping materials shall be in

accordance with **Division 07 Section "Through Penetration Firestop Systems."**
Coordinate with other trades for a consistent installation.

- C. Refer to Architectural Drawings for locations of fire rated building assemblies.

1.10 SUBMITTALS

- A. After award of Contract and before installation, submit for approval Shop Drawings, bulletins, Product Data, Samples, and other related items.
- B. Submit Shop Drawings and Product Data as required in each Section. Submittal shall include physical data and performance data required to verify compliance with the Contract Documents.
- C. Submit Mock-Ups as required in each Section, and as indicated on the Drawings. For general mock-up procedures, refer to Division 01 Section "Quality Requirements." Deliver to the Architect/Engineer for review if so indicated. Provide return shipping.
- D. Architect/Engineer's review will not include the review, coordination, or verification of dimensions or quantities; these shall be the responsibility of the Contractor.

1.11 SUBSTITUTIONS

- A. The first item listed under "Acceptable Manufacturers", "Approved Manufacturers" or "Manufacturers" is the design basis.
 - 1. Other manufacturers listed may be used in the base Bid, but conformance with details of the Specifications, as well as dimensional and electrical data, shall be verified by the Contractor.
 - 2. Architect/Engineer has not verified that each listed manufacturer has the ability to provide an acceptable substitution for the basis-of-design product. Contractor may not assume that substitutions will be approved.
 - 3. Modifications required as a result of differences between the design basis item and the submitted and approved item must be approved by the Architect and made at the Contractor's expense. As an example, if a rooftop HVAC unit is submitted and approved and if the unit's dimensions and weight are different from those of the unit which was used as the design basis, the Contractor shall be responsible for building structural modifications required to accommodate the submitted and approved unit, at no additional cost to the Owner.
 - 4. For items which have no manufacturers listed, any item conforming with the Contract Documents is acceptable.
- B. Substitutions from manufacturers or providers which are not listed may be proposed within the time allowed in the General Requirements of the Specifications.
 - 1. The exception to this is products for which the list of manufacturers or providers is limited by the wording "no substitutions" or similar wording.

1.12 COORDINATION

- A. Coordinate scheduling, submittals, and Work of the various Sections of Specifications to assure efficient and orderly sequence of installation of interdependent construction elements, with provisions for accommodating items installed later.

- B. Verify that utility requirement characteristics of operating equipment are compatible with building utilities. Coordinate work of various Divisions having interdependent responsibilities for installing, connecting to, and placing in service, such equipment.
- C. Coordinate space requirements and installation of mechanical and electrical work which are indicated diagrammatically on Drawings. Follow routing shown for pipes, ducts, and conduit, as closely as practicable; place runs parallel with line of building. Utilize spaces efficiently to maximize accessibility for other installations, for maintenance, and for repairs.
- D. In finished areas, conceal pipes, ducts, and wiring within the construction. Coordinate locations of fixtures and outlets with finish elements.
- E. Coordinate completion and clean-up of work of separate Sections in preparation for Substantial Completion.
- F. After Owner occupancy of premises, coordinate access to site for correction of defective work and work not in accordance with Contract Documents, to minimize disruption of Owner's activities.

1.13 REQUESTS FOR ARCHITECT'S CADD DRAWINGS

- A. In lieu of generating their own CADD drawings, the Contractor may elect to use the Architect's electronic copies of CADD drawings for the purpose of developing coordination drawings, developing control system graphics or for other reasons that pertain to the requirements of this Contract. If the Contractor elects to utilize the Architect's electronic copies of CADD drawings, the electronic files shall be purchased from the Architect at the Architect's current billing rate per drawing. The Contractor shall provide payment and shall sign a release-of-liability form before electronic CADD drawings are released.

1.14 CLEANING

- A. Remove debris from site daily.
- B. Material and pieces of equipment shall be turned over to the Owner free of dust and dirt, both inside and out.
- C. At the completion of the Project, equipment shall have a clean, neat appearance of factory finish by cleaning or repainting as required.
- D. At the completion of the Project, surfaces exposed to view shall have a clean, neat appearance of finish free from smudges and scratches by cleaning or repainting as required.

1.15 ADJUSTMENTS AND OWNER'S INSTRUCTIONS

- A. After completion of the installation work called for in the Contract Documents, furnish necessary mechanics or engineers for the adjustment and operation of the systems, to the end that the systems are perfectly adjusted and turned over to the Owner in perfect working order. Further instruct the Owner's authorized representative in the care and operation of the installation, providing framed instruction charts, directions, and other related items.
- B. Instructors providing Owner training shall be experienced and familiar with the jobsite.

1.16 TESTING

- A. After the entire installation is completed and ready for operation, test the systems as outlined **in Division 23 Section "Testing, Adjusting and Balancing for HVAC."** These tests are supplementary to detailed tests specified herein or directed. The Owner will provide water and electric current for the test. Provide necessary labor, test pump, gauges, meters, other instruments, and materials. Perform tests in the presence of the Architect or their representative.
- B. Perform other tests specified in individual Sections of this Specification.

1.17 COMPLETION OF SYSTEMS

- A. The following mechanical systems shall not be complete until the following conditions are satisfied:
 - 1. Ductwork Systems:
 - a. Ductwork and related components and accessories shall be completely installed and insulated as specified.
 - b. Ductwork leakage testing shall be completed and leakage testing reports shall be submitted and approved.
 - c. Ductwork shall be balanced and a balancing report shall be submitted and approved.
 - d. Commissioning shall be completed.
 - 2. Piping Systems:
 - a. Piping, valves and accessories shall be completely installed, insulated and labeled as specified.
 - b. Piping pressure testing be completed and pressure testing reports shall be submitted and approved.
 - c. Piping systems shall be balanced and a balancing report shall be submitted and approved.
 - d. Commissioning shall be completed.
 - 3. Automatic Temperature Controls (ATC):
 - a. ATC system shall be completely installed.
 - b. Commissioning shall be completed.
 - c. ATC system shall operate in an automatic mode for a minimum of 4 months during Owner occupancy without substantial deficiencies.

1.18 OPERATING AND MAINTENANCE MANUALS

- A. Furnish quantity required in Division 01 of the Specifications, of bound operating and maintenance manuals. Deliver to the Architect for review. Required quantity is for the Owner; the Architect will not retain a bound copy.
- B. For maintenance purposes, provide approved Submittals, parts lists, specifications, and manufacturer's maintenance bulletins for each piece of equipment. For materials used which have been submitted to the Architect for approval but do not require regular maintenance, such as piping, ductwork, and insulation, provide one copy of approved Submittals.
- C. Provide name, address and telephone number of the manufacturer's representative and service company, for each piece of equipment or material so that service or spare parts can be readily obtained.

1.19 WARRANTY

- A. Provide guarantees and warranties for work under this Contract as indicated in the General Requirements of the Specifications.
- B. Provide manufacturers' standard warranties and guarantees for work by the mechanical trades. However, such warranties and guarantees shall be in addition to and not in lieu of other liabilities which the manufacturer and the Mechanical Contractor may have by law or by other provisions of the Contract Documents.
- C. Guarantee that elements of the systems provided under this Contract are of sufficient capacity to meet the specified performance requirements as set forth in these Specifications or as indicated on the Drawings.
- D. Upon receipt of notice from the Owner of failure of any part of the mechanical systems or equipment during the warranty period, the Mechanical Subcontractor shall replace the affected part or parts.
- E. Furnish a written guarantee covering the above requirements before submitting the application for final payment.

PART 2 - PRODUCTS (NOT USED)

PART 3 - EXECUTION (NOT USED)

END OF SECTION 230500

This Page Left Intentionally Blank

SECTION 230529 – HANGERS AND SUPPORTS FOR HVAC PIPING AND EQUIPMENT

PART 1 - GENERAL

1.1 SECTION INCLUDES

- A. Pipe and equipment hangers and supports.
- B. Sleeves and seals.

1.2 RELATED SECTIONS

- A. Division 07 Section “Through-Penetration Firestop Systems”: Joint seals for piping and duct penetration of fire rated assemblies.
- B. Division 09 Section “Painting.”
- C. Division 23 Section “HVAC Piping Insulation.”
- D. Division 23 Section “Hydronic Piping.”
- E. Division 23 Section “Refrigerant Piping.”

1.3 REFERENCES

- A. ASME.
- B. ASTM
- C. MSS.
- D. NFPA 70 - National Electrical Code

1.4 SUBMITTALS

- A. Submit under provisions of Division 01 Section “Submittal Procedures”.
- B. Shop Drawings: Indicate system layout with location and detail of trapeze hangers.
- C. Product Data: Provide manufacturers catalog data including load capacity.
- D. Design Data: Indicate load carrying capacity of trapeze, multiple pipe, and riser support hangers.
- E. Manufacturer's Installation Instructions: Indicate special procedures and assembly of components.

1.5 QUALIFICATIONS

- A. Manufacturer: Company specializing in manufacturing the products specified in this Section

with minimum 3 years' experience.

1.6 REGULATORY REQUIREMENTS

- A. Conform to applicable Codes for support of piping.
- B. Supports for Electrical: In conformance with NFPA 70 and Division 26 of the Specifications.

PART 2 - PRODUCTS

2.1 HANGERS, SUPPORTS, & PIPE CLAMPS

- A. Manufacturers:
 - 1. Strut Hangers:
 - a. Unistrut (division of Tyco).
 - b. Anvil International.
 - c. Cooper B-Line.
 - d. Hydra-Zorb Company.
 - e. Thomas & Betts - Superstrut line.
 - f. Tolco (division of Cooper B-Line).
 - g. Substitutions: Not permitted.
 - 2. Adjustable Swivel Band Hangers:
 - a. Carpenter & Paterson.
 - b. Anvil International.
 - c. Cooper B-Line.
 - d. Tolco (division of Cooper B-Line).
 - e. Substitutions: Not permitted.
 - 3. Clevis Hangers:
 - a. Cooper B-Line.
 - b. Anvil International.
 - c. Carpenter & Paterson.
 - d. Tolco (division of Cooper B-Line).
 - e. Substitutions: Not permitted.
 - 4. J-Hangers:
 - a. Cooper B-Line.
 - b. Carpenter & Paterson.
 - c. Thomas & Betts - Superstrut line.
 - d. Tolco (division of Cooper B-Line).
 - e. Unistrut (division of Tyco).
 - f. Substitutions: Not permitted
 - 5. Cushion Clamps:
 - a. Hydra-Zorb Company.
 - b. Cooper B-Line.
 - c. Thomas & Betts - Superstrut line.
 - d. Tolco (division of Cooper B-Line).
 - e. Unistrut (division of Tyco).
 - f. Substitutions: Not permitted
 - 6. Insulated Pipe Couplings:
 - a. Cooper B-Line - Armafix line.

- b. Klo-Shure Corporation.
 - c. Substitutions: Not permitted
- B. Horizontal Piping Supports: Provide struts for trapeze hangers for single or multiple pipes. Where individual piping runs are hung with individual hangers, adjustable swivel band hangers, clevis hangers, or j-hangers may be used.
- C. Strut hangers shall be standard 1-5/8 inches x1-5/8 inches (41x41 mm) size.
- D. Hangers, clamps, and supports located outdoors or otherwise exposed to weather, or in wet or washdown areas, shall be hot-dipped galvanized steel or 300-series stainless steel. Struts may be extruded aluminum. Threaded rods, nuts, and washers may have standard galvanizing if hot-dipped galvanized is not available.
 - 1. Hot-dipped galvanized steel shall have a nominal zinc coating of 2.6 mil (0.066 mm) thickness and 1.5 oz./sq.ft (458 g/m²) coating weight.
 - 2. In lieu of galvanizing, strut systems and their accessories may have Unistrut Perma-Green III electrodeposited thermoset acrylic coating, or be epoxy-coated equal to B-Line's Dura-Green or Dura-Copper coatings.
 - 3. Lesser coatings for struts and clamps, such as pre-galvanizing (0.75 mil (0.019 mm) thickness), electroplated zinc (0.2 to 0.5 mil (0.005 to 0.013 mm) thickness), and yellow zinc dichromate coating, are not acceptable in these locations.
- E. Pipe hanger rods and nuts shall be plated to match the hangers. Nuts shall be self-locking type, or provide double nuts tightened to lock together. Rods shall be threaded one end, or continuous threaded. Provide washers at each nut.
- F. Cushion Clamps for Un-insulated Lines: Plastic cushion shall be Dupont Hytel plastic, 5555HS plastic elastomer, warranted from -40 to 275 degrees F (-40 to 135 degrees C).
- G. Copper-plated hangers are plated for identification only. Traditional thin copper plating on steel substrate does not provide adequate protection from galvanic corrosion due to contact between dissimilar metals.
 - 1. Where copper-plated supports are specified for use with copper piping, either copper plating or a copper-colored finish such as Cooper B-Line's Dura-Copper epoxy coating is acceptable. This is for identification, and does not protect dissimilar metals.
 - 2. Where copper piping is used with steel hangers and supports, provide protection from galvanic corrosion such as thick plastic or vinyl factory coating, or plastic-lined cushion clamps.
- H. For Insulated Lines Clamped to Strut: Insulated pipe coupling insert with the same thickness as the insulation. Protects insulation from crushing, and provides continuous insulation and vapor barrier thru the hanger or clamp. Klo-Shure product provides plastic pipe support and rigid outer band, for field insulation into the coupling. Armafix product provides insulation with rigid outer band, for field insulation glued to the ends of the insert.

2.2 PIPE SUPPORTS

- A. Hydronic Piping:
 - 1. Conform to ASME B31.9, ASTM F708, MSS SP58, MSS SP69 and MSS SP89.
 - 2. Hangers for Pipe Sizes 1/2 to 1-1/2 inch (13 to 38 mm): Malleable iron, adjustable

- swivel, split ring.
- 3. Multiple or Trapeze Hangers: Steel channels with welded spacers and hanger rods.
- 4. Wall Support for Pipe Sizes to 3 inches (76 mm): Cast iron hook.
- 5. Copper Pipe Support: Carbon steel ring, adjustable, copper plated.

B. Refrigerant Piping:

- 1. Conform to ASME B31.5, ASTM F708, MSS SP58, MSS SP69 and MSS SP89.
- 2. Hangers for Pipe Sizes 1/2 to 1-1/2 inch (13 to 38 mm): Malleable iron, adjustable swivel, split ring.
- 3. Vertical Support: Steel riser clamp.
- 4. Copper Pipe Support: Carbon steel ring, adjustable, copper plated.

2.3 SLEEVES

- A. Sleeves for Pipes Through Non-fire Rated Floors: 18 ga (1.2 mm) thick galvanized steel.
- B. Sleeves for Pipes Through Non-fire Rated Beams, Walls, Footings, and Potentially Wet Floors: Steel pipe or 18 ga (1.2 mm) thick galvanized steel.
- C. Sleeves for Pipes Through Fire Rated and Fire Resistive Floors and Walls, and Fire Proofing: Prefabricated fire rated sleeves including seals, UL listed.
- D. Sleeves for Round Ductwork: Galvanized steel.
- E. Sleeves for Rectangular Ductwork: Galvanized steel.
- F. Stuffing or Firestopping Insulation: Glass fiber type, non-combustible.
- G. Sealant: Acrylic.

PART 3 - EXECUTION

3.1 INSTALLATION

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

3.2 PIPE HANGERS AND SUPPORTS

- A. Support horizontal piping as scheduled.
- B. Install hangers to provide minimum 1/2 inch (13 mm) space between finished covering and adjacent work.
- C. Place hangers within 12 inches (300 mm) of each horizontal elbow.
- D. Use hangers with 1-1/2 inch (38 mm) minimum vertical adjustment.
- E. Where several pipes can be installed in parallel and at same elevation, provide multiple or trapeze hangers.

- F. Support riser piping independently of connected horizontal piping.
- G. Provide copper plated hangers and supports for copper piping.
- H. Design hangers for pipe movement without disengagement of supported pipe.
- I. Prime coat exposed steel hangers and supports. Refer to Division 09 Section "Painting". Hangers and supports located in crawl spaces, pipe shafts, and suspended ceiling spaces are not considered exposed.
- J. Do not support pipes from other pipes or equipment.
- K. Size pipe hangers to accommodate continuous piping insulation.

3.3 SLEEVES

- A. Set sleeves in position in formwork. Provide reinforcing around sleeves.
- B. Size sleeves large enough to allow for movement due to expansion and contraction. Provide for continuous insulation wrapping.
- C. Extend sleeves through floors 1 inch (25 mm) above finished floor level. Caulk sleeves.
- D. Where piping or ductwork penetrates floor, ceiling, or wall, close off space between pipe or duct and adjacent work with fire stopping insulation and caulk air tight. Provide close fitting metal collar or escutcheon covers at both sides of penetration.
- E. Install chrome plated steel escutcheons at finished surfaces.

3.4 SUPPORTING OTHER TRADES

- A. Supports furnished under Division 23 of the Specifications may also be used to support piping furnished under Division 22 "Plumbing" and conduits furnished under Division 26 "Electrical" if this Subcontractor is willing to allow this. Supports shared with other trades shall be designed to accommodate the weight, expansion/contraction, vibration, and other requirements of the other trades' items without detriment to the function, accessibility, and serviceability of the HVAC items or those of the other trades. Provide flexible sections of piping and conduit as required to allow each trade's items to expand and contract along with the other trades, and to absorb vibration caused by the other trades.
- B. Electrical lighting fixtures and equipment, and architectural items such as ceilings, may not be supported from supports furnished under this Section.
- C. Prevent contact between components of other trades, such as architectural suspended ceiling support wires, and HVAC supports which may transmit vibration to the occupied space.

3.5 SCHEDULES

PIPE SIZE		HANGER ROD MAX. HANGER SPACING		DIAMETER	
Inches	(mm)	Feet	(m)	Inches	(mm)
Steel and Copper Piping					
1/2 to 1-1/4	12 to 32	6.5	2	3/8	9
1-1/2 to 2	38 to 50	10	3	3/8	9
PVC (All Sizes)		6	1.8	3/8	9

END OF SECTION 230529

SECTION 230553 – IDENTIFICATION FOR HVAC PIPING AND EQUIPMENT

PART 1 - GENERAL

1.1 SECTION INCLUDES

- A. Nameplates.
- B. Tags.
- C. Ceiling Tacks.
- D. Labels.

1.2 RELATED SECTIONS

- A. Division 09 Section “Painting”: Identification painting.

1.3 REFERENCES

- A. Division 01 Section “References”: Requirements for references and standards.
- B. ASME A13.1 - Scheme for the Identification of Piping Systems (2007 edition or newer).
- C. NFPA 90A - Standard for the Installation of Air-Conditioning and Ventilating Systems.
- D. NFPA 99 - Standard for Health Care Facilities.

1.4 SUBMITTALS

- A. Division 01 Section “Submittal Procedures.”
- B. Submit list of wording, symbols, letter size, and color coding for mechanical identification.
- C. Submit valve chart and schedule, including valve tag number, location, function, and valve manufacturer's name and model number.
- D. Product Data: Provide manufacturers catalog literature for each product required.
- E. Samples: Submit 2 tags, 1-1/2 inches (38 mm) in size.
- F. Samples: Submit 2 labels, 1.9 x 0.75 inches (48 x 19 mm) in size.

1.5 PROJECT RECORD DOCUMENTS

- A. Submit under Division 01 Section “Closeout Procedures.”
- B. Record actual locations of tagged valves; include valve tag numbers.

1.6 OPERATION AND MAINTENANCE DATA

- A. Submit under provisions of Division 01 Section "Operation and Maintenance Data."
- B. Include valve tag chart.

1.7 REGULATORY REQUIREMENTS

- A. Conform to NFPA 99 requirements for labeling and identification of medical gas piping systems and accessories.

PART 2 - PRODUCTS

2.1 NAMEPLATES

- A. Manufacturers:
 - 1. Seton Identification Products.
 - 2. E.R. Perry Signs & Engraving.
 - 3. Brimar Industries, Inc., PipeMarker division.
 - 4. Substitutions: Not permitted
- B. Plastic Nameplates: Laminated 3-layer plastic with beveled edges and engraved letters on contrasting background color, 1/16 inch (1.58 mm) thick. Letters shall be black on light backgrounds, or white on dark backgrounds, as applicable. Service temperature range -40 to 175 degrees F (-40 to 79 degrees C); minimum application temperature for adhesive 50 degrees F (10 degrees C). Suitable for average outdoor lifespan of at least 2-3 years.
- C. Aluminum Nameplates: For higher temperature applications, and for outdoor applications when manufacturer does not recommend their plastic nameplates for use outdoors, provide aluminum nameplates, with integral anodized or painted surface color coating and natural aluminum engraved letters, 1/32-inch (0.78 mm) thick. Service temperature range -40 to 350 degrees F (-40 to 177 degrees C); minimum application temperature for adhesive 50 degrees F (10 degrees C). Suitable for average outdoor lifespan of at least 2-3 years.
- D. Colors: Select background color as appropriate for the application. Color for general applications shall be white (except that aluminum nameplate standard color shall be black). Color for general warnings shall be red or yellow. Colors for fluid services shall comply with ASME A13.1-2007. Comply with ASME/ANSI standards and other regulations as applicable.
- E. Provide with factory adhesive, and with side holes for fastener attachment as applicable. Mechanical fasteners are required for applications which are outdoors or otherwise exposed to weather or sunlight, or in moist areas such as kitchens and locker rooms, or on cooled surfaces subject to condensation, or on surfaces with operating temperatures above 150 degrees F (65 degrees C). Where nameplate is on an irregular surface and cannot make complete contact, provide mechanical fasteners or ties in addition to adhesive.

2.2 TAGS

- A. Plastic Tags:
 - 1. Manufacturers:
 - a. Seton Identification Products.
 - b. E.R. Perry Signs & Engraving.
 - c. Brimar Industries, Inc., PipeMarker division.
 - d. Substitutions: Not permitted.
 - 2. Laminated three-layer plastic with engraved black letters on light contrasting background color. Tag size minimum 1-1/2 inches (38 mm) diameter.
- B. Metal Tags:
 - 1. Manufacturers:
 - a. Seton Identification Products.
 - b. Brady Worldwide, Inc.
 - c. Brimar Industries, Inc., PipeMarker division.
 - d. Substitutions: Not permitted.
 - 2. Brass with stamped letters; tag size minimum 1-1/2 inches (38 mm) diameter with smooth edges.
- C. Information Tags:
 - 1. Manufacturer: Seton Identification Products.
 - 2. Clear plastic with printed "Danger," "Caution," or "Warning" and message; size 3-1/4 x 5-5/8 inches (83 x 143 mm) with grommet and self-locking nylon ties.
- D. Tag Chains and Hooks: Brass or stainless steel compatible with tag material for general applications. Brass where in contact with copper piping or other copper-alloy materials.
- E. Tag Chart: Typewritten letter size list in anodized aluminum frame with plexiglass cover.

