Project Manual For:

University of Southern Maine
Portland, Maine

UNIVERISTY OF SOUTHERN MAINE
SCIENCE BUILDING C300 CHEMISTRY LAB

PERMIT SET, July 21, 2015

Project No: 14-049-00

LAVALLEE | BRENSINGER ARCHITECTS

155 Dow Street, Suite 400, Manchester, NH 03101
40 Cambridge Street, Charlestown, MA 02129
NH 603.622.5450 MA 617.398.2035
www.LBPA.com

SECTION 00 01 03

PROJECT DIRECTORY

OWNER

University of Southern Maine

96 Falmouth Street, Portland, Maine 04101

ARCHITECT

Lavallee Brensinger Architects (LBA)

155 Dow Street, Suite 400, Manchester, New Hampshire 03101

40 Cambridge Street, Charlestown, Massachusetts 02129

Telephone NH: 603-622-5450 Telephone MA: 617-398-2035 E-mail: chris.drobat@lbpa.com

Contact: Chris Drobat, AIA, LEED AP, President

INTERIOR DESIGNER

Lavallee Brensinger Architects (LBA)

Contact: Chris Drobat, AIA, LEED AP, President

CONSULTANTS

FIRE PROTECTION, PLUMBING, MECHANICAL, ELECTRICAL ENGINEERS

Allied Engineering, Inc.

160 Veranda Street, Portland, Maine 04103

Telephone: 207-221-2260 E-mail: imacdonald@allied-eng.com

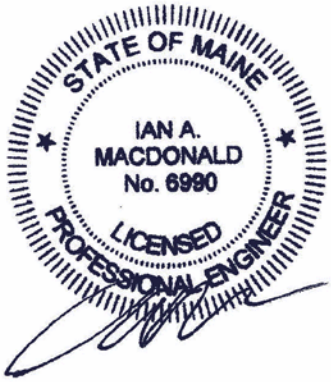
Contact: Ian A. MacDonald, P.E., LEED AP BD+C, Principal