2.3 CEILING DOTS WITH LABEL-MAKER LABELS

- A. Ceiling Dots:
 - 1. Manufacturer: Avery – Division of Avery Dennison Corporation.
 - 2. Description: Self-adhesive 1/2 inch (12.7 mm) diameter color coded label.
- B. Label-Maker Labels:
 - 1. Label Maker:
 - a. Manufacturer:
 - 1) Brother.
 - 2) Brady.
 - 3) Dymo.
 - 4) Substitutions: Approved equal. See Section 016000 - Product Requirements
 - b. Label width capacity: Maximum tape width at least 3/4 inch (19 mm).
 - c. Technology: Thermal transfer.
 - 2. Labels:
 - a. Color:
 - 1) Clear with black lettering for white or off-white ceiling grids.
 - 2) White with black lettering for dark-colored or metallic-colored ceiling grids.
 - b. Width:
 - 1) 3/4 inch (18 mm) for standard 15/16 inch (23.8 mm) wide ceiling grids.

- 2) 1/2 inch (12 mm) for narrow 9/16 inch (14.3 mm) wide ceiling grids.
- c. Lettering Height: Maximum size available, for ease of viewing from floor.
Typical sizes as follows:
 - 1) 36 point (1/2 in. (12 mm)) on 3/4 inch (18 mm) wide labels.
 - 2) 24 point (1/3 in. (8 mm)) on 1/2 inch (12 mm) wide labels.

2.4 LABELS

- A. Manufacturer:
 - 1. Seton Identification Products.
 - 2. Substitutions: Approved equal. See Section 016000 - Product Requirements
- B. Description: Polyester, size 1.9 x 0.75 inches (48 x 19 mm), adhesive backed with printed identification.

2.5 PIPE MARKERS

- A. Color and Lettering: Conform to ASME A13.1.
- B. Plastic Pipe Markers:
 - 1. Manufacturers:
 - a. Seton Identification Products.
 - b. Brady Worldwide, Inc.
 - c. Brimar Industries, Inc., PipeMarker division.
 - d. Substitutions: Not permitted
 - 2. Factory fabricated, flexible, semi-rigid plastic, preformed to fit around pipe or pipe covering. Larger sizes may have maximum sheet size with spring fastener.

PART 3 - EXECUTION

3.1 PREPARATION

- A. Degrease and clean surfaces to receive adhesive for identification materials.

3.2 INSTALLATION

- A. Division 01 Section "Quality Requirements": Manufacturer's instructions.
- B. Install identifying devices after completion of coverings and painting.
- C. Install plastic or aluminum engraved nameplates with corrosion-resistant mechanical fasteners, or adhesive, as specified. In outdoor locations, where lifetime of nameplates is limited, fasteners shall be removable screws or bolts for ease of nameplate replacement.
- D. Install labels with sufficient adhesive to ensure permanent adhesion and seal with clear lacquer. For unfinished canvas covering, apply paint primer before applying labels.
- E. Install tags using corrosion resistant chain. Number tags consecutively by location.
- F. Identify items of mechanical equipment such as chillers, fans, terminal units, air handling units, pumps, heat transfer equipment, tanks, and water treatment devices with plastic nameplates.

Small devices, such as in-line pumps, may be identified with tags.

- G. Identify control panels and major control components outside panels with plastic nameplates.
- H. Identify valves in main and branch piping with metal tags.
- I. Tag automatic controls, instruments, and relays. Key to control schematic.
- J. Identify piping, concealed or exposed, with plastic pipe markers. Use tags on piping 3/4 inch (20 mm) diameter and smaller. Identify service, flow direction and pipe size. Install in clear view and align with axis of piping. Locate identification not to exceed 20 feet on straight runs including risers and drops, at each branch and riser take-off, adjacent to each valve and tee, at each side of penetration of structure or enclosure, and at each obstruction.
- K. Identify with air handling unit identification number and area served. Locate identification at air handling unit, at each side of penetration of structure or enclosure, and at each obstruction.
- L. Identify duct access doors at fire dampers, smoke dampers, and smoke detectors with 1/2 inch (12.7 mm) lettering to indicate the fire protection device(s) within, in accordance with NFPA 90A.
- M. Provide ceiling dots with label-maker labels to locate valves, dampers and equipment above T-bar type panel ceilings. Locate in corner of panel closest to equipment.
- N. Secure valve tag chart on an easily accessible wall in the mechanical room or in a location as otherwise directed by the Architect.

3.3 COORDINATION WITH EXISTING EQUIPMENT

- A. Where an existing equipment identification system is involved, the new system shall be coordinated and compatible with the existing system.

END OF SECTION 230553

This Page Left Intentionally Blank

SECTION 230593 – TESTING, ADJUSTING, AND BALANCING FOR HVAC

PART 1 - GENERAL

1.1 SECTION INCLUDES

- A. Testing, Adjustment, and Balancing of Air Systems.
- B. Testing, Adjustment, and Balancing of Hydronic Piping Systems.
- C. Measurement of Final Operating Condition of HVAC Systems.

1.2 RELATED SECTIONS

- A. Division 01 Section “Quality Requirements”: Testing laboratory services: Employment of testing agency and payment for services.
- B. Division 01 Section “General Commissioning Requirements.”

1.3 REFERENCES

- A. AABC - National Standards for Total System Balance.
- B. ADC - Test Code for Grilles, Registers, and Diffusers.
- C. ASHRAE 111 - Practices for Measurement, Testing, Adjusting, and Balancing of Building Heating, Ventilation, Air-conditioning, and Refrigeration Systems.
- D. NEBB - Procedural Standards for Testing, Adjusting, and Balancing of Environmental Systems.
- E. SMACNA - HVAC Systems Testing, Adjusting, and Balancing.

1.4 DEFINITIONS

- A. AABC: Associated Air Balance Council.
- B. ASHRAE: American Society of Heating, Refrigerating and Air Conditioning Engineers.
- C. NEBB: National Environmental Balancing Bureau.
- D. SMACNA: Sheet Metal and Air Conditioning Contractors’ National Association.
- E. TAB: Testing, Adjusting, and Balancing.

1.5 SUBMITTALS

- A. Submit under provisions of Division 01 Section “Submittal Procedures.”
- B. Submit name of TAB Agency for approval within 14 days after award of Contract.

- C. Design Review Reports:
 - 1. Submit prior to commencement of construction under provisions of Division 01 Section "Quality Requirements."
 - 2. Review the Contract Documents, and indicate deficiencies in systems that would prevent proper testing, adjusting, and balancing of systems and equipment to achieve specified performance.
- D. Preliminary Report Submittals:
 - 1. Prior to commencing work of this Section, and no more than 14 days after approval of TAB Agency submittals, submit report forms or outlines indicating adjusting, balancing, and equipment data required, with columns of design data filled in. By means of plan views, equipment profiles, and similar graphical descriptions, indicate where measurements will be taken.
 - 2. Submit the procedures to be used.
- E. Field Reports: Submit draft copies of report for review prior to final acceptance of Project. Provide final copies for Architect/Engineer and for inclusion in operating and maintenance manuals.
- F. Provide reports in letter size, 3-ring binder manuals, complete with index page and indexing tabs, with cover identification at front and side. Include set of reduced drawings with air outlets and equipment identified to correspond with data sheets, and indicating thermostat locations.
- G. Include detailed procedures, agenda, sample report forms and copy of AABC National Project Performance Guaranty prior to commencing system balance.
- H. Test Reports: Indicate data on AABC National Standards for Total System Balance forms, or forms prepared following ASHRAE 111, or NEBB forms, or forms containing information indicated in Schedules. Indicate data on AABC National Standards for Total System Balance forms, or forms prepared following ASHRAE 111, or NEBB forms.

1.6 QUALITY ASSURANCE

- A. Perform total system balance in accordance with AABC National Standards for Field Measurement and Instrumentation, Total System Balance; or ASHRAE 111; or NEBB Procedural Standards for Testing, Balancing and Adjusting of Environmental Systems.

1.7 QUALIFICATIONS

Agency: Company specializing in the testing, adjusting, and balancing of systems specified in this Section with minimum 3 years' experience and certified by AABC or NEBB, or equivalent experience which would qualify for membership in these testing organizations. Agency shall be one of those listed under article 3.1 AGENCIES in this Section

- A. Perform Work under supervision of AABC Certified Test and Balance Engineer, NEBB Certified Testing, Balancing and Adjusting Supervisor, or registered Professional Engineer experienced in performance of this Work and licensed at the place where the Project is located.
- B. The approved Agency shall be in no way affiliated with the installing Subcontractor.

1.8 SEQUENCING

- A. Sequence work under the provisions of Division 01 Section "Summary."
- B. Sequence work to commence after completion of systems or portions of work, and schedule completion of work before Substantial Completion of Project.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION

3.1 AGENCIES

- A. Tekon Technical Consultants, Portsmouth, NH. Contact: Charles Corlin, (603) 335-3080.
- B. Central Air Balance, Lisbon, Maine 04250; C (207) 754-2023; Contact Glenn Hill.
- C. Hood T.A.B. LLC, Andover, MA. Contact: Michael Hood, (978) 474-7595.
- D. NETB Associates LLC, East Kingston, NH. Contact: Frank Collamore, (978) 270-7547.
- E. Advantage Engineering, 19 Technology Way, Nashua, NH. Contact: Dan LaPlante 603-731-3880
- F. Substitutions: Not permitted.

3.2 EXAMINATION

- A. Verify that systems are complete and operating correctly in accordance with sequence of operations before commencing work. Ensure the following conditions:
 - 1. Systems are started and operating in a safe and normal condition.
 - 2. Temperature control systems are installed complete and operable.
 - 3. Proper thermal overload protection is in place for electrical equipment.
 - 4. Final filters are clean and in place. If required, install temporary media in addition to final filters.
 - 5. Duct systems are clean of debris.
 - 6. Fans are rotating correctly.
 - 7. Fire and volume dampers are in place and open.
 - 8. Air coil fins are cleaned and combed.
 - 9. Access doors are closed and duct end caps are in place.
 - 10. Air outlets are installed and connected.
 - 11. Duct system leakage is minimized.
 - 12. Hydronic systems are flushed, filled, and vented.
 - 13. Proper strainer baskets are clean and in place.
 - 14. Service and balance valves are open.
- B. Submit field reports. Report to the responsible Subcontractors, defects and deficiencies noted during performance of services which prevent system balance. Submit list of locations where the Contractor needs to provide additional balancing devices.

- C. Beginning of work means acceptance of existing conditions.

3.3 PREPARATION

- A. Provide instruments required for testing, adjusting, and balancing operations. Make instruments available to Architect/Engineer to facilitate spot checks during testing.

3.4 INSTALLATION TOLERANCES

- A. Air Handling Systems: Adjust to within plus or minus 5 percent of design for supply systems and plus or minus 10 percent of design for return and exhaust systems.
- B. Air Outlets and Inlets: Adjust total to within plus 10 percent and minus 5 percent of design to space. Adjust outlets and inlets in space to within plus or minus 10 percent of design.
- C. Hydronic Systems: Adjust to within plus or minus 10 percent of design.

3.5 ADJUSTING

- A. Ensure recorded data represents actual measured or observed conditions.
- B. Permanently mark settings of valves, dampers, and other adjustment devices allowing settings to be restored. Set and lock memory stops.
- C. After adjustment, take measurements to verify balance has not been disrupted or that such disruption has been rectified.
- D. Leave systems in proper working order, replacing belt guards, closing access doors, closing doors to electrical switch boxes, and restoring thermostats to specified settings.
- E. For belt driven equipment, provide sheave and belt modifications and/or replacements as required to ensure design flow rates as specified.
- F. Variable-frequency drives shall generally be set near full speed, between 60 Hz and 55 Hz output frequency, to preserve as much frequency range as possible for controllability.

3.6 AIR SYSTEM PROCEDURE

- A. Adjust air handling and distribution systems to provide design supply, return, and exhaust air quantities.
- B. Make air quantity measurements in ducts by Pitot tube traverse of entire cross sectional area of duct.
- C. Measure air quantities at air inlets and outlets.
- D. Adjust distribution system to obtain uniform space temperatures free from objectionable drafts and noise.
- E. Use volume control devices to regulate air quantities only to extent that adjustments do not create objectionable air motion or sound levels. Effect volume control by duct internal devices such as dampers and splitters.

- F. Vary total system air quantities by adjustment of fan speeds. Vary branch air quantities by damper regulation.
- G. Provide system schematic (in floor-plan or line-diagram view) with outlets and inlets numbered with the reference numbers used in the TAB Agent's tabular data, and with required and actual air quantities recorded at each outlet or inlet.
 - 1. Indicate locations of duct traverses.
 - 2. Indicate locations of duct pressure sensors, airflow monitoring stations, and other devices which require measurements for control settings.
- H. Measure static air pressure conditions on air supply units, air return units, exhaust units, and heat recovery units, including pressure drops across filters, coils, dampers, mixing boxes, and heat recovery devices, and total pressure across the fan. Make allowances for 50 percent loading of filters, and indicate actual filter drop as well as the allowances. Provide equipment diagram indicating internal components and measurement points.
- I. Provide duct traverse diagrams with measurement points indicated, with readings recorded at each point, and with calculated velocity and airflow.
- J. Adjust outside air automatic dampers, outside air, return air, and exhaust dampers for design conditions. Adjust at minimum position and maximum position, and use manual dampers and actuator limit stops to minimize differences.
- K. Where available fan capacity is less than total flow requirements of individual system parts (due to system diversity), full flow in one part may be simulated by temporary restriction of flow to other parts.
- L. Set pattern-control vanes and other devices in air inlets and outlets to provide the spread and throw patterns indicated, without objectionable noise or air motion to the occupants. Split the flow of linear slot diffusers in directions as required for good coverage. At completion, patterns shall be uniform and pleasing to the eye.

3.7 WATER SYSTEM PROCEDURE

- A. Adjust water systems to provide required or design quantities.
- B. Use calibrated Venturi tubes, orifices, or other metered fittings and pressure gauges to determine flow rates for system balance. Where flow metering devices are not installed, base flow balance on temperature difference across various heat transfer elements in the system.
- C. Adjust systems to provide specified pressure drops and flows through heat transfer elements prior to thermal testing. Perform balancing by measurement of temperature differential in conjunction with air balancing.
- D. Effect system balance with automatic control valves fully open to heat transfer elements.
- E. Effect adjustment of water distribution systems by means of balancing cocks, valves, and fittings. Do not use service or shut-off valves for balancing.

3.8 VERIFICATION OF DUCT LEAKAGE TESTING

- A. The TAB Agent shall witness the duct leakage tests performed under Division 23 Section “Metal Ducts.” At a minimum, the first duct leakage test shall be witnessed and approved by the TAB Agent and the Engineer. At a minimum, subsequent duct leakage tests shall be witnessed and approved by the TAB Agent. The TAB Agent shall confirm proper testing procedures and shall give written approval to leakage tests. If deficiencies are discovered, the TAB Agent shall document these deficiencies to the Contractor and the Engineer. Once deficiencies are corrected, the TAB Agent shall witness follow-up leakage tests.

3.9 PROJECT CLOSEOUT

- A. At final inspection, recheck random selections of data recorded in report. Recheck points or areas as selected and witnessed by the Architect.
- B. Check and adjust systems approximately 6 months after final acceptance and submit report.

3.10 SCHEDULES

- A. Equipment Requiring Testing, Adjusting, and Balancing:
 - 1. Air Handling Units
 - 2. Fans
 - 3. Air Inlets and Outlets
- B. Report Forms:
 - 1. Title Page:
 - a. Name of Testing, Adjusting, and Balancing Agency
 - b. Address of Testing, Adjusting, and Balancing Agency
 - c. Telephone number of Testing, Adjusting, and Balancing Agency
 - d. Project name
 - e. Project location
 - f. Project Architect
 - g. Project Engineer
 - h. Project Contractor
 - i. Project altitude
 - j. Report date
 - 2. Summary Comments:
 - a. Design versus final performance
 - b. Notable characteristics of system
 - c. Description of systems operation sequence
 - d. Summary of outdoor and exhaust flows to indicate amount of building pressurization
 - e. Nomenclature used throughout report
 - f. Test conditions
 - 3. Instrument List:
 - a. Instrument
 - b. Manufacturer
 - c. Model number
 - d. Serial number
 - e. Range
 - f. Calibration date

4. Electric Motors:
 - a. Manufacturer
 - b. Model/Frame
 - c. HP/BHP
 - d. Phase, voltage, amperage; nameplate, actual, no load
 - e. RPM
 - f. Service factor
 - g. Starter size, rating, heater elements
 - h. Sheave Make/Size/Bore
5. V-Belt Drive:
 - a. Identification/location
 - b. Required driven RPM
 - c. Driven sheave, diameter and RPM
 - d. Belt, size and quantity
 - e. Motor sheave diameter and RPM
 - f. Center to center distance, maximum, minimum, and actual
6. Cooling Coil Data:
 - a. Identification/number
 - b. Location
 - c. Service
 - d. Manufacturer
 - e. Rows, and fins per inch
 - f. Air flow, design and actual
 - g. Entering air DB temperature, design and actual
 - h. Entering air WB temperature, design and actual
 - i. Leaving air DB temperature, design and actual
 - j. Leaving air WB temperature, design and actual
 - k. Water flow, design and actual
 - l. Water pressure drop, design and actual
 - m. Entering water temperature, design and actual
 - n. Leaving water temperature, design and actual
 - o. Refrigerant saturated suction temperature, design and actual
 - p. Refrigerant superheat temperature
 - q. Air pressure drop, design and actual
7. Heating Coil Data:
 - a. Identification/number
 - b. Location
 - c. Service
 - d. Manufacturer
 - e. Rows, and fins per inch
 - f. Air flow, design and actual
 - g. Water flow, design and actual
 - h. Water pressure drop, design and actual
 - i. Entering water temperature, design and actual
 - j. Leaving water temperature, design and actual
 - k. Entering air temperature, design and actual
 - l. Leaving air temperature, design and actual
 - m. Air pressure drop, design and actual
8. Air Moving Equipment:
 - a. Location
 - b. Manufacturer

- c. Model number
 - d. Serial number
 - e. Arrangement/Class/Discharge
 - f. Air flow, specified and actual
 - g. Return air flow, specified and actual
 - h. Outside air flow, specified and actual
 - i. Total static pressure (total external), specified and actual
 - j. Inlet pressure
 - k. Discharge pressure
 - l. Component pressure drops
 - m. Sheave Make/Size/Bore
 - n. Number of Belts/Make/Size
 - o. Fan RPM
9. Return Air/Outside Air Data:
- a. Identification/location
 - b. Design air flow
 - c. Actual air flow
 - d. Design return air flow
 - e. Actual return air flow
 - f. Design outside air flow
 - g. Actual outside air flow
 - h. Return air temperature
 - i. Outside air temperature
 - j. Required mixed air temperature
 - k. Actual mixed air temperature
 - l. Design outside/return air ratio
 - m. Actual outside/return air ratio
10. Exhaust Fan Data:
- a. Location
 - b. Manufacturer
 - c. Model number
 - d. Serial number
 - e. Air flow, specified and actual
 - f. Total static pressure (total external), specified and actual
 - g. Inlet pressure
 - h. Discharge pressure
 - i. Sheave Make/Size/Bore
 - j. Number of Belts/Make/Size
 - k. Fan RPM
11. Duct Traverse:
- a. System zone/branch
 - b. Duct size
 - c. Area
 - d. Design velocity
 - e. Design air flow
 - f. Test velocity
 - g. Test air flow
 - h. Duct static pressure
 - i. Air temperature
 - j. Air correction factor

12. Air Distribution Test Sheet:
 - a. Air terminal number
 - b. Room number/location
 - c. Terminal type
 - d. Terminal size
 - e. Area factor
 - f. Design velocity
 - g. Design air flow
 - h. Test (final) velocity
 - i. Test (final) air flow
 - j. Percent of design air flow
13. Vibration Test:
 - a. Location of points:
 - 1) Fan bearing, drive end
 - 2) Fan bearing, opposite end
 - 3) Motor bearing, center (if applicable)
 - 4) Motor bearing, drive end
 - 5) Motor bearing, opposite end
 - 6) Casing (bottom or top)
 - 7) Casing (side)
 - 8) Duct after flexible connection (discharge)
 - 9) Duct after flexible connection (suction)
 - b. Test readings:
 - 1) Horizontal, velocity and displacement
 - 2) Vertical, velocity and displacement
 - 3) Axial, velocity and displacement
 - c. Normally acceptable readings, velocity and acceleration
 - d. Unusual conditions at time of test
 - e. Vibration source (if non-complying)

END OF SECTION 230593

This Page Left Intentionally Blank

SECTION 230713 – DUCT INSULATION

PART 1 - GENERAL

1.1 SECTION INCLUDES

- A. Ductwork Insulation.

1.2 RELATED SECTIONS

- A. Division 07 Section “Self-Adhering Sheet Waterproofing”: Installation and finishing of outdoor insulation jacket.
- B. Division 23 Section “Identification for HVAC Piping and Equipment.”
- C. Division 23 Section “Metal Ducts”: Factory-insulated flexible ductwork.
- D. Division 23 Section “Metal Ducts”: Ductwork.

1.3 REFERENCES

- A. Division 01 Section “References”: Requirements for references and standards.
- B. ASTM
- C. NAIMA - National Insulation Standards.
- D. NFPA 96 - Standard for Ventilation Control and Fire Protection of Commercial Cooking Operations.
- E. NFPA 255 - Standard Method of Test of Surface Burning Characteristics of Building Materials.
- F. SMACNA - HVAC Duct Construction Standards - Metal and Flexible.
- G. UL 94 - Tests for Flammability of Plastic Materials for Parts in Devices and Appliances.
- H. UL 723 - Standard for Test for Surface Burning Characteristics of Building Materials.

1.4 SUBMITTALS

- A. Division 01 Section “Submittal Procedures”.
- B. Product Data: Provide product description, thermal characteristics, list of materials and thickness for each service, and locations.

1.5 QUALITY ASSURANCE

- A. Manufacturer Qualifications: Company specializing in manufacturing the Products specified in this Section with minimum 3 years’ experience.
- B. Applicator Qualifications: Company specializing in performing the work of this Section with

minimum 3 years' experience.

1.6 REGULATORY REQUIREMENTS

- A. Materials: Flame spread/smoke developed rating of 25/50 in accordance with ASTM E84, NFPA 255 and UL 723. For elastomeric foam insulation, rating shall apply for thicknesses up to 2 inches (50 mm).
- B. Insulation materials shall be asbestos free. No fibers with dimensions similar to asbestos fibers shall be released from any material.

1.7 DELIVERY, STORAGE, AND PROTECTION

- A. Division 01 Section "Product Requirements": Transport, handle, store, and protect products.
- B. Accept materials on site in original factory packaging, labeled with manufacturer's identification, including product density and thickness.
- C. Protect insulation from weather and construction traffic, dirt, water, chemical, and mechanical damage, by storing in original wrapping.

1.8 ENVIRONMENTAL REQUIREMENTS

- A. Division 01 Section "Product Requirements": Environmental conditions affecting products on site.
- B. Maintain ambient temperatures and conditions required by manufacturers of adhesives, mastics, and insulation cements.
- C. Maintain temperature during and after installation for minimum period of 24 hours.

1.9 EXISTING DUCTWORK

- A. Insulate existing ductwork as indicated on the Drawings. Contractor shall be responsible to field-verify quantities and sizes. Provide access to existing ductwork as required for complete insulation. Remove existing finishes and existing insulation as required.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Glass and Mineral Fiber Products:
 - 1. Knauf Insulation.
 - 2. Certainteed Corporation.
 - 3. Johns Manville.
 - 4. Owens Corning.
 - 5. Substitutions: Not permitted.
- B. Elastomeric Foam Products:
 - 1. Armacell LLC.
 - 2. K-Flex USA.

3. Substitutions: Not permitted.
- C. Glass Fiber Insulation Sealing Tapes:
1. Venture Tape Corporation.
 2. 3M Company.
 3. Ideal Tape Co., division of American Biltrite Inc.
 4. Nashua Tape Products, division of Berry Plastics Corp.
 5. Substitutions: Not permitted.
- D. Accessories:
1. Ceel-Co division of Johns Manville (product: plastic jacket systems).
 2. Foster Products, division of Specialty Construction Brands, Inc., a subsidiary of H.B. Fuller (mastics, sealants, reinforcing membranes, and accessories).
 3. Johns Manville (products: Super-Seal acrylic polymer coatings, Zeston plastic jacket systems).
 4. Pabco/Childers Metals, division of ITW Insulation Systems (products: metal jacket systems, and accessories).
 5. Vac Systems International (product: Tough Coat acrylic polymer mechanical insulation repair coating).
 6. Venture Tape Corporation (product: Jacket for outdoor insulation).
 7. Substitutions: Approved equal. See Section 016000 - Product Requirements.

2.2 GLASS FIBER, FLEXIBLE

- A. Insulation: ASTM C553; flexible, noncombustible blanket.
1. 'K' ('Ksi') value: ASTM C518, 0.25 at 75 degrees F (0.039 at 24 degrees C).
 2. Maximum service temperature: 250 degrees F (121 degrees C) faced and 350 degrees F (176 degrees C) unfaced.
 3. Maximum moisture absorption: 0.20 percent by volume.
 4. Minimum density: 1.0 lb/cu. ft. (16 kg/m³).
- B. Vapor Barrier Jacket:
1. ASTM C1136, Kraft paper reinforced with glass fiber yarn and bonded to vapor barrier film. Facing as required for the application. Integral staple flap on one edge.
 - a. Aluminum Faced: FSK (aluminum foil-scrim-kraft) construction.
 - b. White Faced: PSK (polypropylene-scrim-kraft) construction.
 2. Moisture vapor transmission: ASTM E96; 0.02 perm.
 3. Suitable for insulation surface temperatures up to 150 degrees F (66 degrees C).
 4. Overlap longitudinal laps and butt strips.
 5. Secure with outward clinch expanding staples and vapor barrier mastic and pressure sensitive tape.
- C. Vapor Barrier Tape: See article "Glass Fiber Insulation Sealing Tape" in this Section.
- D. Outdoor Vapor Barrier Mastic: Vinyl emulsion type acrylic or mastic, compatible with insulation, black color.
- E. Tie Wire: Annealed steel, 16 ga (1.5 mm).

2.3 GLASS FIBER, RIGID

- A. Insulation: ASTM C612; rigid, noncombustible blanket. Supplied in board form.
 - 1. 'K' ('Ksi') value: ASTM C518, 0.24 at 75 degrees F (0.036 at 24 degrees C).
 - 2. Maximum service temperature: 450 degrees F (232 degrees C).
 - 3. Maximum moisture absorption: 1.0 percent by volume.
 - 4. Density: 3.0 lb/cu. ft. (48 kg/cu m).
- B. Vapor Barrier Jacket:
 - 1. ASTM C1136, kraft paper reinforced with glass fiber yarn and bonded to aluminized film. Facing as required for the application.
 - a. Aluminum Faced: FSK (foil-scrim-kraft) construction
 - b. White Faced: ASJ (all-service jacket) construction.
 - 2. Moisture vapor transmission: ASTM E96; 0.02 perm.
 - 3. Suitable for insulation surface temperatures up to 150 degrees F (66 degrees C).
 - 4. Overlap longitudinal laps and butt strips.
 - 5. Secure insulation with mechanical fasteners to substrate, and seal jacket with pressure sensitive tape.
- C. Vapor Barrier Tape: See article "Glass Fiber Insulation Sealing Tape" in this Section.
- D. Indoor Vapor Barrier Finish:
 - 1. Cloth: Untreated; 9 oz/sq yd (305 g/sq m) weight, glass fabric.
 - 2. Vinyl emulsion type acrylic, compatible with insulation, black color.

2.4 GLASS FIBER, SEMI-RIGID

- A. Insulation: ASTM C612; semi-rigid, noncombustible blanket, with fibers oriented perpendicular to insulation surface to provide compressive strength while maintaining flexibility. Supplied in roll form, suitable for application on rounded shapes such as pipes, tanks, ducts, vessels, and other similar round and irregular shapes.
 - 1. 'K' ('Ksi') value: ASTM C518, 0.24 at 75 degrees F (0.036 at 24 degrees C).
 - 2. Maximum service temperature: 450 degrees F (232 degrees C).
 - 3. Maximum moisture absorption: 1.0 percent by volume.
 - 4. Density: 2.5 lb/cu. ft. (40 kg/cu m).
- B. Vapor Barrier Jacket:
 - 1. ASTM C1136, kraft paper with glass fiber yarn and bonded to aluminized film. Facing as required for the application.
 - a. Aluminum Faced: FSK (foil-scrim-kraft) construction
 - b. White Faced: ASJ (all-service jacket) construction.
 - 2. Moisture vapor transmission: ASTM E96; 0.02 perm.
 - 3. Suitable for insulation surface temperatures up to 150 degrees F (66 degrees C).
 - 4. Overlap longitudinal laps and butt strips.
 - 5. Secure with outward clinch expanding staples and vapor barrier mastic and pressure sensitive tape.
- C. Vapor Barrier Tape: See article "Glass Fiber Insulation Sealing Tape" in this Section.
- D. Indoor Vapor Barrier Finish:
 - 1. Cloth: Untreated; 9 oz/sq yd (305 g/sq m) weight, glass fabric.

2. Vinyl emulsion type acrylic, compatible with insulation, black color.

2.5 GLASS FIBER INSULATION SEALING TAPE

- A. Manufacturer:
 1. 3M VentureTape,
 2. Ideal Tape
 3. Insulation manufacturer
 4. Substitutions: Approved equal. See Section 016000 - Product Requirements
- B. Self-adhesive tape with integral vapor barrier, pressure sensitive acrylic-based or rubber-based adhesive, and release liner strip. Width 3 inch (76 mm) nominal.
- C. Types:
 1. For rigid and semi-rigid insulations, tape shall be reinforced type. For flexible "duct wrap" insulation, tape shall be either reinforced or non-reinforced.
 2. White or aluminum outer surface to match the insulation.
 3. Reinforced: Kraft paper reinforced with glass fiber yarn and bonded to vapor barrier layer.
 - a. Aluminum Finish with FSK: VentureTape 1525CW.
 - b. White Finish with ASJ: VentureTape 1540CW
 - c. White Finish with PSK: VentureTape 1531CW.
 4. Non-Reinforced: Foil insulation tape. Dead-soft temper 2 mil (0.05 mm) thick aluminum foil, without reinforcement. Hand-tearable.
 5. Performance:
 - a. Peel Adhesion: PSTC-101 with 20 minute dwell, 45 oz/in. (12.5 N / 25 mm).
 - b. Shear Adhesion: PSTC-107, 2.2 psi (15.2 kPa) after 24 hours.
 - c. Tensile Strength: PSTC-131:
 - 1) Reinforced Types: 40 lb/in. (180.8 N / 25 mm).
 - 2) Non-reinforced Types: 21 lb/in. (94.9 N / 25 mm).
 - d. Elongation: PSTC 131, 6 percent maximum.
 - e. Service Temperature: -40 to 240 degrees F (-40 to 116 degrees C).
 - f. UL 723 listed or classified (flame/smoke rating).

2.6 ELASTOMERIC FOAM

- A. Approved Products:
 1. Armacell: AP Armaflex and AP Armaflex FS sheet insulation.
 2. K-Flex USA: Insul-Sheet S2S and K-Flex LS sheet insulation.
 3. Substitutions: Not permitted
- B. Insulation: ASTM C534; flexible, cellular elastomeric, molded or sheet.
 1. 'K' ('Ksi') value: ASTM C177; 0.277 Btu-in/(h-ft²-degreesF) at 75 degrees F (0.04 W/m-K at 24 degrees C).
 2. Minimum service temperature: -70 degrees F (-57 degrees C) (flexible to -40 degrees F (-40 degrees C)).
 3. Maximum service temperature: 220 degrees F (104 degrees C).
 4. Maximum moisture absorption: ASTM C209, 0.2 percent by volume; or ASTM D1056, 5 percent by weight.
 5. Moisture vapor transmission: ASTM E96; 0.08 perm-inches (0.116 ng/(s-m-Pa)).
 6. Connection: Waterproof vapor barrier adhesive.

7. Density: 3.0 to 6.0 lb/cu ft (48 to 96 kg/cu m).

C. Elastomeric Foam Adhesive: Air dried, contact adhesive, compatible with insulation.

2.7 ELASTOMERIC FOAM DUCT LINER

A. Products:

1. Armacell, AP Armaflex and AP Armaflex FS black or gray sheet duct liner insulation.
2. K-Flex USA: Insul-Sheet S2S and K-Flex LS sheet insulation.
3. Substitutions: Not permitted.

B. Insulation: ASTM C534; flexible cellular elastomeric foam, molded or sheet, factory-treated with antimicrobial agent.

1. 'K' ('Ksi') value: ASTM C177; 0.25 Btu-in/(h-ft²-degrees F) at 75 degrees F (0.04 W/m-K at 24 degrees C).
2. Minimum service temperature: -70 degrees F (-57 degrees C) (flexible to -40 degrees F (-40 degrees C)).
3. Maximum service temperature: 180 degrees F (82 degrees C).
4. Maximum moisture absorption: ASTM C209, 0.2 percent by volume; or ASTM D1056, 5 percent by weight.
5. Moisture vapor transmission: ASTM E96; 0.20 perm-inches (1.16x10⁻¹⁰ Kg/(s-m-Pa)).
6. Maximum velocity on airstream side: ASTM C1071; 6,000 fpm (30.5 m/sec).
7. Connection: Waterproof vapor barrier adhesive.
8. Density: 3.0 to 6.0 lb/cu. ft. (48 to 96 kg/cu m).
9. Minimum sound absorption coefficients, ASTM C423, Type A mounting (sabins/sq. ft):
 - a. At 250 Hz center band frequency: 0.17 for 1 inch (25 mm) thickness.
 - b. At 500 Hz center band frequency: 0.80 for 1 inch (25 mm) thickness.
 - c. At 1000 Hz center band frequency: 0.32 for 1 inch (25 mm) thickness.
 - d. NRC: 0.50 for 1 inch (25 mm) thickness.

C. Elastomeric Foam Adhesive: Air dried, contact adhesive, compatible with insulation.

D. Self-Adhesive Coating: At the Contractor's option, the insulation may be provided with a factory-applied self-adhesive coating with peel-off release liner. If the Manufacturer recommends installation of self-adhesive liner without mechanical pin fasteners at all velocities, the pins may be omitted. Provide suitable cleaner for the ductwork to ensure adhesion.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Division 01 Section "Project Management and Coordination": Verification of existing conditions before starting work.
- B. Verify that ductwork has been tested before applying insulation materials.
- C. Verify that surfaces are clean, foreign material removed, and dry.
- D. Verify that insulation materials are clean and dry. Discard any materials that exhibit signs of moisture damage, contamination, mold, mildew, or other biological growth. Discard any

materials used in the air handling airstream if they have been exposed to water.

3.2 INSTALLATION

- A. Division 01 Section “Quality Requirements”: Manufacturer's instructions.
- B. Install in accordance with NAIMA National Insulation Standards.
- C. In addition to new ductwork, provide insulation for surfaces of existing ductwork that is uninsulated. Field-verify scope of existing ductwork.
- D. Provide insulation for surfaces of ductwork, as indicated and specified. Insulation values shall meet or exceed the requirements of ASHRAE 90.1-2019, State Energy Codes, and Table I, whichever is greater. In addition, comply with the other requirements of this Section.
- E. Insulated Ductwork Conveying Air below Ambient Temperature:
 - 1. Provide insulation with vapor barrier jackets.
 - 2. Finish with tape and vapor barrier jacket.
 - 3. Continue insulation through walls, sleeves, hangers, and other duct penetrations.
 - 4. Insulate entire system including fittings, joints, flanges, fire dampers, flexible connections, and expansion joints.
- F. Insulated Ductwork Conveying Air above Ambient Temperature:
 - 1. Provide with or without standard vapor barrier jacket.
 - 2. Insulate fittings and joints. Where service access is required, bevel and seal ends of insulation.
- G. Where rigid glass fiber insulation is scheduled, semi-rigid glass fiber insulation may be used on round and flat oval ducts and irregular shapes, and preformed pipe insulation may be used on small diameter round ducts.
- H. External Duct Insulation Application:
 - 1. Secure insulation with vapor barrier with wires and seal jacket joints with vapor barrier adhesive or tape to match jacket.
 - 2. Secure insulation without vapor barrier with staples, tape, or wires.
 - 3. Install without sag on underside of ductwork. Use adhesive or mechanical fasteners where necessary to prevent sagging. Lift ductwork off trapeze hangers and insert spacers.
 - 4. Seal vapor barrier penetrations by mechanical fasteners with vapor barrier adhesive.
 - 5. Stop and point insulation around access doors and damper operators to allow operation without disturbing wrapping.
- I. Duct and Plenum Liner Application:
 - 1. Duct dimensions indicated are net inside dimensions required for air flow. Increase duct size to allow for insulation thickness.
 - 2. Provide duct liner where:
 - a. Indicated on the Drawings.
 - b. Specified.
 - 3. Install duct liner in accordance with SMACNA standards.
 - 4. Install elastomeric foam duct liner in accordance with manufacturer's recommendations.
 - 5. Adhesive: Apply to duct sheet metal for 90 percent coverage. Clean the duct before

- applying adhesive.
6. Mechanical Fastening: In addition to adhesive, provide mechanical fastening devices meeting the following requirements:
 - a. Are spaced in accordance with SMACNA Standards and Manufacturer's recommendations.
 - b. When installed, are as corrosion-resistant as G60 coated galvanized steel.
 - c. Will not adversely affect the fire-resistant classification of liner and adhesives.
 - d. Do not damage the liner when applied as recommended by the manufacturer.
 - e. Do not cause leakage in the duct.
 - f. Do not project more than nominally into the airstream.
 - g. Will indefinitely sustain a 50 lb (222 N) tensile dead load test perpendicular to the duct wall.
 - h. Have a permanent, waterproof bond to the duct wall.
 - i. Are the correct length for the specified liner thickness.
 7. Self-Adhesive Elastomeric Foam Insulation: If manufacturer's instructions recommend omitting mechanical pin fasteners at all air velocities, they may be omitted. Clean the duct with recommended liquid cleaner before installing insulation.
 8. Seal and smooth liner airstream surface penetrations, cuts, tears, edges, and transverse and longitudinal joints with adhesive or acrylic polymer repair coating, compatible with liner surface coating.
 9. Corners: Cut and fit liner in the corners of rectangular duct sections to assure butted edge overlapping. Longitudinal joints in duct liner shall not occur except at the corners of ducts unless the size of the duct and standard liner product dimensions make joints necessary.
 10. Transverse Joints: Butt liner neatly without gaps.
 11. Provide securely-installed metal nosings that are either channel or zee profile or are integrally-formed from the duct wall over transversely oriented liner edges facing the airstream at fan discharge, at access doors, and at any interval of lined duct preceded by unlined duct. In addition, where velocities exceed 2,000 fpm (10.2 mps), provide metal nosing on upstream edges of liner at every transverse joint.
 12. Do not install duct liner in fresh air intake ductwork between the outside intake opening and the fan or other air moving device, or within 10 feet (3 m) downstream of a cooling coil or humidifier.
- J. Install insulation after ductwork and equipment have been tested and approved.
- K. Ensure that surface is clean and dry prior to installation. Ensure that insulation is dry before and during application. Finish with system at operating conditions.
- L. Ensure that insulation is continuous through inside walls. Pack around ducts with fireproof self-supporting insulation material, properly sealed.
- M. Finish insulation neatly at hangers, supports and other protrusions.
- N. Locate insulation or cover seams in least visible locations.
- O. Repair separation of joints or cracking of insulation due to thermal movement or poor workmanship.
- P. Standing seams, supporting angles and flanges on insulated ductwork shall be insulated with thickness equal to the duct and edges shall be finished and vapor sealed.

- Q. For supply or return ductwork which is required to be insulated, insulation shall be continuous and shall include the insulating of register, grille and diffuser connection plenums/boots.
- R. Mechanical fasteners shall not be riveted or screwed to the duct and shall not penetrate the metalwork.

3.3 FIELD INSPECTION

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

TABLE I
DUCTWORK INSULATION MATERIAL AND WALL THICKNESS

DUCTWORK TYPE	INSULATION MATERIAL	VAPOR BARRIER REQUIRED	INSULATION WALL THICKNESS
Supply ductwork (unless exposed in a conditioned space)	Glass Fiber, Flexible	Yes	1 ½ inches (38.1 mm)
	Glass Fiber, Rigid	Yes	1 ½ inches (38.1 mm)
Exhaust ductwork from exterior building openings (such as louvers and roof hoods) to 4 feet (1.2 m) interior of motorized damper or backdraft damper.	Glass Fiber, Flexible (only if ductwork is concealed)	Yes	1 ½ inches (38.1 mm)
	Glass Fiber, Rigid	Yes	1 ½ inch (38.1 mm)
Outside air intake ductwork	Glass Fiber, Flexible (only if ductwork is concealed)	Yes	2 layers of 1 ½ inch (38.1 mm) with staggered joints
	Glass Fiber, Rigid	Yes	2 layers of 1 ½ inch (38.1 mm) with staggered joints
Ductwork 10 feet upstream and downstream from a supply or return fan, or through the first elbow, whichever is longer (excluding fresh air intake ductwork)	Elastomeric Foam Duct Liner	--	1 inch (25.4 mm)

END OF SECTION 230713

This Page Left Intentionally Blank

SECTION 230719 – HVAC PIPING INSULATION

PART 1 - GENERAL

1.1 SECTION INCLUDES

- A. Piping insulation.
- B. Jackets and accessories.

1.2 RELATED SECTIONS

- A. Division 07 Section “Through Penetration Firestop Systems.”
- B. Division 09 Section “Painting”: Painting insulation jacket.
- C. Division 23 Section “Identification for HVAC Piping and Equipment.”
- D. Division 23 Section “Hangers and Supports for HVAC Piping and Equipment”: Placement of hangers and hanger inserts.
- E. Division 23 Section “Hydronic Piping”: Placement of hangers and hanger inserts.
- F. Division 23 Section “Refrigerant Piping.”: Placement of inserts.

1.3 REFERENCES

- A. Division 01 Section “References”: Requirements for references and standards.
- B. ASTM
- C. NAIMA National Insulation Standards.
- D. NFPA 255 - Standard Method of Test of Surface Burning Characteristics of Building Materials.
- E. UL 723 - Standard for Test for Surface Burning Characteristics of Building Materials.

1.4 SUBMITTALS

- A. Submit under provisions of Division 01 Section “Submittal Procedures”.
- B. Product Data: Provide product description, thermal characteristics, list of materials and thickness for each service, and locations.

1.5 QUALITY ASSURANCE

- A. Manufacturer Qualifications: Company specializing in manufacturing the Products specified in this Section with minimum 3 years’ experience.
- B. Applicator Qualifications: Company specializing in performing the work of this Section with minimum 3 years’ experience.

1.6 REGULATORY REQUIREMENTS

- A. Conform to maximum flame spread/smoke developed rating of 25/50 in accordance with ASTM E84, NFPA 255 and UL 723. For elastomeric foam insulation, rating shall apply for thicknesses up to 2 inches (50 mm).
- B. Insulation materials and accessories shall be asbestos-free. No fibers with dimensions similar to asbestos fibers shall be released from any material.

1.7 DELIVERY, STORAGE, AND PROTECTION

- A. Division 01 Section "Product Requirements": Transport, handle, store, and protect products.
- B. Accept materials on site, labeled with manufacturer's identification, product density, and thickness.

1.8 ENVIRONMENTAL REQUIREMENTS

- A. Division 01 Section "Product Requirements": Environmental conditions affecting products on site.
- B. Maintain ambient conditions required by manufacturers of each product.
- C. Maintain temperature before, during, and after installation for minimum of 24 hours.

1.9 EXISTING PIPING

- A. Insulate existing piping as indicated on the Drawings. Contractor shall be responsible to field-verify quantities and sizes. Provide access to existing piping as required for complete insulation. Remove existing finishes and existing insulation as required.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Elastomeric Foam Products:
 - 1. Armacell: AP Armaflex and AP Armaflex FS pipe and sheet insulation.
 - 2. K-Flex USA: Insul-Tube and K-Flex LS pipe insulation, and Insul-Sheet S2S and K-Flex LS sheet insulation.
 - 3. Substitutions: Not permitted.
- B. Glass and Mineral Fiber Products:
 - 1. Knauf Insulation.
 - 2. Certaineed Corporation.
 - 3. Johns Manville.
 - 4. Owens Corning.
 - 5. Substitutions: Not permitted.
- C. Accessories:
 - 1. Ceel-Co division of Johns Manville (product: plastic jacket systems).
 - 2. Foster Products, division of Specialty Construction Brands, Inc., a subsidiary of H.B.

- Fuller (mastics, sealants, reinforcing membranes, and accessories).
- 3. Johns Manville (products: Super-Seal acrylic polymer coatings, Zeston plastic jacket systems).
- 4. Pabco/Childers Metals, division of ITW Insulation Systems (products: metal jacket systems, and accessories).
- 5. Pittsburgh Corning (product: cellular glass insulation for high-density inserts).
- 6. Proto Corporation (product: plastic jacket systems).
- 7. Vac Systems International (product: Tough Coat acrylic polymer mechanical insulation repair coating).