END OF SECTION

SECTION 00 01 07

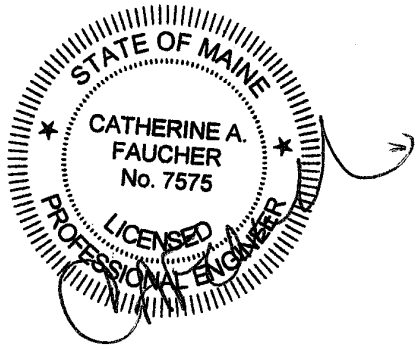
PROFESSIONAL SEAL PAGE

LA**VALLEE BRENSINGER ARCHITECTS**
ARCHITECT



ALLIED ENGINEERING, INC.
FIRE PROTECTION ENGINEER

ALLIED ENGINEERING, INC.
MECHANICAL ENGINEER



ALLIED ENGINEERING, INC.
ELECTRICAL ENGINEER

A

ALLIED ENGINEERING, INC.
PLUMBING ENGINEER

END OF SECTION

SECTION 00 01 10
TABLE OF CONTENTS

PROCUREMENT AND CONTRACTING REQUIREMENTS

DIVISION 00 -- PROCUREMENT AND CONTRACTING REQUIREMENTS

SPECIFICATIONS

DIVISION 01 -- GENERAL REQUIREMENTS

END OF TABLE OF CONTENTS

SECTION 00 01 15

LIST OF DRAWINGS

University of Maine, Portland Campus

University of Southern Maine/Science Building C300 Chemistry Lab

List of Drawings

Sheet Number	**Sheet Title**
- - - - -	COVER SHEET
AD.1	DEMOLITION PLAN
A0.1	LEGENDS, SYMBOLS, NOTES, PARTITION TYPES
A0.2	CODE ANALYSIS TEXT, SYMBOLS AND RATINGS
A0.3	DOOR AND FRAME TYPES & 1 1/2" DETAILS
A1.1	FLOOR PLAN – BASE BID
A1.2	FLOOR PLAN – ALTERMNATE NO. 1
A1.3	REFLECTED CEILING PLAN – BASE BID
A1.4	REFLECTED CEILING PLAN – ALTERNATE NO. 1
A6.1	INTERIOR ELEVATIONS
A6.2	INTERIOR ELEVATIONS
A7.1	MILLWORK DETAILS
AI1.1	INTERIOR DESIGN PLAN – BASE BID
AI1.2	GENERAL NOTES, LEGENDS, ROOM FINISH SCHEDULES AND INTERIOR DESIGN PLAN – ALTERNATE NO. 1
EQ1.1	EQUIPMENT PLAN
MD1.1	MECHANICAL AND PLUMBING PART PLANS SECOND AND THIRD FLOOR DEMOLITION
MH1.1	MECHANICAL PARTIAL PLAN – THIRD FLOOR HVAC
MP1.1	MECHANICAL PARTIAL PLAN – THIRD FLOOR PIPING
PS1.1	PLUMBING PART PLANS SECOND & THIRD FLOORS SANITARY
PL1.1	PLUMBING PART PLANS SECOND & THIRD FLOOR SUPPLY
F1.2	FIRE PROTECTION PART PLAN – THIRD FLOOR SPRINKLER
E0.1	ELECTRICAL LEGENDS, ABBREVIATIONS AND GENERAL NOTES
EP-1.1	POWER AND SYSTEMS THIRD FLOOR PART PLAN
EL1.1	LIGHTING THIRD FLOOR PART PLAN
FA1.1	FIRE ALARM PLAN
LS1.1	LIFE SAFETY PLAN

END OF SECTION

SECTION 00 11 13

NOTICE TO CONTRACTORS
(Advertisement)

Sealed Bids in envelopes plainly marked for: **Science Building C300 Chemistry Lab, #2014-023**, addressed to:

University of Southern Maine,

c/o **Nancy Theriault**

Project Coordinator

25 Bedford Street, Portland, Maine 04104

Will be received until **10:00 AM on (Date-TBD, 2015) at University of Southern Maine – Portland Campus, 25 Bedford Street, Portland, Maine 04104 in the Facilities Management conference room** at which time they will be opened and read aloud. Notice to Proceed is anticipated shortly after the bid opening, and Substantial Completion is (Date – TBD).

Sealed bids may also be hand delivered to **Facilities Management, 25 Bedford Street, on the University of Southern Maine – Portland Campus**. Proposals received after the stated time will not be considered and will be returned unopened.

Proposals must be accompanied by a satisfactory Bid Bond, as prescribed in Section 00 43 13, for 5% of the Proposal (checks will not be accepted).

The University System reserves the right to waive all formalities and reject any and all proposals or to accept any proposal.

The successful bidder will be required to furnish a 100% Performance Bond and 100% Payment Bond to cover the execution of the contract which shall be in conformity with the form of Bonds contained in Sections 00 61 13.13 and 00 61 13.16 of the Specifications and for the contract amount.

Project Summary: Complete interior demolition, renovations and system upgrades of an existing chemistry laboratory and adjacent support spaces located within the third floor portion of Payson Smith Hall located on the University of Southern Maine Portland Campus. Completion of scope of work will require partial demolition and renovations to the abutting second floor areas for floor utility access, replacement and installation of new roof top equipment including minor roof renovations/repairs and necessary selective demolition and repair as required for additional utility connections, replacement or installations as required throughout the building. The construction start date will by May 18, 2015

A **Mandatory** pre-bid meeting and site walk-through will be held on **(Date – TBD) at 10:00 AM** at the Facilities Management Office, 25 Bedford Street, Portland Maine. **Bidding contractors must attend to be considered** and subcontractors are strongly encouraged to attend.

Hard copies of the bidding documents will be available on **(Date – TBD)**, at cost of **$150.00 at Xpress Copy**, 100 Fore St, Portland, ME 04101. After purchasing a hard copy prospective bidders may obtain an electronic copy of the Plans and Specifications (in PDF format) for a fee of **$35.00.**

Additional information may be obtained at: **http://www.usm.maine.edu/facilities/current-projects**

The documents may be examined at the following places:

AGC of Maine, 188 Whitten Road, Augusta, ME 04332-5519, (207)622-4741; smetrano@agcmaine.org

McGraw-Hill Construction/Dodge, 224 Gorham Road, Scarborough, ME 04074, (207)883-4856;
DODGE DOCUMENT NA@mcgraw-hill.com Dodge ReocNA@mcgraw-hill.com
Construction Summary of NH, Maine & VT: info@constructionsummary.com; (800) 321-8856
University of Southern Maine, 25 Bedford Street, Portland, Maine 04104
University of Southern Maine, 30 University Way, Gorham, Maine 04038
University of Maine System, 16 Central Street, Bangor, Maine 04401

The University of Maine System in all its activities, subscribes and adheres to the provisions of the Civil rights Act of 1964 as amended to date. General contractors, subcontractors, and product suppliers bidding on this project must subscribe and adhere to the same. There shall be no discrimination in employment because of race, color, religion, sex, sexual orientation, including transgender status or gender expression, national origin or citizenship status, age, disability, genetic information, or veterans status in employment, education, and all other areas of the University.