2.2 ELASTOMERIC FOAM

- A. Insulation: ASTM C534; flexible, cellular elastomeric, molded or sheet.
 - 1. 'K' ('Ksi') value: ASTM C177; 0.277 Btu-in/(hr-sq.ft- degrees F) at 75 degrees F (0.04 W/m-K at 24 degrees C).
 - 2. Minimum service temperature: -70 degrees F (-57 degrees C) (flexible to -20 degrees F (-29 degrees C)).
 - 3. Maximum service temperature: 220 degrees F (104 degrees C).
 - 4. Maximum moisture absorption: ASTM C209, 0.2 percent by volume; or ASTM D1056, 5 percent by weight.
 - 5. Moisture vapor transmission: ASTM E96; 0.08 perm-inches (0.116 ng/(s-m-Pa)).
 - 6. Connection: Waterproof vapor barrier adhesive.
- B. Elastomeric Foam Adhesive: Air dried, contact adhesive, compatible with insulation.
- C. Insulated Hanger Inserts: EATON Armafix IPH insulated pipe hanger inserts or for strut mounting with two piece pipe clamps with pre-installed friction tape and elastic stop nuts shall be used at hanger locations.
 - 1. Engineered from Armaflex insulation, with inserts of CFC-free PPUR/PIR polyurethane foam insulation bearing segments.
 - 2. Outer shell of 30 mils (0.76 mm) -thick painted aluminum.
 - 3. Self-adhesive closure strip.
 - 4. Insulation material shall meet the requirements as defined in ASTM C534
 - 5. 'K' ('Ksi') value: ASTM C177; 0.27 Btu-in/(hr-sq.ft- degrees F) at 75 degrees F
 - 6. Moisture vapor transmission: ASTM E96; 0.08 perm-inches (0.116 ng/(s-m-Pa)).
 - 7. Connection: Armaflex 520 Waterproof vapor barrier adhesive
 - 8. Provide Armaflex friction tape, wrapped around the IPH prior to placing in the hanger.

2.3 GLASS FIBER

- A. Insulation: ASTM C547; rigid molded, noncombustible.
 - 1. 'K' ('Ksi') value: ASTM C177, 0.24 Btu-in/(hr-sq.ft- degrees F) at 75 degrees F (0.035 W/m-K at 24 degrees C).
 - 2. Maximum service temperature: 850 degrees F (454 degrees C).
 - 3. Maximum moisture absorption: 0.2 percent by volume.
- B. Vapor Barrier Jacket:
 - 1. ASTM C1136, White kraft paper with glass fiber yarn, bonded to aluminized film.
 - 2. Moisture vapor transmission: ASTM E96; 0.02 perm-inches.
- C. Tie Wire: 0.048 inch (1.22 mm) stainless steel with twisted ends on maximum 12 inch (300

mm) centers.

- D. Vapor Barrier Lap Adhesive: Compatible with insulation.
- E. Insulating Cement/Mastic: ASTM C195; hydraulic setting on mineral wool.
- F. Indoor Vapor Barrier Finish:
 - 1. Cloth: Untreated; 9 oz/sq yd (305 g/sq m) weight.
 - 2. Vinyl emulsion type acrylic, compatible with insulation, white color.
- G. Outdoor Vapor Barrier Mastic: Vinyl emulsion type acrylic or mastic, compatible with insulation, black color.
- H. Outdoor Breather Mastic: Vinyl emulsion type acrylic or mastic, compatible with insulation, black color.
- I. Insulating Cement: ASTM C449/C449M.

2.4 JACKETS

- A. PVC Plastic.
 - 1. Jacket: ASTM D1784, One piece molded type fitting covers and sheet material, off-white color.
 - a. Minimum service temperature: 0 degrees F (-18 degrees C).
 - b. Maximum service temperature: 150 degrees F (66 degrees C).
 - c. Moisture vapor transmission: ASTM E96; 0.002 perm-inches.
 - d. Thickness: 15 mil (0.38 mm) for indoor use, 30 mil (0.76 mm) for outdoor use.
 - e. Connections: Brush on welding adhesive, tacks (for heating systems only) or pressure sensitive color matching vinyl tape.
 - 2. Covering Adhesive Mastic: Compatible with insulation.
- B. ABS Plastic:
 - 1. Jacket: One piece molded type fitting covers and sheet material, off-white color.
 - a. Minimum service temperature: -40 degrees F (-40 degrees C).
 - b. Maximum service temperature of 180 degrees F (82 degrees C).
 - c. Moisture vapor transmission: ASTM E96; 0.012 perm-inches.
 - d. Thickness: 30 mil (0.76 mm).
 - e. Connections: Brush on welding adhesive.

2.5 MANUFACTURER'S STAMP OR LABEL

- A. Every package or standard container of insulation, jackets, cements, adhesives, and coatings delivered to the project site for use shall have the manufacturer's stamp or label attached giving name of manufacturer, brand, and description of material. Insulation packages and containers shall be asbestos-free.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Verify that piping has been tested before applying insulation materials.
- B. Verify that surfaces are clean and dry, with foreign material removed.

3.2 INSTALLATION

- A. Division 01 Section "Quality Requirements": Manufacturer's instructions.
- B. Install in accordance with NAIMA National Insulation Standards where applicable.
- C. Provide insulation for surfaces of new piping and for surfaces of existing piping that is uninsulated, as indicated and specified.
- D. Insulation values shall meet or exceed the requirements of ASHRAE 90.1-2019, applicable State Energy Codes, and Table I, whichever is greater. In addition, comply with the other requirements of this Section.
 - 1. International Energy Conservation Code (IECC): Chapter 5 of the Code allows the use of ASHRAE 90.1 insulation thicknesses instead of the Minimum Pipe Insulation table which is in Chapter 5 of the IECC. This Specification does not reference the table in IECC.
- E. Piping systems requiring insulation, types of insulation required, and insulation thickness shall be as listed in Table I herein. For piping not listed in Table 1, insulate to meet Code requirements, using suitable specified materials, subject to Architect's approval. Except for flexible unicellular insulation, insulation thicknesses as specified in Table I shall be one inch (25 mm) greater for insulated piping systems located outside the building and in unconditioned spaces. Unless otherwise specified, insulate fittings, flanges, and valves, except valve stems, hand wheels, and operators. Use factory pre-molded, precut, or field-fabricated insulation of the same thickness and conductivity as used on adjacent piping. Insulation exterior shall be factory cleanable, grease resistant, non-flaking, and non-peeling.
- F. Exposed Piping: Locate insulation and cover seams in least visible locations.
- G. Insulated Pipes Conveying Fluids Below Ambient Temperature: Insulate entire system including fittings, valves, unions, flanges, strainers, flexible connections, and expansion joints.
- H. Glass Fiber Insulated Pipes Conveying Fluids below Ambient Temperature:
 - 1. Provide vapor barrier jackets, factory-applied or field-applied. Secure with self-sealing longitudinal laps and butt strips with pressure sensitive adhesive. Secure with outward clinch expanding staples and vapor barrier mastic.
 - 2. Insulate fittings, joints, and valves with molded insulation of like material and thickness as adjacent pipe. Finish with glass cloth and vapor barrier adhesive or PVC fitting covers.
- I. For hot piping conveying fluids 140 degrees F (60 degrees C) or less, do not insulate flanges and unions at equipment, but bevel and seal ends of insulation.

- J. For hot piping conveying fluids over 140 degrees F (60 degrees C), insulate flanges and unions at equipment.
- K. Glass Fiber Insulated Pipes Conveying Fluids above Ambient Temperature:
 - 1. Provide standard jackets, with or without vapor barrier, factory-applied or field-applied. Secure with self-sealing longitudinal laps and butt strips with pressure sensitive adhesive. Secure with outward clinch expanding staples.
 - 2. Insulate fittings, joints, and valves with insulation of like material and thickness as adjoining pipe. Finish with glass cloth and adhesive or PVC fitting covers.
- L. Continue insulation through walls, sleeves, pipe hangers, and other pipe penetrations. Finish at supports, protrusions, and interruptions. At fire separations, refer to Division 07.
- M. Pipe Exposed in Finished Spaces 10 feet (3 meters) or Less Above Finished Floor: Finish with PVC or ABS jacket and fitting covers.
- N. Exterior Applications:
 - 1. Provide vapor barrier jacket. Insulate fittings, joints, and valves with insulation of like material and thickness as adjoining pipe, and finish with glass-mesh-reinforced vapor barrier cement.
 - 2. Other Piping: Cover with PVC jacket and fitting covers with seams located on bottom side of horizontal piping.

3.3 UNIFORM INSTALLATION

- A. Systems shall use a single insulation type throughout the installation.

3.4 PIPING INSULATION

- A. Pipe Insulation (Except Elastomeric): Place sections of insulation around the pipe and joints tightly butted into place. The jacket laps shall be drawn tight and smooth. Secure jacket with fire resistant adhesive, factory applied self sealing lap. Cover circumferential joints with butt strips, not less than 3-inches (76 mm) wide, of material identical to the jacket material. Overlap longitudinal laps of jacket material not less than 1-1/2 inches (38 mm). Adhesive used to secure the butt strip shall be the same as used to secure the jacket laps. When a vapor barrier jacket is required, as indicated in Table I, or on the ends of sections of insulation that butt against flanges, unions, valves, fittings, and joints, use a vapor-barrier coating conforming to manufacturer's weatherproof coating for outside service. Apply this vapor barrier coating at longitudinal and circumferential laps. Patch damaged jacket material by wrapping a strip of jacket material around the pipe and cementing, and coating as specified for butt strips. Extend the patch not less than 1-1/2 inches (38 mm) past the break in both directions. At penetrations by pressure gauges and thermometers, fill the voids with the vapor barrier coating for outside service. Seal with a brush coat of the same coating. Where penetrating roofs, insulate piping to a point flush with the top of the flashing and seal with the vapor barrier coating. Butt tightly the exterior insulation to the top of the flashing and interior insulation. Extend the exterior metal jacket 2 inches (51 mm) down beyond the end of the insulation. Seal the flashing and counterflashing underneath with the vapor barrier coating.
- B. Elastomeric Foam Insulation: Bond cuts, butt joints, ends, and longitudinal joints with adhesive. Miter 90-degree turns and elbows, tees, and valve insulation. Where pipes penetrate fire walls, provide mineral-fiber insulation inserts and sheetmetal sleeves. Insulate flanges,

unions, valves, and fittings in accordance with manufacturer's published instructions. Apply two coats of vinyl lacquer finish to elastomeric foam insulation before applying PVC jacket in outside locations.

3.5 FIELD INSPECTION

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

TABLE I
PIPING INSULATION MATERIAL AND WALL THICKNESS

SERVICE	INSULATION MATERIAL	VAPOR BARRIER REQUIRED	INSULATION WALL THICKNESS AT THE FOLLOWING PIPE DIAMETERS				
			<1 inch	1 inch to <1.5 inches	1.5 inches to <4 inches	4 inches to <8 inches	8 inches or Greater
Heating Systems (Hot Water Supply and Return)							
141 degrees F to 200 deg. F	Glass Fiber	No	1.5 inches	1.5 inches	2 inches	2 inches	2 inches
105 degrees F to 140 deg. F	Glass Fiber	Yes	1 inch	1 inch	1.5 inches	1.5 inches	1.5 inches
Air Conditioning Condensate Drain Located Inside Building	Elastomeric Foam	N/A	0.5 inch	0.5 inch	1 inch	1 inches	1 inches
	Glass Fiber	Yes	0.5 inch	0.5 inch	1 inch	1 inches	1 inches
Refrigerant Suction and Liquid Piping							
40 degrees F to 60 deg. F	Elastomeric Foam	N/A	0.5 inch	0.5 inch	1 inch	1 inches	1 inches
Below 40 degrees F	Elastomeric Foam	N/A	0.5 inch	1 inch	1 inch	1.0 inches	1.5 inches

END OF SECTION 230719

This Page Left Intentionally Blank

SECTION 232113 – HYDRONIC PIPING

PART 1 - GENERAL

1.1 SECTION INCLUDES

- A. Pipe and Pipe Fittings For:
 - 1. Heating water piping system.
 - 2. Equipment drains and overflows.

1.2 PRODUCTS FURNISHED BUT NOT INSTALLED UNDER THIS SECTION

- A. Access Doors.

1.3 RELATED SECTIONS

- A. Division 08 Section “Access Doors and Frames.”
- B. Division 09 Section “Painting.”
- C. Division 23 Section “Hangers and Supports for HVAC Piping and Equipment.”
- D. Division 23 Section “Identification for HVAC Piping and Equipment.”
- E. Division 23 Section “HVAC Piping Insulation.”

1.4 SUBMITTALS

- A. Submit under provisions of Division 01 Section “Submittal Procedures.”
- B. Product Data: Include data on pipe materials, pipe fittings, valves, and accessories. Provide Manufacturers catalogue information. Indicate valve data and ratings.
- C. Welders Certificate: Include welder’s certification of compliance with ASME SEC 9 and AWS D1.1.
- D. Manufacturer's Installation Instructions: Indicate hanging and support methods, joining procedures.

1.5 PROJECT RECORD DOCUMENTS

- A. Submit under provisions of Division 01 Section “Closeout Procedures.”
- B. Record actual locations of valves.

1.6 OPERATION AND MAINTENANCE DATA

- A. Submit under provisions of Division 01 Section “Operation and Maintenance Data.”
- B. Maintenance Data: Include installation instructions, spare parts lists, exploded assembly views.

1.7 QUALIFICATIONS

- A. Manufacturer: Company specializing in manufacturing the products specified in this Section with minimum 3 years' experience.
- B. Installer: Company specializing in performing the work of this Section with minimum 3 years' experience.
- C. Welders: Certify in accordance with ASME SEC 9 and AWS D1.1.
- D. Pressed Pipe Fittings: Submit documentation of fitting-manufacturer training of installers or their on-site supervisors, with names of individuals.

1.8 REGULATORY REQUIREMENTS

- A. Conform to ASME B31.9 code for installation of piping system.
- B. Welding Materials and Procedures: Conform to ASME SEC 9 and applicable state labor regulations.
- C. Provide certificate of compliance from authority having jurisdiction indicating approval of welders.

1.9 DELIVERY, STORAGE, AND HANDLING

- A. Deliver, store, protect and handle products to site under provisions of Division 01 Section "Product Requirements."
- B. Provide temporary end caps and closures on piping and fittings. Maintain in place until installation.
- C. Protect piping systems from entry of foreign materials by temporary covers, completing sections of the work, and isolating parts of completed system.

1.10 ENVIRONMENTAL REQUIREMENTS

- A. Do not install underground piping when bedding is wet or frozen.

PART 2 - PRODUCTS

2.1 HEATING WATER PIPING, ABOVE GROUND

- A. Copper Tubing: ASTM B88, Type L hard drawn.
 - 1. Allowed only for pipe sizes 2 inch (50.8 mm) and smaller.
 - 2. Fittings: ASME B16.18, cast brass, or ASME B16.22, solder wrought copper.
 - 3. Joints: Solder or braze.

2.2 EQUIPMENT DRAINS AND OVERFLOWS

- A. PVC Pipe: ASTM D1785, Schedule 40, and Schedule 80 for sizes 8 inch (200 mm) and larger, or ASTM D2241, SDR 21 or 26.

1. Fittings: ASTM D2466, D2665 or D2467, PVC.
2. Joints: ASTM D2855, solvent weld.

B. ABS Pipe: ASTM D2680 or D2751.

1. Fittings: ASTM D2751.
2. Joints: ASTM D2235, solvent weld.

2.3 BRAZING MATERIALS – 15 percent Silver for copper, brass, and bronze

A. Manufacturers:

1. Harris (Product: Stay-Silv 15).
2. Lucas-Milhaupt (Product: Sil-Fos 15).
3. Wolverine (Product: Silvaloy 15).
4. Substitutions: Not permitted.

B. Nominal Composition: 5.0 percent phosphorus, 15.0 percent silver, 0.15 percent other elements (total), remainder copper. Cadmium-free.

C. Physical Properties:

1. Color: Yellow/Gray
2. Solidus: 1190 degrees F (643 degrees C)
3. Liquidus: 1480 degrees F (802 degrees C)
4. Brazing Range: 1300 – 1500 degrees F (704-816 degrees C)
5. Electrical Conductivity: 9.9 percent IACS
6. Electrical Resistivity: 17.40 Microhm-cm

D. Specification Compliance:

1. ANSI/AWS A5.8, class BCuP-5
2. ASME SFA5.8, class BCuP-5
3. Optional:
 - a. QQB 650C, class BCuP-5
 - b. QQB 654A, class BCuP-5
 - c. QQB 654, class BCuP-5

E. Flux:

1. Harris (Stay-Silv For copper-to-brass joints. No flux required for copper-to-copper joints).

2.4 BRAZING MATERIALS – 35 percent Silver for brazing to ferrous metals (steel)

A. Manufacturers:

1. Harris (Product: Safety-Silv 35).
2. Lucas-Milhaupt (Product: Braze 351).
3. Wolverine (Product: Silvaloy A-35).
4. Substitutions: Not permitted.

B. Nominal Composition: 35.0 percent silver, 33 percent Zinc, 0.15 percent other elements (total), remainder copper. Cadmium-free.

C. Physical Properties:

1. Color: Yellow/Gray

2. Solidus: 1250 degrees F (677 degrees C)
3. Liquidus: 1410 degrees F (732 degrees C)
4. Electrical Conductivity: 19.8 percent IACS
5. Electrical Resistivity: 8.2 Microhm-cm

D. Specification Compliance:

1. ANSI/AWS A5.8, class BAg-5
2. ASME SFA5.8, class BCuP-5

E. Flux:

1. Harris (Stay-Silv white flux, or where heating cycles are extended, Stay-Silv black flux).

2.5 SOLDER MATERIALS:

A. Manufacturers:

1. Harris (Product: Stay-Brite).
2. Lucas-Milhaupt (Product: Clean 'n Brite).
3. Wolverine (Product: Silvabrite).
4. Substitutions: Not permitted.

B. Nominal Composition: Alloy of silver and tin (3-6 percent Ag, remainder Sn). Antimony-free.

C. Physical Properties:

1. Color: Bright Silver
2. Solidus: 430 degrees F (221 degrees C)
3. Liquidus: 430 degrees F (221 degrees C)
4. Electrical Conductivity: 16.4 percent IACS
5. Shear Strength: 10,600 psi (73 MPa)
6. Tensile Strength: 14,000 psi (96 MPa)
7. Elongation: 48 percent

D. Specification Compliance:

1. NSF 51
2. ASTM B32-89, Alloy Grade Sn96
3. Federal Spec. QQ-S-571E, Class Sn 96 with exception to QPL paragraph 3.1
4. J-STD-006, Sn96Ag04A

E. Flux:

1. Harris (Product: Stay Clean Paste Flux, Stay Clean Liquid Flux (used with 4 inch or larger copper tubing also stainless steels), or Bridgit Water Soluble Paste Flux).
2. Canfield (Product: Aqua-Brite or AB Cream Flux). Glycerin-based, water soluble.

2.6 UNIONS, FLANGES, AND COUPLINGS

A. Unions for Pipe 2 inch (50 mm) and Under:

1. Ferrous Piping: 150 psig (1034 kPa) malleable iron, threaded.
2. Copper Pipe: Bronze, soldered joints.

B. Dielectric Connections: Union with galvanized or plated steel threaded end, copper solder end, water impervious isolation barrier.

2.7 PIPE HANGERS AND SUPPORTS

- A. See Division 23 Section “Hangers and Supports for HVAC Piping and Equipment.”

PART 3 - EXECUTION

3.1 PREPARATION

- A. Ream pipe and tube ends. Remove burrs.
- B. Remove scale and dirt on inside and outside before assembly.
- C. Prepare piping connections to equipment with flanges or unions.
- D. Keep open ends of pipe free from scale and dirt. Protect open ends with temporary plugs or caps.

3.2 INSTALLATION

- A. Install in accordance with Manufacturer's instructions.
- B. Install heating water piping to ASME B31.9.
- C. Pipe used shall be new material, and threads on piping shall be full length and clean cut with inside edges reamed smooth to full inside bore.
- D. Minimum pipe size allowed for hydronic piping shall be 3/4 inch (19 mm). Piping less than 3/4 inch (19 mm) shall not be allowed for these piping systems.
- E. Route piping in orderly manner, parallel to building structure, and maintain gradient.
- F. Install piping to conserve building space, and not interfere with use of space.
- G. Group piping whenever practical at common elevations.
- H. Erect piping to provide for the easy passage and noiseless circulation of water under working conditions.
- I. Slope piping and arrange systems to drain at low points. Use eccentric reducers to maintain top of pipe level. Slope water piping 1 inch in 40 feet (1:480) and arrange to drain at low points. Slope piping up in direction of water flow.
- J. On closed systems, equip low points with 3/4 inch (19 mm) drain valves and hose nipples. Provide, at high points of mains, collecting chambers and high capacity float operated automatic air vents, with ball valves on their inlets to valve off after initial system startup. Provide, at high points of branches, manual air vents with air chambers.
- K. Caulking of threads will not be allowed on any piping.
- L. Pipe joint compound shall be put on male threads only.

- M. Where more than one piping system material is specified, ensure system components are compatible and joined to ensure the integrity of the system is not jeopardized. Provide necessary joining fittings. Ensure flanges, union, and couplings for servicing are consistently provided.
- N. Dissimilar Metals: Use non-conducting dielectric connections whenever jointing dissimilar metals. Cast red-brass (not yellow brass) or bronze-bodied fittings such as valves and couplings may be used when joining steel to copper, steel to stainless steel, or copper to stainless steel. Steel and stainless steel may connect directly to iron, but copper may not connect directly to iron.
- O. Provide clearance in hangers and from structure and other equipment for installation of insulation and access to valves and fittings. Refer to Division 23 Section "HVAC Piping Insulation."
- P. In the erection of mains, use special care in the support, working into place without springing or forcing, and proper allowance made for expansion.
- Q. Pipes shall be anchored, guided, and otherwise supported, where necessary, to prevent vibration or to control expansion.
- R. Make such offsets as are shown and required to place the pipes and risers in proper position to avoid other work.
- S. Take branch lines off bottom of mains or at 45 degree bottom angle, as space permits.
- T. Use unions, flanges, and couplings downstream of valves and at equipment or apparatus connections. Do not use direct welded or threaded connections to valves, equipment or other apparatus.
- U. Install a sufficient number of unions or flanged fittings to facilitate making possible future alterations or repairs.
- V. Provide access where valves and fittings are not exposed.
- W. Where pipe support members are welded to structural building framing, scrape, brush clean, and apply one coat of zinc rich primer to welds.
- X. Prepare unfinished pipe, fittings, supports, and accessories, ready for finish painting. Refer to Division 09 Section "Painting."

3.3 CLEANING

- A. After satisfactory completion of pressure tests, before permanently connecting equipment, strainers, and the like, clean equipment thoroughly, blow and flush piping for a sufficient length of time as directed, so that interiors will be free of foreign matter. Perform cleaning in the presence of an authorized representative of the Architect. Provide a minimum of 10 days notification to the Architect prior to system cleaning.
- B. Fill, vent and circulate the system with approved solution in accordance with equipment (boiler, piping, coils, and others) manufacturer's recommendation, allowing it to reach design or

operating temperatures. After circulating for 6 hours, drain the system completely and remove and clean strainer screens. Perform cleaning in the presence of an authorized representative of the Architect. Provide a minimum of 10 days notification to the Architect prior to system cleaning.

- C. Fill and vent system as required.
- D. Manually vent heat transfer units and high points of the system.
- E. Adjust the pressure reducing valve to provide minimum of 5 psig (35 kPa) pressure at the highest point of the system.
- F. After system has been completely filled, start zone pumps and circulate cold water for a short time to dislodge small air bubbles, and return them to air extraction device.
- G. Raise water temperature to 200 degrees F (93 degrees C) while operating pumps.
- H. Stop pump and vent radiation and high points of the system. Normal operation may now be started at any time.

3.4 TESTING

- A. No joint or section of piping shall be left untested.
- B. Before testing piping systems, remove, or otherwise protect from damage, control devices, air vents, and other parts which are not designed to stand test pressures.
- C. Test piping for leaks under 100 psig (689 kPa) air pressure with soap suds prior to hydrostatic testing.
- D. Test piping hydrostatically to 1-1/2 times the maximum systems operating pressure, but in no case to less than 100 psig, for at least 4 consecutive hours, during which time pressure shall remain constant without pumping.
- E. Test and obtain Architect's approval before painting, covering, or concealing piping, including swing joints.

END OF SECTION 232113

This Page Left Intentionally Blank

SECTION 232300 – REFRIGERANT PIPING

PART 1 - GENERAL

1.1 SECTION INCLUDES

- A. Piping.
- B. Refrigerant.

1.2 RELATED SECTIONS

- A. Division 08 Section “Access Doors and Frames.”
- B. Division 09 Section “Painting.”
- C. Division 23 Section “Hangers and Supports for HVAC Piping and Equipment.”
- D. Division 23 Section “HVAC Piping Insulation.”
- E. Division 26 “Electrical.”

1.3 SYSTEM DESCRIPTION

- A. Where more than one piping system material is specified, ensure system components are compatible and joined to ensure the integrity of the system is not jeopardized. Provide necessary joining fittings. Ensure flanges, unions, and couplings for servicing are consistently provided.
- B. Refrigerant Charging (Packed Angle) Valve: Use in liquid line between receiver shut-off valve and expansion valve.

1.4 SUBMITTALS

- A. Submit under provisions of Division 01 Section “Submittal Procedures.”
- B. Shop Drawings: Indicate schematic layout of system, including equipment, critical dimensions, and sizes.
- C. Product Data: Provide general assembly of specialties, including manufacturer’s catalog information. Provide manufacturer’s catalog data including load capacity.
- D. Pipe Sizing Recommendations of Equipment Manufacturers:
 - 1. Verify indicated pipe sizes with the manufacturers of the associated equipment. If manufacturer’s recommendations differ from the sizes indicated on the Drawings, submit recommendations to the Architect. The Architect will make the final determination of pipe sizes. Provide sizes per final determination at no additional cost to the Owner. In sizing piping, include modifications as required to affected items including but not limited to piping, valves, filters, other pipeline accessories, insulation, supports, sleeves, conduits, building openings, and building enclosures.
 - 2. Submission of manufacturer’s recommendations, and equipment performance related to

- pipe sizing, is the Contractor's responsibility.
- 3. Verify sizing prior to any preparation for piping installation.
- E. Design Data: Submit design data indicating pipe sizing. Indicate load carrying capacity of trapeze, multiple pipe, and riser support hangers.
- F. Test Reports: Indicate results of leak test, acid test.
- G. Manufacturer's Installation Instructions: Indicate support, connection requirements, and isolation for servicing.
- H. Submit welders' certifications of compliance with AWS D1.1., and their assigned identification letters, numbers or symbols.
- 1.5 PROJECT RECORD DOCUMENTS
 - A. Submit under provisions of Division 01 Section "Closeout Procedures."
 - B. Record exact locations of equipment and refrigeration accessories on record drawings.
- 1.6 OPERATION AND MAINTENANCE DATA
 - A. Submit under provisions of Division 01 Section "Operation and Maintenance Data."
 - B. Maintenance Data: Include instructions for changing cartridges, assembly views, spare parts lists.
- 1.7 QUALIFICATIONS
 - A. Installer: Company specializing in performing the work of this Section with minimum 3 years' experience.
 - B. Design piping system under direct supervision of a Professional Engineer experienced in design of this work and licensed at the place where the Project is located.
- 1.8 REGULATORY REQUIREMENTS
 - A. Conform to ASME B31.9 for installation of piping system.
 - B. Welding Materials and Procedures: Conform to ASME SEC 9 and applicable state labor regulations.
 - C. Welders Certification: In accordance with AWS D1.1. and state and local requirements.
 - D. Products Requiring Electrical Connection: Listed and classified by UL, as suitable for the purpose indicated.
 - E. Refrigerant Safety: Conform with ASHRAE 15, state and local codes and manufacturer's requirements for safe handling to avoid exposure to workers or to occupants.

1.9 DELIVERY, STORAGE, AND HANDLING

- A. Deliver, store, protect and handle products to site under provisions of Division 01 Section "Product Requirements."
- B. Deliver and store piping and specialties in shipping containers with labeling in place.
- C. Protect piping and specialties from entry of contaminating material by leaving end caps and plugs in place until installation.
- D. Dehydrate and charge components such as piping and receivers, seal prior to shipment, until connected into system.

1.10 MAINTENANCE MATERIALS

- A. Provide maintenance materials under provisions of Division 01 Section "Closeout Procedures."

PART 2 - PRODUCTS

2.1 PIPING

- A. Copper Tubing: ASTM B280, Type ACR hard drawn, degreased, nitrogen charged and sealed. Annealed (soft) tubing may be used only for underfloor or below grade runs or for short (6 feet (1.8 m) or less) above-grade connections to valves and equipment.
 - 1. Fittings: ASME B16.22 wrought copper.
 - a. Fittings shall be packaged and labeled for ACR use.
 - b. Elbows: Use long-radius elbows wherever possible. Do not use 45-degree elbows, because they are more likely to break at their inner surface in refrigeration service.
 - 2. Joints:
 - a. Braze, 15 percent silver for copper, brass, and bronze.
 - b. Braze, 35 percent silver, for brazing to ferrous metals (steel).
 - c. Solder (for use only at equipment and valve connections where required by the equipment manufacturer).
 - d. Other: If a valve or equipment manufacturer recommends a joint material other than those specified, submit it for approval.
 - e. Flux: Use as recommended by alloy manufacturer. Should not be needed for copper-to-copper brazed joints.
- B. Copper Tubing to 7/8 inch (22 mm) OD: ASTM B88, Type K, annealed.
 - 1. Fittings: ASME B16.26 cast copper.
 - 2. Joints: Flared.
- C. Press fittings: Press fittings are not allowed for any condition whether recommended by manufacturer or any other entity.

2.2 PIPE SUPPORTS AND ANCHORS

- A. See Division 23 Section "Hangers and Supports for HVAC Piping and Equipment."

2.3 BRAZING MATERIALS - 15% Silver

- A. Manufacturers:
 - 1. Harris (Product: Stay-Silv 15).
 - 2. Lucas-Milhaupt (Product: Sil-Fos 15).
 - 3. Wolverine (Product: Silvaloy 15).
 - 4. Substitutions: Not permitted.
- B. Nominal Composition: 5.0 percent phosphorus, 15.0 percent silver, 0.15 percent other elements (total), remainder copper. Cadmium-free.
- C. Physical Properties:
 - 1. Color: Yellow/Gray
 - 2. Solidus: 1190 degrees F (643 degrees C)
 - 3. Liquidus: 1480 degrees F (802 degrees C)
 - 4. Brazing Range: 1300–1500 degrees F (704-816 degrees C)
 - 5. Electrical Conductivity: 9.9 percent IACS
 - 6. Electrical Resistivity: 17.40 microhm-cm
- D. Specification Compliance:
 - 1. ANSI/AWS A5.8, class BCuP-5
 - 2. ASME SFA5.8, class BCuP-5
 - 3. Optional:
 - a. QQB 650C, class BCuP-5
 - b. QQB 654A, class BCuP-5
 - c. QQB 654, class BCuP-5
- E. Flux:
 - 1. Harris (Stay-Silv For copper-to-brass joints. No flux required for copper-to-copper joints).

2.4 BRAZING MATERIALS – 35 percent Silver

- A. Manufacturers:
 - 1. Harris (Product: Safety-Silv 35).
 - 2. Lucas-Milhaupt (Product: Braze 351).
 - 3. Wolverine (Product: Silvaloy A-35).
 - 4. Substitutions: Not permitted.
- B. Nominal Composition: 35.0 percent silver, 33 percent Zinc, 0.15 percent other elements (total), remainder copper. Cadmium-free.
- C. Physical Properties:
 - 1. Color: Yellow/Gray
 - 2. Solidus: 1250 degrees F (677 degrees C)
 - 3. Liquidus: 1410 degrees F (732 degrees C)
 - 4. Electrical Conductivity: 19.8 percent IACS
 - 5. Electrical Resistivity: 8.2 microhm-cm
- D. Specification Compliance:
 - 1. ANSI/AWS A5.8, class BAg-5

2. ASME SFA5.8, class BCuP-5

E. Flux:

1. Harris (Stay-Silv white flux, or where heating cycles are extended, Stay-Silv black flux).

2.5 SOLDER MATERIALS:

A. Manufacturers:

1. Harris (Product: Stay-Brite).
2. Lucas-Milhaupt (Product: Clean 'n Brite).
3. Wolverine (Product: Silvabrite).
4. Substitutions: Not permitted.

B. Nominal Composition: Alloy of silver and tin (3-6 percent Ag, remainder Sn). Antimony-free.

C. Physical Properties:

- | | |
|-----------------------------|-------------------------------|
| 1. Color: | Bright Silver |
| 2. Solidus: | 430 degrees F (221 degrees C) |
| 3. Liquidus: | 430 degrees F (221 degrees C) |
| 4. Electrical Conductivity: | 16.4 percent IACS |
| 5. Shear Strength: | 10,600 psi (73 MPa) |
| 6. Tensile Strength: | 14,000 psi (96 MPa) |
| 7. Elongation: | 48 percent |

D. Specification Compliance:

1. NSF 51
2. ASTM B32-89, Alloy Grade Sn96
3. Federal Spec. QQ-S-571E, Class Sn 96 with exception to QPL paragraph 3.1
4. J-STD-006, Sn96Ag04A

E. Flux:

1. Harris (Product: Stay Clean Paste Flux, Stay Clean Liquid Flux (used with 4 inches or larger copper tubing also stainless steels), or Bridgit Water Soluble Paste Flux).
2. Canfield (Product: Aqua-Brite or AB Cream Flux). Glycerin-based, water soluble.

2.6 REFRIGERANTS AND LUBRICANTS

A. Refrigerant: ASHRAE 34;

1. R-22: Monochlorodifluoromethane. HCFC; no new equipment after 2009.
2. R-32: Difluoromethane. Component of blends.

B. Oils and Other Lubricants: Provide as required by the refrigerant manufacturer and the equipment manufacturer(s).

C. Packed Angle Valves:

1. Manufacturers:
 - a. Henry Technologies.
 - b. Mueller.
 - c. Superior.
 - d. Substitutions: Approved equal. See Section 016000 - Product Requirements
2. Forged brass (or brass and copper), forged brass seal caps with copper gasket, rising stem

and seat with backseating, molded stem packing, solder or flared ends; for maximum working pressure of 500 psig (3450 kPa) and maximum temperature of 275 degrees F (135 degrees C).

PART 3 - EXECUTION

3.1 PREPARATION

- A. Ream pipe and tube ends. Remove burrs. Bevel plain end ferrous pipe.
- B. Remove scale and dirt on inside and outside before assembly.
- C. Prepare piping connections to equipment with flanges or unions.

3.2 INSTALLATION

- A. Follow ASHRAE 15 procedures for charging and purging of systems and for disposal of refrigerant.
- B. Comply with Federal, State, and local Codes and regulations regarding the handling and disposal of refrigerants and oil. Provide documentation of quantities installed in the system. Document handling and disposal; see "Project Closeout" in this Section.
- C. Flood piping system with nitrogen when brazing.
- D. Route piping in orderly manner, parallel or perpendicular to building structure, and maintain gradient.
- E. Install annealed piping free of kinks, and with bends only as necessary.
- F. Install piping to conserve building space and not interfere with use of space.
- G. Group piping whenever practical at common elevations and locations. Slope piping one percent in direction of oil return.
- H. Install piping to allow for expansion and contraction without stressing pipe, joints, or connected equipment.
- I. Arrange piping to return oil to compressor. Provide traps and loops in piping, and provide double risers as required.
- J. Provide clearance for installation of insulation and access to valves and fittings.
- K. Provide access to concealed valves and fittings. Coordinate size and location of access doors with Division 08 Section "Access Doors and Frames."
- L. Where pipe support members are welded to structural building frame, brush clean, and apply one coat of zinc rich primer to welding.
- M. Prepare unfinished pipe, fittings, supports, and accessories ready for finish painting. Refer to Division 09 Section "Painting."

- N. Fully charge completed system with refrigerant after testing.
- O. Provide electrical connection to solenoid valves. Refer to Division 26 - Electrical.

3.3 FIELD QUALITY CONTROL

- A. Perform field inspection and testing under provisions of Division 01 Section "Quality Requirements."
- B. Test refrigeration system in accordance with ASME B31.5.
- C. Pressure test system with dry nitrogen to 200 psig (1470 kPa). Perform final tests at 27 inches of mercury (92 kPa) vacuum and 200 psig (1470 kPa) pressure using electronic leak detector. Test to no leakage.
- D. Evacuate the system as required by Codes and by equipment manufacturer, including a vacuum test at 0.02 inches of mercury (500 microns). The system shall be valved off and tested for 2 hours with a pressure rise of no more than 0.002 inches of mercury (50 microns).

3.4 SYSTEM STARTUP

- A. Lubricate motors and other moving parts as necessary before operating them.
- B. Charge the system with liquid refrigerant into the low pressure side of the system, where the liquid will evaporate. Expel air from the system. Operate the compressor, condenser, water cooling pumps and evaporator fans during charging. Monitor compressor discharge pressure. Monitor oil levels for a period of 24 hours.
- C. Coordinate control setpoints and wiring prior to startup.
- D. Change suction filter elements if the pressure drop exceeds 1 Psi (6.9 kPa) after the initial 24 hours of operation. Change suction wax removal cores to filter elements after system cleanup.
- E. Adjust expansion valve superheat using a thermistor or thermocouple temperature sensor at the bulb location and a pressure gauge at the external equalizer line (or the compressor). Adjust under full system load, and again when the system stabilizes.
- F. Check the system again after seven full days of operation.
- G. Periodically clean strainers until no more accumulation occurs.

3.5 PROJECT CLOSEOUT

- A. Submit records of handling and disposal of refrigerant and oil to verify compliance with Federal, State, and local Codes and regulations.
- B. Submit records of installed quantities of refrigerants and oils in each system. Submit manufacturer's product sheets, MSDS, and instructions in the Operation and Maintenance Manuals.

END OF SECTION 232300

SECTION 233113 – HVAC DUCTS

PART 1 - GENERAL

1.1 SECTION INCLUDES

- A. Metal Ductwork.
- B. Nonmetal Ductwork.

1.2 PRODUCTS INSTALLED BUT NOT FURNISHED UNDER THIS SECTION

- A. Division 26 – Electrical: Smoke detectors.

1.3 RELATED SECTIONS

- A. Division 01 Section “Testing, Adjusting and Balancing for HVAC.”
- B. Division 09 Section “Painting”: Weld priming, weather resistant, paint or coating.
- C. Division 23 Section “Duct Insulation”: External insulation and duct liner.
- D. Division 23 Section “HVAC Air Duct Cleaning.”
- E. Division 23 Section “Air Duct Accessories”
- F. Division 23 Section “Air Outlets and Inlets.”

1.4 REFERENCES

- A. ASTM
- B. AWS D9.1 - Welding of Sheet Metal.
- C. NBS PS 15 - Voluntary Product Standard for Custom Contact-Molded Reinforced-Polyester Chemical Resistant Process Equipment.
- D. NFPA
- E. SMACNA
- F. UL.

1.5 PERFORMANCE REQUIREMENTS

- A. No variation of duct configuration or sizes is permitted except by written permission from the Architect. Size proposed substitutions of round ducts in place of rectangular ducts in accordance with ASHRAE table of equivalent rectangular and round ducts.

1.6 SUBMITTALS

- A. Submit under provisions of Division 01 Section "Submittal Procedures".
- B. Shop Drawings: Indicate duct fittings, particulars such as gauges, sizes, welds, and configuration. Submit prior to start of work.
- C. Product Data: Provide data for duct materials, duct liner and duct connectors.
- D. Test Reports: Submit testing apparatus, procedures, and preliminary forms prior to performing tests. On final reports, indicate pressure tests performed. Include date, section tested, test pressure, and leakage rate, following SMACNA HVAC Air Duct Leakage Test Manual.

1.7 PROJECT RECORD DOCUMENTS

- A. Submit under provisions of Division 01 Section "Closeout Procedures."
- B. Record actual locations of ducts and duct fittings. Record changes in fitting location and type. Indicate additional fittings used.

1.8 QUALITY ASSURANCE

- A. Perform Work in accordance with SMACNA HVACDCS.

1.9 QUALIFICATIONS

- A. Manufacturer: Company specializing in manufacturing the Products specified in this Section with minimum 3 years' experience.
- B. Installer: Company specializing in performing the work of this Section with minimum 3 years' experience.

1.10 REGULATORY REQUIREMENTS

- A. Construct ductwork to NFPA 90A, NFPA 90B and NFPA 96 standards.

1.11 ENVIRONMENTAL REQUIREMENTS

- A. Do not install duct sealants when temperatures are less than those recommended by sealant manufacturers.
- B. Maintain temperatures during and after installation of duct sealants.

PART 2 - PRODUCTS

2.1 ACCEPTABLE MANUFACTURERS

- A. Flexible Ducts:
 - 1. Flexible Technologies Group - Thermaflex product line.
 - 2. Buckley Associates - Flexmaster Triple-Lock Buck Duct product line.
 - 3. Substitutions: Not permitted.

- B. Plastic Drawbands:
 - 1. Panduit.
 - 2. Thomas and Betts.
 - 3. Tyton.
 - 4. Substitutions: Approved equal. See Section 016000 - Product Requirements
- C. Tape for Flexible Ducts:
 - 1. Ideal Tape Co., division of American Biltrite Inc.
 - 2. 3M Company.
 - 3. Nashua Tape Products, division of Berry Plastics Corp.
 - 4. Venture Tape Corporation.
 - 5. Substitutions: Not permitted.
- D. Manufactured Ductwork - Round:
 - 1. McGill AirFlow LLC, a subsidiary of United McGill Corporation.
 - 2. Aero Heating & Ventilating, Inc.; Portland, ME.
 - 3. Air Purchases, Inc.; Manchester, NH – spiral duct lengths.
 - 4. Atlantic Air Products LLC; Bow, NH.
 - 5. Hahnel Brothers; Bangor and Lewiston, ME.
 - 6. Linx Industries – duct fittings only.
 - 7. Macy Industries, Inc.; Hookset, NH.
 - 8. Northeastern Sheet Metal Inc.; Goffstown, NH.
 - 9. Semco Inc., division of the Flakt Woods Group.
 - 10. Total Air Supply; Nashua, NH – spiral duct lengths.
 - 11. Substitutions: Not permitted.
- E. Manufactured Ductwork - Transverse Duct Connection System:
 - 1. Ductmate.
 - 2. HFC Enterprises; Baldwin Park, CA – Dura Flange product line, for round ducts only
 - 3. Substitutions: Approved equal. See Section 016000 - Product Requirements.
- F. Sealants:
 - 1. Hardcast, a division of Carlisle Corporation.
 - 2. 3M Company.
 - 3. Ductmate.
 - 4. Foster.
 - 5. McGill AirSeal LLC, a subsidiary of United McGill Corporation.
 - 6. Mon-Eco Industries, Inc - Eco product line.
 - 7. Polymer Adhesive Sealant Systems.
 - 8. Substitutions: Approved equal. See Section 016000 - Product Requirements

2.2 MATERIALS

- A. Galvanized Steel Ducts:
 - 1. Steel sheet metal components of galvanized ductwork in this Specification Section shall be galvanized steel sheet, lock-forming quality, having G60 or heavier zinc coating (G90 minimum for outdoor or moist applications) conforming to ASTM A653 rating system and tested in accordance with ASTM A90.
 - 2. Provide paint-grip exterior surfaces for exposed ducts, where available.
 - 3. Sheet metal gauge shall be not less than 24 gauge.

2.3 FLEXIBLE DUCTS

A. Insulated Flexible Ducts:

1. Semi-Rigid Flexible Aluminum Ductwork:
 - a. Flexmaster Triple-Lock Buck Duct - Insulated.
 - b. Triple lock mechanical joint aluminum flex duct, constructed entirely without the use of adhesive.
 - c. Fiberglass insulation and fire-retardant polyethylene vapor retarder film.
 - d. Pressure Rating: Positive pressure 12 in. WG for all sizes. Negative pressure 12 in. WG for sizes thru 16 in. diameter, 8 in. WG for sizes 18 and 20 in. diameter.
 - e. Maximum Velocity: 5500 fpm.
 - f. Inside bend radius: Minimum one diameter.
 - g. Temperature Range: -40 to 250 degrees F
 - h. UL 181, Class 1 air duct.
 - i. Insulation: ASTM C518 or ASTM C177
 - 1) R-value: R-6 at 75 degrees F
 - 2) Vapor Transmission Rating: 0.10 perms, ASTM E96.
 - 3) Minimum density: 2" at 0.71 lb/cu. ft.
 - j. Meets NFPA 90A and 90B standards.

B. Non-Insulated Flexible Ducts:

1. Semi-Rigid Flexible Aluminum Ductwork:
 - a. Flexmaster Triple-Lock Buck Duct - Bare.
 - b. Triple lock mechanical joint aluminum flex duct, constructed entirely without the use of adhesive.
 - c. Pressure Rating: 12 inches WG positive for all sizes, 12 inches WG negative for sizes thru 16 in. diameter, 8 inches WG negative for sizes 18 in. and 20 in. diameter.
 - d. Maximum Velocity: 5500 fpm.
 - e. Inside bend radius: Minimum one diameter.
 - f. Temperature Range: -40 to 250 degrees F.
 - g. UL 181, Class 0 air duct.
 - h. Meets NFPA 90A and 90B standards.

2.4 ACCESSORIES

A. Drawbands for Flexible Ducts:

1. Stainless Steel: ½ inch wide with screw-driven worm gear.
2. Plastic: Panduit PLT5H or PLT8H; Thomas and Betts Dukt-Rap, VAL-26-50, or VAL-275X-25; or Tyton T150L or LX. Install with manufacturer's lever-action tightening tool.

B. Tape for Flexible Ducts: Ideal-Seal 587A/B, UL 181B-FX listed, aluminum foil with pressure-sensitive acrylic adhesive, -20 to 250 degrees F temperature range, 25.0 lb/in. width tensile strength.