University of Southern Maine
Robert W. Bertram
Executive Director of Facilities Management
For
The University of Maine System Board of Trustees

END OF SECTION

SECTION 00 11 13.10

NOTICE TO CONTRACTORS
(Advertisement)

The **University of Southern Maine** is seeking bids for the following construction project:
Science Building C300 Chemistry Lab, #2014-023

Project Summary: Complete interior demolition, renovations and system upgrades of an existing chemistry laboratory and adjacent support spaces located within the third floor portion of Science Building C300 located on the University of Southern Maine Portland Campus. Completion of scope of work will require partial demolition and renovations to the abutting second floor areas for floor utility access, replacement and installation of new roof top equipment including minor roof renovations/repairs and necessary selective demolition and repair as required for additional utility connections, replacement or installations as required throughout the building. The construction start date will by (Date – TBD), 2015

Bids will be received until **10:00 a.m. (Date – TBD), 2015,** at which time they will be opened and read aloud.

A **Mandatory** pre-bid meeting and site walk-through will be held on **(Date – TBD), 2015** at 10:00 AM at the Facilities Management Office, 25 Bedford Street, Portland Maine**. Bidding contractors must attend to be considered** and subcontractors are strongly encouraged to attend.

Additional information may be obtained at: **http://www.usm.maine.edu/facilities/current-projects**

END OF SECTION

SECTION 00 21 13

INSTRUCTION TO BIDDERS

1. At the time of the opening of bids, each bidder will be presumed to have inspected the site and to have read and to be thoroughly familiar with the plans and contract documents, including all addenda. The failure or omission of any bidder to receive or examine any form, instrument, or document shall not relieve any bidder from any obligation in respect to the bid. The Owner reserves the right to accept or reject any or all bids as may best serve the interests of the University of Maine System.
2. Subject to the University System's right, reserved herein, to accept or reject any or all bids, the General Contractor will be selected on the basis of the sum of the lowest base bid, plus such of the alternates as the University System desires to use.
3. The University System is exempt from the payment of Federal Excise Taxes on articles not for resale and the Federal Transportation Tax on all shipments. The Contractor shall quote less these taxes. Upon application, exemption certificates will be furnished when required.
4. No proposal may be withdrawn during a period of thirty (30) calendar days immediately following the opening thereof.
5. No contract may be assigned, sublet or transferred without the written consent of the University of Maine System.
6. All individuals not residents of this State must comply with the provisions of 14 M.R.S.A. §704-A.
7. The successful bidder, or bidders, will be required to furnish 100% Contract Bonds to cover the execution of the contract, in accordance with Article 23 of the General Conditions.
8. Contractors may be required to furnish a statement of their business experience, record of accomplishments, and financial responsibility, at the discretion of the University System.
9. The base bid shall be based on the materials, methods, equipment and products, as specified.
10. The Contractor shall submit his/her bid on the University provided Bid Form (00 41 13).
11. Any materials, methods, equipment and products not herein specified, but worthy of consideration by any General or Subcontractor, may be introduced by a separate letter attached to the regular bid. The Bidder shall state the cost comparison with the specified materials, methods, equipment and products, and the reason for the suggested substitution. It shall be understood by all bidders that the attached letter proposing substitutions shall not be used to determine the low bidder and that all bids are based on specified products.
12. Telegraphic or facsimile proposals will not be considered, but modification of proposals already submitted will be considered if received prior to the hour set for receipt of proposals. If the telegram or facsimile discloses the amount of the proposal, the proposal will be declared invalid. The bidder bears full responsibility to assure that the correction is delivered to the proper location and within the time required.
13. Where a bidder wishes a product to be considered an "approved equal" for bidding purposes, the product, along with all supporting documentation, shall be submitted to the architect for review a minimum of 10 calendar days prior to the bid opening date or the file bid due date, if file bids are required on the project. Products which are determined to be an "approved equal" for bidding purposes shall be listed in an addendum issued so as to be received by bidders no less than 72 hours prior to the bid date or the file bid due date if file bids are required.
14. Where the Proposal Form requires the tabulation of subcontractors other than "File Bidders," the Bidder shall list the name of the firm the bidder intends to use in the event the bidder receives the contract award.