C. Fasteners: Rivets, bolts, or sheet metal screws.

D. Sealants: See Duct Sealant portion of this Specification.

E. Hanger Rod: ASTM A36; galvanized steel; threaded both ends, threaded one end, or

continuously threaded.

2.5 DUCTWORK FABRICATION

- A. Fabricate and support in accordance with SMACNA HVACDCS, as specified or as indicated on the drawings. Provide duct material, gauges, reinforcing, and sealing for operating pressures indicated.
- B. SMACNA Duct Construction Manuals:
 - 1. The SMACNA recommendations shall be considered as mandatory requirements.
 - 2. Substitute the word "shall" for the word "should" in these manuals.
 - 3. Where the Contract Specifications differ from SMACNA recommendations, the more stringent requirements (as determined by the Architect) shall take precedence.
 - 4. Details on the Contract Drawings take precedence over SMACNA standards.
- C. Sheet metal shall be galvanized steel as specified in Part 2 paragraph "Materials" in this Section, unless otherwise indicated or specified.
- D. Construct Tees, bends, and elbows with radius of not less than 1-1/2 times width of duct on centerline.
 - 1. Where space is too restricted for full-radius elbows, provide mitered (square-throat) elbows with single wall turning vanes. Do not use air foil turning vanes.
 - 2. Mitered elbows in round ductwork shall be factory-manufactured.
 - 3. Radiused elbows with throat radius 1/2 times width of duct (centerline radius 1 width of duct) may be used instead of mitered elbows, but only where space is too restricted for full radius.
 - 4. Fittings not conforming to these requirements will be ordered removed and replaced with proper fittings.
- E. Increase duct sizes gradually, not exceeding 15 degrees divergence or convergence (per side) wherever possible; maximum 30 degrees divergence (per side) upstream of equipment and 45 degrees convergence (per side) downstream.
- F. Fabricate continuously welded round duct fittings two gauges heavier than duct gauges indicated in SMACNA Standard. Joints shall be minimum 4 inch cemented slip joint, brazed or electric welded. Prime coat welded joints.
- G. Provide standard 45 degree lateral wye takeoffs unless otherwise indicated where 90 degree conical tee connections may be used.
- H. Longitudinal locks or seams known as "button-punch-snap-lock" and other "snap-lock" types will not be permitted in rectangular duct. Snap-lock longitudinal seams may be used on round ducts up to 8 inches diameter, with screws provided to secure the seams at 24 inches on center maximum spacing.

2.6 MANUFACTURED DUCTWORK AND FITTINGS

- A. Manufacturers:
 - 1. McGill Airflow: Standard Uni-Seal product line (smooth surface between spiral lockseams)
 - 2. Uni-Rib product line (one standing seam reinforcement between each pair of spiral

- lockseams).
- 3. Substitutions: Approved equal. See Section 016000 - Product Requirements
 - a. Standard spiral product line (smooth surface between spiral lockseams).
- B. Manufactured ductwork and fittings listed above are acceptable alternatives to standard ductwork systems. For exposed round ductwork, factory-manufactured ductwork and fittings are required.
- C. Manufacture in accordance with SMACNA HVACDCS, and as specified or as indicated on the drawings. Provide duct material, gauges, reinforcing, and sealing for operating pressures indicated.
- D. Ductwork and fittings shall be products of a single manufacturer.
- E. Exposed Ducts:
 - 1. Select and handle materials with care for a neat appearance.
 - 2. Joint connections on round ducts shall be sleeve or flanged type; drawbands are not acceptable.
 - 3. Provide exterior reinforcing only where required, with prior approval from the Architect.
- F. Galvanized sheet metal used in fabrication shall be not less than 26 gauge thickness. This requirement supersedes SMACNA requirements.
- G. Round Duct and Fittings:
 - 1. Shall be suitable for at least 4 in. WG positive pressure and 2 in. WG negative pressure in accordance with SMACNA HVACDCS standards. This is a minimum; provide higher ratings where required.
 - 2. Fittings shall be fabricated of sheet metal at least one gauge heavier than straight duct of the same size.
 - 3. Fittings shall be factory-sealed so that no field sealing of joints between gores or segments is required. Acceptable methods of construction are fully welded, spot-welded with inner sealant, or standing-seam crimped joints.
- H. Radiused Elbows in Round:
 - 1. In exposed ductwork shall be non-adjustable type, factory-sealed.
 - 2. In concealed ductwork may be adjustable type, with full long radius as detailed on the Drawings. Short-radius elbows are not allowed.
 - 3. Shall be constructed of the following minimum number of segments or gores: 90-degree: 4 gores; 60-degree: 3 gores; 45-degree: 3 gores; 30-degree: 2 gores; 22-1/2-degree: 2 gores.
 - 4. 1-piece stamped elbows are acceptable up to 12 inches diameter. Pleated elbows are acceptable up to 10 inches diameter.
- I. Mitered Elbows in Round:
 - 1. Available in both 90-degree and 45-degree elbows.
 - 2. Shall have minimum number of welded single-wall vanes as follows (size is duct width in plane of bend):
 - a. 3 to 9 inch: 2.
 - b. 10 to 14 inch: 3.
 - c. 15 to 19 inch: 4.
 - d. 20 to 60 inch: 5.

- e. Larger Sizes: 12-inch maximum spacing.
- J. Inner tie-rod reinforcement is not allowed. Increase duct sheet metal gauge or external reinforcement as required.
- K. Transverse Duct Connection System: SMACNA "F" rated or SMACNA "J" rated rigidity class connection, interlocking angle and duct edge connection system with sealant, gasket, cleats, and corner clips. Product shall be Ductmate factory-manufactured connectors, or field-formed flanges using a specialized machine.

2.7 PRESSURE CLASSIFICATION

- A. Ratings as indicated on the Drawings or as specified. See Ductwork Pressure Class Schedule in Part 3 of this Section.
- B. If no ratings are indicated, ductwork shall be rated for the external static pressure of the system plus 25 percent.
 - 1. If 4 dampers (of any type) or fewer can isolate a duct system, that portion of the system shall be rated for the shut-off pressure of the system fans.

2.8 DUCT SEALING

- A. Seal ductwork as outlined in the SMACNA HVACDCS. Seal ductwork to a minimum of class A (transverse joints, longitudinal seams, and duct wall penetrations), regardless of pressure class.
- B. Seal ductwork systems as required to ensure that maximum duct leakage does not exceed that allowed by the latest edition of the SMACNA HVAC Air Duct Leakage Test Manual. Allow sealant to dry in accordance with manufacturer's requirements of time and environmental conditions before ductwork systems are pressurized.
- C. Existing Ductwork: Seal existing ductwork served by, and/or connected to, the equipment furnished under Division 23, and ductwork as indicated on the Drawings. Contractor shall be responsible to field-verify quantities and sizes. Provide access to existing ductwork as required for complete sealing. Remove existing finishes and loose existing sealants as required for proper adhesion of sealant.
- D. Duct sealing materials used shall be non-flammable and non-combustible in both liquid and solid states.
- E. Seal Pittsburgh hammered lockseams by flooding the joint with sealant prior to assembly.
- F. Seal exposed ducts by applying mastic-type or gasket-type sealer just before the joint or seam is made; remove excess sealant for a neat appearance.
- G. Fill (with matching duct material such as sheet metal) any gaps in duct which exceed the recommendations of the sealant manufacturer, and in no case shall liquid or mastic sealant be used to fill gaps or openings which exceed 1/8 inch in any direction. Verify that system air pressure acting on a wide gap will not exert enough force to damage or loosen the sealant.

- H. Materials for Sealing:
1. Hardcast: Flex-Grip 550 or Iron-Grip 601 mastic.
 2. Hardcast: gypsum-based tape and mastic, waterproof type when used on moist-air exhaust or in humid or outdoor locations.
 3. Ductmate: Flanged lateral joints with gaskets.
 4. Ductmate: PROseal.
 5. Foster: Duct-Fas or Safetee mastic sealant. Duct-Fas is UV resistant and recommended for applications exposed to sunlight.
 6. Mon-Eco: Eco-Duct Seal 4450 (red color) or 4452 (grey color). Use grey color where ducts will be unpainted and exposed to public view.
 7. Polymer Adhesives Sealant Systems: Airseal No. 11 premium sealant.

2.9 UNIFORMITY OF MATERIALS

- A. Ductwork accessories, including but not limited to volume dampers, smoke dampers, fire dampers, combination fire/smoke dampers, backdraft dampers and motorized dampers, shall be fabricated of materials that are similar to the ductwork in which they are installed.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Install in accordance with manufacturer's instructions.
- B. Install ducts in accordance with SMACNA HVACDCS.
- C. Duct Hangers and Supports:
1. Provide in accordance with SMACNA HVAC Duct Construction Standards, Section 4.
 2. Regardless of SMACNA standards, duct hangers shall be provided as follows:
 - a. Hang ducts up to and including 36 inches (914 in width by a minimum of 1 in x 16 ga flat straps on each side of the duct on 4 ft centers, bent under bottom of duct a minimum of 2 inches and securely fastened to duct. Hang ducts larger than 36 inches in width by 3/8 inch steel rods and 2 x 2 x 1/4-inch steel angle trapeze hangers, spaced 4 ft on center. Anchor risers in the center of the vertical run to allow ends of riser free vertical movements.
 - b. Ducts with Extra Weight Such As Lead Lining or Lagging: Include the extra weight in determination of suitable hangers and supports.
- D. Hanging of Ductwork:
1. Attach supports only to structural framing members and non-metal deck concrete slabs.
 2. Support ductwork from the top chord of bar joists at the "Panel Points" or from the top flange of beams. Provide intermediate support consisting of steel angle or equal as required where supports are installed between joist spaces.
 3. Do not anchor supports to metal decking with or without a concreted slab.
- E. Duct Sizes are inside clear dimensions. For lined ducts, maintain sizes inside lining.
- F. "Fishmouth" duct connections are not allowed.
- G. Locate ducts with sufficient space around equipment to allow normal operating and

maintenance activities.

- H. Use crimp joints with or without bead for joining round duct sizes 8 inch and smaller with crimp in direction of air flow.
- I. Use double nuts and lock washers on threaded rod supports. Strap hangers shall be minimum 16 gauge x 1 inch galvanized straps. Hanger and support components including but not limited to “unistrut” shall be galvanized steel except that where other duct materials are used, the hanger materials shall be compatible and non-corrosive to the duct. Wire hangers are not acceptable.
- J. Flexible Ducts:
 - 1. Connect diffusers to low pressure supply ducts directly or with 5 feet maximum length of flexible duct held in place with strap or clamp.
 - 2. Minimum bend radius shall be one and one half times the duct diameter. Support the bend to maintain this radius.
 - 3. Bends shall not exceed 45 degrees.
 - 4. Connect flexible ducts to metal ducts with 2 turns of duct tape and metal draw bands. Plastic drawbands may be used if they are installed using the band manufacturer’s lever-action tightening tool. On insulated flexible ducts, provide an additional seal of tape and drawband on the insulation’s vapor barrier.
- K. During construction, provide temporary closures of metal or taped polyethylene on open ductwork to prevent construction dust from entering ductwork system. Do not start ducted air moving equipment until construction is completed to a stage where airborne construction dust is no longer present. At the time of substantial completion, the entire air distribution system shall be turned over to the Owner clear of construction dust and debris. If the interior surfaces of any ducted air moving equipment or the interior surfaces of any portion of the ductwork distribution system are found, as determined by the Architect, to contain significant construction dust and debris, the entire air distribution system shall be cleaned in accordance with Division 23. If proper precautions are taken to prevent construction dust and debris from entering the ductwork during construction and if the Architect finds all ductwork to be free from such dust and debris, air duct cleaning shall not be required.

3.2 SCHEDULES

A. Ductwork Material Schedule

AIR SYSTEM	MATERIAL
Low Pressure Supply (Heating Systems)	Galvanized Steel, Aluminum
Low Pressure Supply (System with Cooling Coils)	Galvanized Steel, Aluminum
Return and Relief	Galvanized Steel, Aluminum
General Exhaust	Galvanized Steel, Aluminum

B. Ductwork Pressure Class Schedule

AIR SYSTEM	SMACNA PRESSURE CLASS
Supply (Heating Systems)	2 inch
Supply (System with Cooling Coils)	2 inch
Return and Relief	2 inch
General Exhaust	2 inch

END OF SECTION 233113

SECTION 233300 – AIR DUCT ACCESSORIES

PART 1 - GENERAL

1.1 SECTION INCLUDES

- A. Dampers:
 - 1. Backdraft Dampers.
 - 2. Volume Control Dampers.
- B. Flexible Duct Connections.
- C. Round Duct Branch Taps.

1.2 RELATED SECTIONS

- A. Division 01 Section “Operation and Maintenance Data.”
- B. Division 07 Section “Through-Penetration Firestop Systems.”
- C. Division 23 Section “Common Work Results for HVAC”
- D. Division 23 Section “Identification for HVAC Piping and Equipment.”
- E. Division 23 Section “Metal Ducts.”
- F. Division 26 “Electrical”: Electrical characteristics and wiring connections.

1.3 REFERENCES

- A. ASTM C423-02a - Standard Test Method for Sound Absorption and Sound Absorption Coefficients by the Reverberation Room Method.
- B. ASTM E477-99 - Standard Test Method for Measuring Acoustical and Airflow Performance of Duct Liner Materials and Prefabricated Silencers.
- C. NFPA 90A - Installation of Air Conditioning and Ventilating Systems.
- D. NFPA 70 - National Electrical Code.
- E. SMACNA - HVAC Duct Construction Standards - Metal and Flexible, Third Edition - 2005 (HVACDCS).
- F. SMACNA - Seismic Restraint Manual - Guidelines for Mechanical Systems (SRMGMS).
- G. UL 1995 - Heating and Cooling Systems.

1.4 SUBMITTALS

- A. Submit under provisions of Division 01 Section “Submittal Procedures.”

- B. Shop Drawings: Indicate for shop fabricated assemblies including volume control dampers, duct access doors and duct test holes.
- C. Product Data: Provide for shop fabricated assemblies including volume control dampers, duct access doors, duct test holes and hardware used. Include electrical characteristics and connection requirements.

1.5 PROJECT RECORD DOCUMENTS

- A. Submit under provisions of Division 01 Section "Closeout Procedures."
- B. Record actual locations of access doors and test holes.

1.6 QUALIFICATIONS

- A. Manufacturer: Company specializing in manufacturing the products specified in this Section with minimum 3 years' experience.

1.7 REGULATORY REQUIREMENTS

- A. Products Requiring Electrical Connection: Listed and classified by Underwriters' Laboratories Inc., as suitable for the purpose specified and indicated.

1.8 DELIVERY, STORAGE, AND HANDLING

- A. Deliver, store, protect and handle products to site under provisions of Division 01 Section "Product Requirements."
- B. Protect dampers from damage to operating linkages and blades.

PART 2 - PRODUCTS

2.1 GALVANIZED STEEL

- A. Steel sheet metal components of accessories in this Specification Section shall be galvanized steel sheet, lock-forming quality, having G60 or heavier zinc coating conforming to ASTM A653 rating system and tested in accordance with ASTM A90. Provide paint-grip exterior surfaces for exposed ducts, where available.

2.2 DAMPERS

- A. Manufacturers:
 - 1. Ruskin.
 - 2. Air Balance, Inc.
 - 3. Arrow.
 - 4. Cesco.
 - 5. Greenheck.
 - 6. NCA.
 - 7. Tamco.
 - 8. Ventex.

9. Vent Products, Inc.
10. Substitutions: Not permitted.

B. Backdraft Dampers:

1. Gravity Backdraft Dampers, Size 18 x 18 inches (450 x 450 mm) or Smaller, Furnished with Air Moving Equipment: Air moving equipment manufacturer's standard construction.

C. Volume Control Dampers:

1. Factory-fabricate in accordance with SMACNA HVACDCS, and as specified or as indicated on the Drawings.
2. Shop fabrication is permitted for single blade dampers only.
3. Height is the dimension perpendicular to the blade rod or shaft. Width is the dimension parallel to the blade rod.
4. Single Blade Dampers: For duct sizes (height x width) up to 7 x 30 inch (175 x 760 mm). When height or width exceeds its respective maximum, provide multi-blade damper.

2.3 FLEXIBLE DUCT CONNECTIONS

A. Manufacturers:

1. Ductmate.
2. Ventfabrics.
3. Duro-Dyne.
4. Substitutions: Not permitted.

B. Fabricate in accordance with SMACNA HVACDCS, and as specified or as indicated on the Drawings.

C. Connector: Fabric crimped into metal edging strip.

1. Connectors shall be Ductmate PROFLEX Commercial series.
2. Fabric: UL listed coated woven glass fiber fabric meeting the requirements of NFPA 90A and NFPA 701.
 - a) Supply Ducts: Neoprene coated, minimum density 30 oz per sq yd (1.0 kg/sq m). Fire-retardant coating. Black color. Temperature range -40 to 200 degrees F (-40 to 93 degrees C).
 - b) Exhaust Ducts Serving Fume Hoods: Hypalon coated, minimum density 24 oz per sq yd (0.8 kg/sq m). Flame proof coating. White color. UV and ozone resistant. Temperature range -40 to 250 degrees F (-40 to 121 degrees C).
3. Net Fabric Width: Approximately 3 inches (75 mm) wide.
4. Metal: 3 inch (75 mm) wide, 24 ga (0.6 mm thick).
 - a) Supply Ducts: G-60 galvanized steel.
 - b) Exhaust Ducts Serving Fume Hoods: Type 316 stainless steel.
5. Connectors shall have double fold seams. Single fold seams (metal folded once only) shall not be accepted.

2.4 ROUND DUCT BRANCH TAPS AND SPIN-IN FITTINGS

- A. Saddle Taps: For round ducts branching off main ducts at 90 degrees, provide factory fabricated, saddle-tap fittings with conical or bellmouth taps, or 45 degree rectangular-to-round branch fittings. For round ducts branching off at 45 degrees, fittings do not require conical or bellmouth expansion. Fittings shall be furnished with flange for fastening and sealing designed

to overlap onto adjacent duct, and shall be shaped to fit tight to the exterior of the duct, flat for rectangular duct, curved for round duct.

- B. Spin-in fittings, factory-fabricated with conical or bellmouth taps are an acceptable substitute for saddle taps.
- C. Factory-fabricated taps and spin-ins may be furnished with integral volume dampers and quadrants as specified in paragraph "Manual Dampers" in this Section.

2.5 UNIFORMITY OF MATERIALS

- A. Ductwork accessories, including but not limited to volume dampers, backdraft dampers and motorized dampers, shall be fabricated of materials that are similar to the ductwork in which they are installed.

PART 3 - EXECUTION

3.1 PREPARATION

- A. Verify that electric power is available and of the correct characteristics.

3.2 INSTALLATION

- A. Install accessories in accordance with manufacturer's instructions, NFPA 90A, and follow SMACNA HVACDCS. Refer to Division 23 Section "Metal Ducts" for duct construction and pressure class.
- B. Duct Hangers and Supports: SMACNA HVACDCS, Section 4.
 - 1. Flexible Ducts: Support ducts by hangers every 3 feet (0.9 m), unless supported by ceiling construction. Stretch flexible air ducts to smooth out corrugations, and long radius elbows, where possible, using a minimum length to make connections.
 - 2. Flexible Connectors: Provide flexible connectors between fans and ducts or casings and where ducts are of dissimilar metals. For round ducts, securely fasten flexible connectors by zinc-coated steel clinch-type draw-bands. For rectangular ducts, lock flexible connectors to metal collars.
- C. Attach supports only to structural framing members and non-metal deck concrete slabs. Do not anchor supports to metal decking unless a means is provided and approved for preventing the anchors from puncturing the metal decking. Where supports are required between structural framing member, provide suitable intermediate metal framing. Where C clamps are used, use retainer clips.
- D. Provide backdraft dampers on exhaust fans or exhaust ducts nearest to outside and where indicated.
- E. Provide balancing dampers on duct take-offs to diffusers, grilles, and registers, regardless of whether dampers are specified as part of the diffuser, grille, or register assembly. Where branch duct is completely above non-accessible wallboard ceiling and the Architect has not approved the use of access doors, duct mounted balancing dampers shall not be required.

- F. For volume dampers located above suspended ceilings and in areas that are not visible to building occupants (e.g. mechanical rooms), provide fluorescent orange colored surveyor's tape. Permanently attach tape to damper handles and run tape down to 10 in. (254 mm) above ceiling or 12 in. (304 mm) below damper handle where ceilings do not exist (e.g. mechanical rooms).
- G. Provide flexible connections immediately adjacent to equipment in ducts associated with fans and motorized equipment, and support by vibration isolators. Staple and seal connections airtight.
- H. Provide duct test holes where indicated and required for testing and balancing purposes.
- I. Provide interconnecting power and control wiring as required, in accordance with Division 26.

END OF SECTION 233300

This Page Left Intentionally Blank

SECTION 233423 – HVAC POWER VENTILATORS

PART 1 - GENERAL

1.1 SECTION INCLUDES

- A. Ceiling Exhaust Fans.

1.2 RELATED SECTIONS

- A. Division 23 Section “Metal Ducts”
- B. Division 23 Section “Air Duct Accessories”: Backdraft dampers
- C. Division 26 “Electrical.”

1.3 REFERENCES

- A. Division 01 Section “Quality Requirements.”
- B. AMCA 99 - Standards Handbook.
- C. AMCA 210 - Laboratory Methods of Testing Fans for Rating Purposes.
- D. AMCA 261 - Directory of Products Licensed to Bear the AMCA Certified Ratings Seal.
- E. AMCA 300 - Test Code for Sound Rating Air Moving Devices.
- F. AMCA 301 - Method of Publishing Sound Ratings for Air Moving Devices.
- G. NEMA MG1 - Motors and Generators.
- H. UL 705 - Power Ventilators.

1.4 SUBMITTALS

- A. Division 01 Section “Submittal Procedures.”
- B. Product Data: Provide data on fans and accessories including fan curves with specified operating point clearly plotted, power, RPM, sound power levels at rated capacity, and electrical characteristics and connection requirements.

1.5 SUBMITTALS AT PROJECT CLOSEOUT

- A. Division 01 Section “Closeout Procedures”: Procedures for submittals.
- B. Maintenance Data: Include instructions for lubrication, motor and drive replacement, spare parts list, and wiring diagrams.

1.6 QUALITY ASSURANCE

- A. Manufacturer Qualifications: Company specializing in manufacturing the Products specified in this Section with minimum 3 years experience.

1.7 REGULATORY REQUIREMENTS

- A. Products Requiring Electrical Connection: Listed and classified by Underwriters Laboratories Inc., as suitable for the purpose specified and indicated.

PART 2 - PRODUCTS

2.1 CEILING EXHAUST FANS

- A. Manufacturers:
 - 1. Greenheck.
 - 2. Loren Cook.
 - 3. Acme.
 - 4. Twin City Fan Co.
 - 5. Substitutions: Approved equal. See Section 016000 - Product Requirements
- B. Speed Control Switch: unit mounted solid state speed controller.
- C. Grille: Molded white plastic.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Division 01 Section "Quality Requirements": Manufacturer's instructions.
- B. Where scheduled, provide backdraft dampers in ductwork on outlet from ceiling exhausters fans and as indicated. Remove integral backdraft dampers.
- C. Do not operate fans until ductwork is clean and bearings are lubricated.

END OF SECTION 233423

SECTION 233700 - AIR OUTLETS AND INLETS

PART 1 - GENERAL

1.1 SECTION INCLUDES

- A. Diffusers.
- B. Registers/Grilles.

1.2 RELATED SECTIONS

- A. Division 09 Section "Painting": Painting of ductwork visible behind outlets and inlets.

1.3 REFERENCES

- A. AAMA 611 - Voluntary Specification for Anodized Architectural Aluminum.
- B. ADC 1062 - Certification, Rating and Test Manual.
- C. AMCA 500 - Test Method for Louvers, Dampers and Shutters.
- D. AMCA 511 - Certified Ratings Program for Air Control Devices
- E. ARI 650 - Air Outlets and Inlets.
- F. ASHRAE 70 - Method of Testing for Rating the Air Flow Performance of Outlets and Inlets.
- G. ASTM E90 - Standard Test Method for Laboratory Measurement of Airborne Sound Transmission Loss of Building Partitions and Elements.
- H. ASTM E413 - Classification for Rating Sound Insulation.
- I. SMACNA - HVAC Duct Construction Standard - Metal and Flexible.
- J. NFPA 70 - National Electrical Code.
- K. NFPA 90A - Installation of Air Conditioning and Ventilating Systems.

1.4 SUBMITTALS

- A. Submit under provisions of Division 01 Section "Submittal Procedures."
- B. Product Data: Provide data for equipment required for this project. Review outlets and inlets as to size, finish, and type of mounting prior to submission. Submit schedule of outlets and inlets indicating type, size, application, rated airflow, noise level, pressure drop, and throw distance as applicable. Submit both manufacturer's standard performance tables and graphs, AND tabulated selection data specific to this project. NOTE: Submittals without complete and sufficient information, to verify the performance specified and scheduled on the Drawings, shall be rejected.

1.5 PROJECT RECORD DOCUMENTS

- A. Submit under provisions of Division 01 Section "Closeout Procedures."
- B. Record actual locations of air outlets and inlets.

1.6 QUALITY ASSURANCE

- A. Test and rate air outlet and inlet performance in accordance with ADC Equipment Test Code 1062 and ASHRAE 70.
- B. Test and rate louver performance in accordance with AMCA 500.

1.7 QUALIFICATIONS

- A. Manufacturer: Company specializing in manufacturing the Products specified in this Section with minimum 3 years' experience.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Diffusers, Registers, Grilles, and Drum Louvers:
 - 1. Titus.
 - 2. Anemostat.
 - 3. Krueger.
 - 4. Metalaire.
 - 5. Price.
 - 6. Nailor
 - 7. Substitutions: Not permitted

2.2 RECTANGULAR CEILING SUPPLY DIFFUSERS

- A. Type: Square plaque ceiling diffusers with round inlet collar connection.
- B. Frame: 24x24 inch lay-in or surface mount.
- C. Fabrication: Steel construction with seamless, one-piece, precision formed backpan. Face panel shall have smooth edges and rounded corners to blend with back cone.

2.3 RETURN REGISTERS/GRILLES

- A. Type: Streamlined blades, 3/4 inch (19 mm) minimum depth, 3/4 inch (19 mm) maximum spacing, with blades set at 45 degrees, vertical or horizontal face as indicated.
- B. Frame: 1-1/4 inch (32 mm) margin with countersunk screw mounting.
- C. Fabrication: Steel with 20 gauge (0.90 mm) minimum frames and 22 gauge (0.80 mm) minimum blades, steel and aluminum with 20 gauge (0.90 mm) minimum frame, or aluminum extrusions, as indicated, with factory off-white enamel finish.

- D. Damper: Integral, gang-operated, opposed blade type with removable key operator, operable from face where not individually connected to exhaust fans.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Install in accordance with manufacturer's instructions.
- B. Check location of outlets and inlets and make necessary adjustments in position to conform to architectural features, symmetry, and lighting arrangement.
- C. Install outlets and inlets to ductwork with air tight connection.
- D. Slope ducts or plenums at louvers, and at brick or block vents, to drain outward, and seal bottoms watertight.
- E. Provide balancing dampers on duct take-off to diffusers, and grilles and registers, despite whether dampers are specified as part of the diffuser, or grille and register assembly.
- F. Paint ductwork visible behind air outlets and inlets matte black. Refer to Division 09 Section "Painting."
- G. Surfaces exposed to view shall be clean, and free of stains, smudges, and scratches.
- H. Provide hex-head fasteners to curb in each hole in curb caps or bases of roof-mounted units. Provide protection between dissimilar metals.

END OF SECTION 233700

This Page Left Intentionally Blank

SECTION 260100 - SHORT FORM ELECTRICAL SPECIFICATIONS

PART 1 - GENERAL

1.1 SECTION INCLUDES

- A. The work included under this Section consists of electric system work, as required to accommodate the 250 Goddard Road Renovations.

1.2 WORK INCLUDED

- A. Electric Services shall remain with no changes.
- B. This project will include selective demolition and renovations to the following systems:
 - 1. Fire Alarm devices
 - 2. Lighting, including egress lighting and switching
 - 3. Power – Devices and Equipment Connections
 - 4. Telecommunications devices

1.3 RELATED REQUIREMENTS

- A. Conditions of the Contract and Division 1, General Requirements, apply to all the work, including the work of this Division. Examine all contract documents for requirements affecting the work.
- B. Definitions:
 - 1. Communications Jack: A fixed connecting device designed for insertion of a communications cable plug.
 - 2. Communications Outlet: One or more communications jacks, or cables and plugs, mounted in a box or ring, with a suitable protective cover.
 - 3. Designated Seismic System: A system component that requires design in accordance with ASCE/SEI 7, Ch. 13 and for which the Component Importance Factor is greater than 1.0.
 - 4. Direct Buried: Installed underground without encasement in concrete or other protective material.
 - 5. Enclosure: The case or housing of an apparatus, or the fence or wall(s) surrounding an installation, to prevent personnel from accidentally contacting energized parts or to protect the equipment from physical damage. Types of enclosures and enclosure covers include the following:
 - a. Cabinet: An enclosure that is designed for either surface mounting or flush mounting and is provided with a frame, mat, or trim in which a swinging door or doors are or can be hung.
 - b. Concrete Box: A box intended for use in poured concrete.
 - c. Conduit Body: A means for providing access to the interior of a conduit or tubing system through one or more removable covers at a junction or terminal point. In the United States, conduit bodies are listed in accordance with outlet box requirements.
 - d. Conduit Box: A box having threaded openings or knockouts for conduit, EMT, or fittings.
 - e. Cutout Box: An enclosure designed for surface mounting that has swinging doors or covers secured directly to and telescoping with the walls of the enclosure.
 - f. Device Box: A box with provisions for mounting a wiring device directly to the box.
 - g. Extension Ring: A ring intended to extend the sides of an outlet box or device box to increase the box depth, volume, or both.

- h. Floor Box: A box mounted in the floor intended for use with a floor box cover and other components to complete the floor box enclosure.
 - i. Floor-Mounted Enclosure: A floor box and floor box cover assembly with means to mount in the floor that is sealed against the entrance of scrub water at the floor level.
 - j. Floor Nozzle: An enclosure used on a wiring system, intended primarily as a housing for a receptacle, provided with a means, such as a collar, for surface-mounting on a floor, which may or may not include a stem to support it above the floor level, and is sealed against the entrance of scrub water at the floor level.
 - k. Junction Box: A box with a blank cover that joins different runs of raceway or cable and provides space for connection and branching of the enclosed conductors.
 - l. Outlet Box: A box that provides access to a wiring system having pryout openings, knockouts, threaded entries, or hubs in either the sides or the back, or both, for the entrance of conduit, conduit or cable fittings, or cables, with provisions for mounting an outlet box cover, but without provisions for mounting a wiring device directly to the box.
 - m. Pedestal Floor Box Cover: A floor box cover that, when installed as intended, provides a means for typically vertical or near-vertical mounting of receptacle outlets above the floor's finished surface.
 - n. Pull Box: A box with a blank cover that joins different runs of raceway and provides access for pulling or replacing the enclosed cables or conductors.
 - o. Raised-Floor Box: A floor box intended for use in raised floors.
 - p. Recessed Access Floor Box: A floor box with provisions for mounting wiring devices below the floor surface.
 - q. Recessed Access Floor Box Cover: A floor box cover with provisions for passage of cords to recessed wiring devices mounted within a recessed floor box.
 - r. Ring: A sleeve, which is not necessarily round, used for positioning a recessed wiring device flush with the plaster, concrete, drywall, or other wall surface.
 - s. Ring Cover: A box cover, with raised center portion to accommodate a specific wall or ceiling thickness, for mounting wiring devices or luminaires flush with the surface.
 - t. Termination Box: An enclosure designed for installation of termination base assemblies consisting of bus bars, terminal strips, or terminal blocks with provision for wire connectors to accommodate incoming or outgoing conductors, or both.
6. Emergency Systems: Those systems legally required and classed as emergency by municipal, state, federal, or other codes, or by any governmental agency having jurisdiction that are designed to ensure continuity of lighting, electrical power, or both, to designated areas and equipment in the event of failure of the normal supply for safety to human life.
 7. Essential Electrical Systems: Those systems designed to ensure continuity of electrical power to designated areas and functions of a healthcare facility during disruption of normal power sources, and also to minimize disruption within the internal wiring system. (healthcare facilities)
 8. High-Performance Building: A building that integrates and optimizes on a life-cycle basis all major high-performance attributes, including energy conservation, environment, safety, security, durability, accessibility, cost-benefit, productivity, sustainability, functionality, and operational considerations.
 9. Jacket: A continuous nonmetallic outer covering for conductors or cables.
 10. Luminaire: A complete lighting unit consisting of a light source such as a lamp, together with the parts designed to position the light source and connect it to the power supply. It may also include parts to protect the light source or the ballast or to distribute the light.
 11. Mode: The terms "Active Mode," "Off Mode," and "Standby Mode" are used as defined in the Energy Independence and Security Act (EISA) of 2007.
 12. Multi-Outlet Assembly: A type of surface, flush, or freestanding raceway designed to hold conductors, receptacles, and switches, assembled in the field or at the factory.
 13. Plenum: A compartment or chamber to which one or more air ducts are connected and

that forms part of the air distribution system.

14. Provide: As used in this section, "provide" shall mean, "Furnish and install". "Furnish" shall mean "to purchase and deliver to the project site complete with every necessary appurtenance and support", and "install" shall mean "to unload at the delivery point at the site and perform every operation necessary to establish secure mounting and correct operation at the proper location in the project."
15. Receptacle: A fixed connecting device arranged for insertion of a power cord plug. Also called a power jack.
16. Receptacle Outlet: One or more receptacles mounted in a box with a suitable protective cover.
17. Sheath: A continuous metallic covering for conductors or cables.
18. UL Category Control Number: An alphabetic or alphanumeric code used to identify product categories covered by UL's Listing, Classification, and Recognition Services.
19. Voltage Class: For specified circuits and equipment, voltage classes are defined as follows:
 - a. Control Voltage: Having electromotive force between any two conductors, or between a single conductor and ground, that is supplied from a battery or other Class 2 or Class 3 power-limited source.
 - b. Line Voltage: (1) (controls) Designed to operate using the supplied low-voltage power without transformation. (2) (transmission lines, transformers, SPDs) The line-to-line voltage of the supplying power system.
 - c. Extra-Low Voltage: Not having electromotive force between any two conductors, or between a single conductor and ground, exceeding 30 V(ac rms), 42 V(ac peak), or 60 V(dc).
 - d. Low Voltage: Having electromotive force between any two conductors, or between a single conductor and ground, that is rated above 30 V but not exceeding 1000 V.
 - e. Medium Voltage: Having electromotive force between any two conductors, or between a single conductor and ground, that is rated about 1 kV but not exceeding 69 kV.
 - f. High Voltage: (1) (circuits) Having electromotive force between any two conductors, or between a single conductor and ground, that is rated above 69 kV but not exceeding 230 kV. (2) (safety) Having sufficient electromotive force to inflict bodily harm or injury.

1.4 GENERAL REQUIREMENTS

- A. The work covered by these specifications consists of furnishing all labor, equipment, materials, supplies, etc. as necessary for a complete operating electrical system as shown on the plans. Responsibilities for cutting, patching, channeling and chasing shall be as defined in the construction documents.
- B. All work shall be in accordance with the current edition of the National Electric Code (NEC), NFPA, applicable state building code, and any other local requirements that may apply. Contractor shall pay for all required permits, fees, inspections, etc.
- C. The drawings are diagrammatic and are not intended to show each and every conductor, fitting, device, conduit, or a complete detail of all the work to be performed, but are for the purpose of illustrating the type system and special conditions necessary for the experienced electrician to take off his material and lay out his work. The contractor shall be responsible for making such measurements as may be necessary at the project and adapting his work to the project conditions.
- D. Adequate housing shall be provided for all materials stored on the job site. Only conduit may be stored outside, but it shall be protected from the weather.

- E. Upon completion of work, contractor shall present owner with a certificate of approval from the local inspector.
- F. All work shall be guaranteed, in accordance with the contract requirements, for a period of one year after acceptance by the owner. Any imperfect materials or workmanship shall be replaced without additional cost to the owner.
- G. Each bidder shall visit the job site prior to bidding to familiarize himself with the existing conditions. Failure to visit site shall not excuse the contractor from performing the required work nor shall it be an acceptable reason for requesting additions to the contract.
- H. The existing portions of this facility will remain in operation during this construction. The contractor shall cause as little disruption as possible to the functioning of the facility in order to maintain the comfort and safety of the occupants. Demolition and construction will be required so as not to interfere with facility operations; therefore, all work shall be coordinated with the owner.
- I. This project involves some work on existing electrical facilities. Existing feeders, branch circuits, raceways, etc. which are disrupted by this project shall be rerouted and/or refed from a new source as required to maintain them in full and permanent service.
- J. Where penetrations are made through a fire-resistive or smoke wall, floor, or partition, for the purpose of running raceway carrying electrical circuits, the opening around the raceway shall be sealed with a U.L. approved system for the purpose of cutting off drafts and to provide an effective fire and/or smoke stop. Coordination with subcontractors shall be maintained to ensure that this fire/smoke stopping is accomplished.
- K. In required fire rated walls and partitions, openings for installation of boxes that are greater than 16 square inches shall be protected as required by U.L. Coordinate closely with the subcontractors to ensure the integrity of the UL rating is maintained.
- L. All terminations, conductors, and devices shall be 75 degree rated for circuits greater than 100A.
- M. All fixed electrical equipment furnished by the contractor shall be listed and labeled by an approved testing agency. Factory assembled listed components shall be listed and labeled as an assembly. Any electrical equipment not listed or labeled must be approved by the local electrical inspector and have a third party testing label.
- N. It is understood that while the construction documents shall be followed as closely as circumstances will permit, the contractor is held responsible for the installation of the system according to the true intent and meaning of the construction documents. Anything not entirely clear in the construction documents will be fully explained if application is made to the architect/engineer in accordance with the general conditions and supplements thereto. However, should conditions arise where, in the judgement of the contractor, certain changes will be advisable, the contractor shall communicate with the architect/engineer and secure his review of these changes before proceeding with the work, provided they are of a major nature.
- O. Drawings shall not be scaled. Refer to architectural drawings for building construction and dimensions, and to room finish schedule or architectural drawings for material, finish, and construction method of walls, floor, and ceiling, in order to ensure proper rough in and installation of work.
- P. At the contractor's request, electronic files of the electrical construction documents shall be made available in autocad format for the contractor to use on this project. The contractor shall

be required to sign an electronic data release form from harriman in order to receive the electronic files. Upon receipt of a \$25 per sheet processing fee, the requested electronic files will be available for the contractor's use.

1.5 SHOP DRAWINGS

- A. The Contractor shall, after award of Contract and before installation, submit Shop Drawings, Owner's Manuals and Operating Instructions for equipment to be furnished under this Contract. Shop Drawings shall be submitted for the following items (Shop Drawings are required prior to acceptance):
 - 1. Disconnect switches.
 - 2. Panelboard breakers.
 - 3. Fire alarm system.
 - a. Shop Drawings shall show indicating and Initiative device type and location and shall indicate any device controlled in such cases
 - b. Shop Drawings shall also provide device number, area or room number indicating device label, type and engineering data.
 - c. Submittals and shop drawings shall be provided for all proposed equipment, components, and accessories.
 - 4. Light fixtures.
 - 5. Relays and lighting contactors.
 - 6. Wiring materials and devices.

1.6 RECORD DRAWINGS AND CLOSE OUT

- A. The contractor shall provide one set of marked plans to the architect/engineer for their preparation of record drawings. The plans shall be marked with a red pen and indicate all changes and deviations from the original construction documents. Each change shall be marked in a clear, legible manner, keying it to the appropriate change order, clarification note, or field authorization note, as applicable.
- B. Safety Material Data Sheets (MSDS) must be received prior to project close out.
- C. Instruction manuals shall be provided for all proposed equipment, components, and accessories.

PART 2 - PRODUCTS

2.1 MATERIALS

- A. All materials and equipment shall be new and shall be listed by the Underwriter's Laboratories (U.L.), inc. for the use intended when a standard for such material and use exists. All items of the same type and rating shall be identical and of the same manufacturer.
- B. Submit materials list showing proposed raceway, boxes, wire, etc.
- C. Where "or equivalent as accepted by the architect/engineer" is specifically noted in the specifications, reference to any article, device, product, material, fixture, or type of construction by name, make or catalog number, such reference shall be interpreted only as establishing a standard of quality and shall not be construed as limited competition. The contractor, in such cases, may at his option use any article, device, product, material, fixture, form or type of construction which in the judgment of the Architect or Engineer, expressed in writing, is acceptable as equivalent to that specified.
- D. Materials from listed manufacturers shall only be acceptable if they can properly fit in the

allocated spaces without interference from building walls, ceilings, piping, conduit, ducts or other equipment.

2.2 RACEWAY

- A. Shall be manufactured by Allied, Triangle, Wheatland, or approved equivalent.
- B. Use EMT for general concealed branch circuiting. MC Cable may be used for final runout wiring to receptacles and light switch devices in wall only. MC cable shall be terminated in junction box above ceiling near device served with homeruns to panel in EMT conduit.
- C. EMT fittings shall be compression gland type, of malleable iron or steel. Connectors shall have insulated throats. Cast, set screw, or indenter type fittings are not acceptable.
- D. All raceway shall be run concealed where possible (i.e., In new walls or above ceilings). All runs shall be neat and square. Obtain approval from owner before running exposed wiring. All exposed conduit shall be painted to match surface.
- E. Minimum conduit size shall be 3/4".
- F. Provide nylon pull strings in all empty conduits.
- G. Use liquidtight flexible conduit for connections to transformers, motors and other vibration producing equipment.
- H. Use flexible metal conduit, maximum 72", for connection to recessed and semi-recessed luminaires.
- I. Use rigid galvanized steel conduit where exposed to outdoor elements or subject to physical damage. Fittings shall be steel compression type. Connectors shall have insulated throats. Cast, set screw, or indenter type. Fittings are not acceptable.
- J. Underground raceway shall be schedule 40 pvc conduit with a separate copper grounding conductor sized in accordance with the NEC. Provide schedule 80 pvc where conduit is direct buried under a roadway, parking lot, or any path that may see vehicular traffic. Conduit exposed to the weather shall be IMC type.
- K. All electrical work shall be executed in a neat manner by skilled electricians. Exposed raceways shall be run parallel or perpendicular to structural members, walls, ceilings or floor.
- L. Conduits shall be of sizes required by the national electrical code increased as required to include bonding conductor as specified.
- M. No wire shall be installed until work which might cause damage to wires or conduits has been completed.
- N. Conduits shall be thoroughly cleaned of water or other foreign matter before wire is installed.
- O. Conduits shall be fastened by suitable galvanized clips or approved hangers. Clips and boxes shall be fastened by wood screws on wooden surfaces, machine screws on metal, toggle bolts in masonry block, or by expansions shields in concrete.
- P. Parallel runs of conduit shall be neatly clustered with all bends and offsets of uniform pattern.

2.3 WIRING DEVICES AND PLATES

- A. Manufactured by Hubbell, G.E., Bryant, or approved equal.
- B. Switches shall be 20A, 120/277VAC, specification grade.
- C. Receptacles shall be 20A, 125VAC, specification grade.
- D. Device plates shall be installed with tamperproof screws. Confirm color selection with architect.
- E. Device color selection shall be confirmed by architect. Those connected to emergency power shall be red.
- F. Duplex receptacles shall be safety type that permit current to flow only while a standard plug is in the proper position in the receptacle.
- G. Locate switches close to door frame on latch side of door, or beyond swing of door where appropriate.

2.4 OUTLET BOXES

- A. Shall be as manufactured by Midland Ross/Steel City, Raco, T&B, Appleton, or approved equivalents.
- B. Use no nails. Attach boxes with screws, bolts, caddy bar straps, etc. Secure both sides of flush mounting box to interior wall and partition. Studs. Accurately position to allow for surface finish thickness. Use stamped steel bridges or spanner bars to secure both sides of flush mounting outlet box between studs.
- C. Minimum size shall be 4" square by 1 1/2" deep with plaster rings as required for finishing.
- D. Provide divider for different voltages or branches.
- E. Outlet boxes, fittings, etc. For exterior use shall be cast type "condulet" with gaskets for waterproofing.

2.5 JUNCTION BOXES

- A. Junction boxes shall be standard type galvanized steel minimum size four inch (4") octagon or four inch (4") square 2-1/8" minimum depth, except where noted otherwise.
- B. Provide plaster rings raised up to 1-1/4" on boxes as required.
- C. Junction boxes shall be specially constructed of code gauge galvanized sheet steel where required.
- D. Light outlet boxes are to be provided with drilled and tapped ears to received fixture bars. Use 4-11/16" square boxes where required.

2.6 SUPPORTS

- A. All equipment shall be adequately supported from structure.
- B. Inserts in masonry shall be lead or fiber in drilled holes or cast in place.
- C. Use no nails. Use only screws, bolts, etc.
- D. Raceway shall be supported from structure and properly secured. Supports shall be a maximum

of 10' apart and a minimum of 3' from boxes. Do not support raceway from ceiling grid or duct work.

- E. Provide seismic bracing based on the site class and assigned use group. Calculations to support seismic restraints designs must be signed and sealed by a qualified professional engineer registered in project state.

2.7 CONDUCTORS

- A. Shall be manufactured by Rome, American/Leviton, Triangle, or approved equal. All conductors shall be copper.
- B. Wiring shall be 600 Volt, type THHN or THW or type XHHW.
- C. Color code shall match existing or be as required by the NEC.
- D. Wiring within panelboards shall be neat and square, bunched, and tagged.
- E. Wiring shall be copper conductors. Wiring #8 AWG and larger shall be stranded.
- F. Wiring within led fixture housings and between fixtures and junction boxes above ceilings shall be type THHN insulated conductors rated for use at temperatures not lower than 90c.
- G. All exterior exposed wiring shall have threaded cast "condulet" type fittings and boxes for exterior installations hall be weatherproofed.

2.8 WIRING METHOD

- A. No conduit shall contain more than three circuits.
- B. Connect loads to circuits shown.
- C. Ground all equipment per the NEC. Bond where conduits enter enclosures through concentric knockouts.
- D. Equipment grounding conductor: provide separate, insulated conductor within each feeder and branch circuit raceway. Terminate each end on suitable lug, bus, or bushing.
- E. Branch circuit wiring requires a minimum #12 AWG insulated grounding conductor. This conductor may or may not be shown on the drawings.

2.9 EQUIPMENT IDENTIFICATION

- A. Provide nameplates for all electrical equipment including, but not limited to, the following equipment:
 - 1. Panelboards
 - 2. Individually mounted circuit breakers
 - 3. Safety switches
 - 4. 1/4 hp and larger motors
 - 5. HVAC equipment
- B. Nameplates shall be engraved, laminated micarta. Plates up to 8 square inches shall not be less than 1/16" thick material; larger than 8 square inches not less than 1 1/8" thick. Letter and background colors shall be as follows (unless directed otherwise by the owner):
 - 1. Normal: White letters on black background.

2. Life safety: White letters on red background.
3. Standby / Emergency - Fed from gen: Black letters on orange background.

- C. Engraving shall be condensed gothic type, 1/4" minimum height.
- D. Nameplates shall be attached with two-sided adhesive tape.

2.10 PANELBOARDS

- A. Panelboards shall be flush, or surface mounted as indicated on the drawings. Circuit breakers shall be bolt-in type. Ratings shall be as indicated on the drawings. Bus material shall be copper.
- B. Manufacturer shall be Square 'D' or approved equal.
- C. Panels shall be provided with a typed circuit directory, with the date from the construction documents, mounted on inside of panel door.

2.11 GROUNDING

- A. Each conductive, non-current carrying, part of the electrical system shall be bonded to an equipment grounding conductor sized in accordance with the NEC.
- B. Grounding continuity between the grounding circuit of a receptacle and its grounded outlet box shall be established by means of a bonding jumper between the outlet box and the receptacle grounding terminal.

2.12 QUALITY ASSURANCE

- A. Electrical components, devices, and accessories: listed and labeled as defined in NFPA 70, article 100, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.
- B. Comply with UL 467 for grounding and bonding materials and equipment.

2.13 CONDUCTORS

- A. Insulated conductors: copper wire or cable insulated for 600 V unless otherwise required by applicable code or authorities having jurisdiction.
- B. Bare copper conductors:
 1. Solid conductors: ASTM B 3.
 2. Stranded conductors: ASTM B 8.
- C. Grounding bus: Rectangular bars of annealed copper, 1/4 by 2 inches (6 by 50 mm) in cross section, unless otherwise indicated; with insulators.

2.14 CONNECTORS

- A. Listed and labeled by a nationally recognized testing laboratory acceptable to authorities having jurisdiction for applications in which used, and for specific types, sizes, and combinations of conductors and other items connected.
- B. Bolted connectors for conductors and pipes: copper or copper alloy, bolted pressure-type, with at least two bolts.

- C. Pipe connectors: clamp type, sized for pipe.
- D. Welded connectors: Exothermic-welding kits of types recommended by kit manufacturer for materials being joined and installation conditions.

2.15 APPLICATIONS

- A. Conductors: install solid conductor for no. 8 AWG and smaller, and stranded conductors for No. 6 AWG and larger, unless otherwise indicated. Isolated grounding conductors: green-colored insulation with continuous yellow stripe. On feeders with isolated ground, identify grounding conductor where visible to normal inspection, with alternating bands of green and yellow tape, with at least three bands of green and two bands of yellow.
- B. Conductor terminations and connections:
 - 1. Pipe and equipment grounding conductor terminations: bolted connectors.
 - 2. Connections to structural steel: welded connectors.

2.16 INSTALLATION

- A. Grounding conductors: route along shortest and straightest paths possible, unless otherwise indicated or required by code. Avoid obstructing access or placing conductors where they may be subjected to strain, impact, or damage.
- B. Bonding straps and jumpers: install in locations accessible for inspection and maintenance, except where routed through short lengths of conduit.
 - 1. Bonding to structure: bond straps directly to basic structure, taking care not to penetrate any adjacent parts.
 - 2. Bonding to equipment mounted on vibration isolation hangers and supports: install so vibration is not transmitted to rigidly mounted equipment.
 - 3. Use exothermic-welded connectors for outdoor locations, but if a disconnect-type connection is required, use a bolted clamp.

2.17 FIELD QUALITY CONTROL

- A. Report measured ground resistances that exceed the following values:
 - 1. Power and lighting equipment or system with capacity 500 KVA and less: 10 Ohms.
 - 2. Power distribution units or panelboards serving electronic equipment: 3 Ohm(s).
- B. Excessive ground resistance: if resistance to ground exceeds specified values, notify architect promptly and include recommendations to reduce ground resistance.

2.18 ELECTRICAL CONNECTIONS

- A. The electrical contractor shall provide power wiring and final electrical connection to all equipment requiring electrical power.
- B. Control wiring for equipment not provided under this section, unless specifically called for on the electrical drawings, will be provided by the respective equipment contractor.
- C. Final equipment connection shall be the responsibility of this contractor. Final connection to HVAC units shall be accomplished via flexible metallic conduit suitable for the application.
- D. The electrical contractor shall provide full and final connection to all equipment furnished by

owner requiring electrical connections.

2.19 CIRCUIT BREAKERS

- A. Circuit breakers to be added to existing panelboards shall match the existing panelboard circuit breakers.

2.20 FUSES

- A. Dual Element time delay type RK-1 Buss Fusetron or approved equal.

2.21 DISCONNECT SWITCHES

- A. Fused and unfused disconnect switches shall be enclosed, heavy duty type, except as noted. Switches shall have visible blades and shall have NEMA-1 enclosure, 600-volt and 250-volt ratings as required by the particular circuit with fuses and ampere rating and number of poles as indicated on Drawings, or as required by the specific equipment. Where required for exterior use, switches shall be NEMA-3R rain tight.
- B. Fuses for all fuse clips, plugs, etc., shall be provided and one (1) spare set delivered to Owner. A duplicate set of spare fuses shall be delivered to Owner and a receipt shall be delivered to the Architect with the request for final payment. Fuses shall be Bussman or Chase Shawmut.
- C. Disconnect switches shall be as manufactured by ITE Siemens, Square-D, Cutler Hammer, or General Electric.

2.22 FIRE ALARM SYSTEM

- A. System Description: Provisions shall be made for new fire alarm components, devices and appliances to be integrated into the existing fire alarm system. The integrated system including equipment, components, and all accessories shall be UL listed for the purpose for which the devices are used.
- B. All new devices shall be fully compatible with the existing system.
- C. All work shall be installed in accordance with National Electrical Code, National Fire Protection Association, Standards 72 and also all applicable Federal, State and local codes.
- D. Conductors for initiating, notification, and annunciation devices shall be sized and installed per manufacturers recommendations. All associated wiring shall be in minimum ¾" conduit with all loop wiring marked at all terminations for identification on associated prints and as outlined by NFPA-70 and NEC.
- E. All fire alarm circuits shall be installed in a separate and independent conduit or cable systems from other electrical circuits. Initiating, notification, annunciation, and all other fire alarm system circuits shall be color coded cables and identified by number at termination and splice points.
- F. All Electrical boxes and pull boxes for the fire alarm system shall be identified by having their covers painted red.
- G. Under no circumstances shall fire alarm wire be ty-wrapped to existing conduit or pipes.
- H. Fire Alarm system components, shop drawings shall show indicating and initiating device type

and location and shall indicate any device controlled in such cases.

- I. Shop drawings shall also provide device number, area or room number indicating device label, type and engineering data.
- J. Conduit and sleeves penetrating fire rated barriers shall be sealed and/or filled with approved material to maintain the fire rating.
- K. Provide nameplates identifying all equipment, junction boxes and controls.

2.23 TELEPHONE SYSTEM

- A. Install minimum ¾" conduit from each outlet and stub to above the accessible corridor ceiling.
- B. Provide single gang outlet box, 2 1/8" deep with single gang plaster ring and cover plate of same finish material as used with the wiring devices.
- C. Provide and install CAT 6A cable to nearest Telecomm room and coordinate with Owner for connection to telephone system.
- D. Provide all required cable testing including visual inspection, and continuity testing for faults and DC loop resistance.

2.24 VOICE/DATA SYSTEM

- A. Install minimum 1" conduit from each outlet or junction box and stub to above the accessible corridor ceiling.
- B. Provide two gang outlet box, 2 1/8" deep with single gang plaster ring and cover plate of same finish material as used with the wiring devices.
- C. Provide and install CAT 6A cable to nearest Telecomm Server Rack and coordinate with Owner for final connections.
- D. Provide all required cable testing including visual inspection, and continuity testing for faults and DC loop resistance.

2.25 EMERGENCY LIGHTING SYSTEM

- A. Unit Voltage: 120 volts, AC.
- B. Exit Signs:
 - 1. Universal LED type Self powered, complete with ceiling, side wall brackets and arrows and faces as indicated.
 - 2. Die-cast aluminum construction black or white Face as indicated on the drawings and Red letters.
 - 3. LED's protected by clear diffuser and optical diffuser for Smooth look and no visible LED's.
 - 4. Manufacturer and series as indicated on the drawings
- C. Emergency battery lighting units:
 - 1. LED lamp.
 - 2. UV-stable plastic housing.
 - 3. Maintenance free batteries for 90 minute operation.
 - 4. Self-testing electronics.

- 5. Low-voltage battery disconnect, test switch, AC on light.
- 6. Manufacturer and series as indicated on the drawings.
- D. All components of these systems shall be listed by Underwriters' Laboratories, Inc., and shall be so labeled.
- E. All components used shall be of the same manufacturer and shall be fully guaranteed for a period of three (3) years and the batteries shall be warranted for an additional five (5) years minimum, on a pro-rated basis with a life expectancy of ten (10) years.
- F. All AC wiring to exit signs shall be in separate conduit, and wired to one 20A, 1P, 120 volt breaker. Provide handle lock on breaker.

PART 3 - EXECUTION

3.1 DEMOLITION

- A. Prior to beginning demolition, coordinate with the owner which items shall be removed and retained by the owner, and which items shall be removed and discarded.
- B. Equipment or materials which are to be reused or turned over to the owner shall be carefully removed, cleaned, and stored in a clean, dry area. Should the contractor encounter such equipment which is not in satisfactory condition for reuse and not in working order, the contractor shall notify the owner before performing any further work.
- C. Disconnect electrical services to all equipment requiring removal. Conduit shall be removed back to the point where it will be concealed, at the completion of this contract, unless it is to be reused for connection of new equipment. Conductors and/or cable shall be removed back to the first outlet box, cabinet, or termination point which is to remain.
- D. Equipment, circuits, and utilities that remain, but that are served by feeders or circuits being removed or altered, shall be reconnected in accordance with the methods required by this specification and the NEC, without additional time or cost to the owner.
- E. Provide flat blanking plates, painted to match surrounding finishes, to cover holes or openings left by electrical equipment in existing walls and ceilings, unless these openings are shown to be refilled and finished on the architectural drawings under a different section of the specifications.
- F. Electrical is responsible for removing all electrical work associated with items shown on other drawings, architectural, mechanical, plumbing, fire protection, etc., whether shown on the electrical drawings or not.
- G. Electrical demolition work shown is based on casual field observations and existing drawings and is shown to convey the general scope of work to be existing drawings and is shown to convey the general scope of work to be accomplished.
- H. Electrical shall visit the site and observe existing conditions prior to bidding. No change orders will be considered for items that were visible prior to beginning demolition work.
- I. Temporary power will be provided wherever necessary at no extra cost to the owner in order to keep the building in operation during each phase of renovation.
- J. All electrical power outages shall be coordinated with owner at least 24 hours in advance. Outages which are anticipated to last longer than 1 hour shall be coordinated with owner at least

1 week in advance.

- K. Unless otherwise noted, all electrical devices, etc., in walls and ceilings being demolished shall be removed. Existing electrical devices, etc., shown to remain and located downstream from those being removed, shall be reworked in accordance with the methods required by this specification and the NEC, without additional time or cost to the owner.
- L. All existing electrical work to remain, but interferes with the renovation, shall be reworked in accordance with the methods required by this specification and the NEC, without additional time or cost to the owner.

3.2 COORDINATION OF WORK

- A. Installation of electrical conduits, boxes, and equipment shall not interfere with access to HVAC and plumbing equipment, its controls, or its maintenance.
- B. Relocation of equipment, system connections, or rough-in locations up to ten feet, if necessary, shall be done without additional cost to the owner, or his agents, if done before roughing-in.
- C. The contractor shall coordinate the work under his contract to avoid conflicts between his work and the work of other trades. He shall carefully examine the drawings and shall be responsible for the proper fittings of materials and equipment into the space provided, prior to installing any conduit or equipment. If any departures from the contract documents are deemed necessary by the contractor, detail drawings of such departures and the reasons therefore shall be submitted as soon as practicable to the architect/engineer for his review. No such departures shall be made without this review and written clarification or change order.
- D. The contractor shall cooperate with other contractors and subcontractors to allow for the installation of their work as well as his own.
- E. The contractor shall be responsible for his work fitting in place without conflict with the other trades, where proper planning could avoid interference. Any work installed by this contractor without regard for the work of others, or if a conflict results, must be changed as directed by the architect/engineer without additional cost to the owner.
- F. Coordinate with HVAC, plumbing, and fire protection contractors to ensure that no pipe or duct is run above any panelboard or switchboard.
- G. The contractor shall verify that the electrical equipment to be installed fits in the assigned space prior to running any conduit or installing the equipment. Any potential conflict shall be brought to the attention of the architect/engineer at once.
- H. The architect/engineer reserves the right to observe all concealed work, before being covered. This contractor shall notify the architect/engineer of the need of a job observation at least two working days prior to concealment of work.
- I. Do not install outlets back-to-back, regardless of what may appear to be shown on the drawings. Outlets installed on opposite sides of same wall shall be installed not less than 12" apart as viewed on plan.

3.3 WORKMANSHIP AND INSTALLATION

- A. All work shall be in accordance with the National Electrical Code requirements as amended to date, with the local electric utility company's rules, the Fire Underwriters' requirements and all local, State and Federal laws and regulations. All equipment shall be Underwriters' listed.

- B. In general, all wiring shall be concealed. Wiring to all wall outlets and devices shall be concealed within the walls. Wiring to ceiling outlets shall generally be concealed between the ceiling and the floor or roof above. Where construction requires exposed wiring, conduits or surface raceway shall be neatly arranged parallel and perpendicular to beams and joists with right angle turns consisting of bends, fittings, or outlet boxes where indicated. Drops to switches and convenience outlets shall be concealed in the walls.
- C. Conduits shall be of sizes required by the National Electrical Code increased as required to include bonding conductor as specified. No wire shall be installed until work which might cause damage to wires or conduits has been completed. Conduits shall be thoroughly cleaned of water or other foreign matter before wire is installed.
- D. Conduits shall be fastened by suitable galvanized clips or approved hangers. Clips and boxes shall be fastened by wood screws on wooden surfaces, machine screws on metal, toggle bolts in masonry block, or by expansion shields in concrete. Parallel runs of conduit shall be neatly clustered with all bends and offsets of uniform pattern.
- E. Separate circuits shall be run for lighting and receptacle outlets as indicated. Circuits shall be balanced and loads and capacities shall be in accordance with requirements of local electric light company and National Boards of Fire Underwriters.
- F. Circuits for emergency lighting shall be run in separate conduits independent from other circuit wiring as required by Code.
- G. The entire electrical system shall be permanently and effectively grounded in accordance with Code requirements.
- H. Switch and receptacle plates shall be installed vertically and plumb. Locate switches close to door frame on latch side of door, or beyond swing of door where appropriate. Where door frames have side lights, switch shall be either located below side light where a 3'-0" mounting height is possible, or beyond the side light. Coordinate with door frame schedule.
- I. The location of conduits, outlets, equipment, etc., as shown shall be considered as approximate only. The Contractor shall study all Plans with relation to spaces surrounding each outlet, in order that his work may fit the work of others. Switches indicated in the same mounting heights shall be ganged together under a common plate.
- J. All splices shall be mechanically and electrically perfect, using approved solderless wire connectors. Splices shall be insulated equivalent to insulation on conductors.
- K. All motors connected under this Section of the Specifications shall be connected for correct rotation.
- L. All fixtures and equipment shall be in first-class condition at time of delivery of building to Owners with all scratches, mars, etc., refinished to factory standards.
- M. All empty conduits shall have nylon pull rope or min. #10AWG wire installed and labeled.
- N. Fixtures mounted within, on or from suspended ceilings shall be supported from structural framing above ceiling framing suspension system. Provide 10 gage safety hanger wire supports for all fixtures recessed in ceiling grids of suspended acoustical ceilings. Hangers shall be independent of ceiling framing suspension system and shall extend from fixture housing to structure above (top cord of bar joist for bar joist construction). Lighting fixtures weighing less than 56 pounds shall have minimum of two hangers, at diagonal corners of fixture (2 locations).

- O. Lighting fixtures weighing more than 56 pounds shall have four hangers, one at each corner of fixture (4 locations). Wires shall have no tension (slack) to prevent ceiling distortion. In addition, attach to ceiling framing "T"s as required by code.

3.4 SUPERVISION

- A. The contractor shall have in charge of the work, at all times during construction, a thoroughly competent foreman with extensive experience in the work to be performed under this contract. Anyone deemed not capable by the architect/engineer shall be replaced immediately upon request, and after a satisfactory foreman has been assigned, he shall not be withdrawn without the written consent of the engineer.

3.5 CUTTING AND PATCHING

- A. This contractor shall do all cutting and patching necessary for the proper installation of his work and shall repair any damage done by himself or his workman.

3.6 WASTE MATERIALS

- A. The contractor shall at all times keep the premises free from accumulation of waste materials or rubbish caused by his employees or work. At the completion of the work, he shall remove all leftover materials, equipment, and debris resulting from the work done under this division.

3.7 ACCESS TO EQUIPMENT

- A. All equipment shall be installed in a location and manner that will allow for convenient access for maintenance and inspection.
- B. Access doors and panels in walls and ceilings shall be provided as required for concealed equipment, controls, and boxes, and all other items under this division requiring accessibility for operation and maintenance. Doors and panels shall be provided, conforming to the metals division, under this division.

3.8 TESTS

- A. A full scale test with all lights, equipment, and appliances in operation shall be conducted by the contractor at his expense, and the electrical system shall be proven satisfactory for operation and free from defects. Particular attention shall be paid to the balancing of the single-phase loads on the Three-phase system. Any and all defects shall be promptly remedied.
- B. The contractor shall test all wiring and connections for continuity and grounds, before luminaires, equipment, and appliances are connected.

3.9 EQUIPMENT TESTS

- A. All control devices, breakers, switches, contactor motor starters, contactors and relays shall be adjusted so as to operate smoothly without chatter and excessive hum.
- B. The contractor shall ensure that the phasing sequence is the same throughout the entire electrical system.

3.10 IDENTIFICATION

- A. Furnish and install laminated phenolic nameplates engraved to the white core identifying all new panelboards plus circuits on all spaces of switchboards and distribution panels, also all

safety switches, controls, relays, junction boxes, pull boxes, pilot lights, special switches and outlets, etc., as furnished under this Section. Nameplates shall identify function of device, space controlled, voltage conditions, fuse size, panel serving switch, etc., as indicated or required without abbreviations. Details shall be as approved.

- B. Provide tags on each end of all pull wires, all intercommunication wires, etc., giving location of other end.
- C. Branch circuit conductors, conductors throughout the building including feeder conductors, conductors in conduits and conductors in wireways and trenches shall have color to identify voltage and service supplied in accordance with the following:
 - 1. All metallic bonding conductors - Green.
 - 2. All neutral conductors (all systems) - White.
 - 3. Phase conductors of 120/208 volt system - black, red, blue.
- D. All circuit conductors of the same color shall be connected to the same ungrounded feeder conductor throughout the installation. Conductors of different voltage systems shall not enter same raceway systems.
- E. Where conductors are not available in the colors indicated, due to size or other reason, the Contractor shall install identifying adhesive bands 3/4" wide of colors indicated above around each conductor within six inches (6") and twelve inches (12") of each end and at a maximum of five foot (5') intervals along wireways, at back of panelboards, etc., where conductors are accessible.
- F. Fire Alarm Identification: Provide address and identification labeling installed on the bases of all addressable initiation and annunciation devices noting circuit and node identification.

3.11 TESTING AND ADJUSTING

- A. The entire installation shall be free from short circuits and improper grounds. Tests shall be made in the presence of the Architects or their representatives. Each panel shall be tested with mains disconnected from the feeder, branches connected and switches closed, all fixtures in place and permanently connected, lamps removed or omitted from the sockets, and all wall switches closed.
- B. Feeders shall be tested with the feeders disconnected from the branch circuit panels. Each individual power circuit shall be tested at the panel, and in testing for insulation resistance to ground, the power equipment shall be connected from proper operation. In no case shall the insulation resistance be less than that required by the National Electrical Code. Failure shall be corrected in a manner satisfactory to the Architect and Engineers.
- C. Each system shall be completely tested and shall be adjusted for proper operation as required by the Architects.
- D. Fire Alarm Certification and Testing: Tests shall be performed by the Contractor and the Manufacturer's representative. The completed system shall be tested for proper operation, code compliance, and compliance to this standard. The Contractor and the Manufacturer's Representative shall sign a letter attesting to the completion of testing and its compliance to items outlined above. Testing shall be performed at a time convenient to the Owner. Provide a minimum of 4 hours orientation and operational training when not specified further in Contract Documents. Training shall include operation, troubleshooting, maintenance, and a general system walk-through related to the complete system installation.

3.12 CONTINUITY OF SERVICE AND SCHEDULE OF WORK

- A. All work shall be scheduled and coordinated with the Division 02 Specifications. Demolition and removal of electrical items are included as part of this Specification Section 260100, Electric. Patching of existing structure left by removals, specified under Section 099000.
- B. The Contractor shall arrange to execute the work at such times and in such locations as may be required to provide uninterrupted services for the building or any of its sections. If necessary, temporary work shall be installed to provide for this condition. Authorization for interrupting service shall be obtained in writing, from the Owner. Costs for overtime work and temporary work shall be included in the bid.

END OF SECTION 260100

Harriman

www.harriman.com