15. Bidders may appeal the award decision by submitting a written protest to the University of Maine System's System Director of Facilities Management & General Services within five (5) business days of the date of the award notice, with a copy of the protest to the successful bidder. The protest must contain a statement of the basis for the challenge.
16. Each Bidder by making his/her Bid represents that he has assessed the conditions of the current construction marketplace, and verified that an adequate, experienced workforce is available to suitably man the Work of this Project, and complete it in a timely fashion.
17. Immediately notify Architect through the Owner Representative in writing, upon finding ambiguity, discrepancies or omissions in the Bid Documents, or the site and local conditions. Should Bidders fail to notify the Architect through the Owner Representative, of discrepancies or contradictions in the Bidding Documents, they shall be assumed to have Bid the more expensive alternative.
18. Requests for interpretation or correction of any ambiguity, inconsistency or error, which a Bidder may discover therein, shall be submitted to the Architect, through the Owner Representative, in writing. Any interpretation or correction will be issued in writing as an Addendum by the Architect. No Bidder shall rely upon any interpretation or correction given by any other method. Addenda may be issued during the bidding period. All Addenda become part of the Contract Documents. Include resultant costs in the Bid Amount. Verbal answers are not binding on any party.
19. Each Bidder represents that his/her Bid is based upon the materials and equipment described in the Bidding Documents. Where the language "or approved equal" is used in the Bidding Documents, it is intended to require that all such materials and equipment shall be submitted as required by these Instructions to Bidders, and approved by the Architect prior to the receipt of Bids. See Section 01 06 00 - Product Requirements, for additional information and the required Contractor's Substitution Request form.
20. The Contract Documents are intended to produce a building and site improvements of consistent character and quality of design. The Architect shall judge the design and appearance of proposed substitutes on the basis of their suitability in relation to the overall design of the project, as well as for their intrinsic merits. The Architect will not approve as equal to materials specified proposed substitutions which, in his/her opinion, would be out of character, obtrusive, or otherwise inconsistent with the character or quality of design of the Project.
21. The Contractor shall be solely responsible for coordinating the installation of accepted substitutions, making such changes as may be required for the Work to be complete in all respects. Any additional cost, or any loss or damage arising from the substitution of any material or any method for those originally specified shall be borne by the Contractor, notwithstanding approval or acceptance of such substitution by the Owner or the Architect, unless such substitution was made at the written request or direction of the Owner or the Architect.

END OF SECTION

SECTION 00 41 13

BID FORM

BIDDER:

_____

_____

_____

University of Maine, **UNIVERSITY OF SOUTHERN MAINE**
c/o **Nancy Theriault**
Project Coordinator
P. O. Box 9300, 25 Bedford Street, Portland, ME 04104-9300

Having carefully examined the form of contract, general conditions and plans and specifications contained therein for the **Science Building C300 Chemistry Lab, #2014-023**, as well as the premises and conditions affecting the work, we the undersigned propose to furnish all labor, equipment and materials necessary for and reasonably incidental to the construction and completion of this contract for the sum of _____ Dollars ($_____).

Alternate Prices:
Alternate #1 _____ Alternate #2 _____ Alternate #3 _____ Alternate #4 _____

This proposal includes the cost of 100% Performance Bond plus 100% Payment Bond.

The receipt of the following addenda to plans and specifications is hereby acknowledged:

ADDENDUM # _____ DATED _____ ADDENDUM # _____ DATED _____

Any material or materials not specified in the bidding document but worthy of consideration may be introduced by the bidder by a separate letter attached to this Proposal. A cost comparison must be included giving the comparison with the Material specified and reason for suggested substitution. The basic bid shall be as specified.

The undersigned agrees, if this bid is accepted, to sign a contract and deliver it, along with the bonds and affidavits for all insurance specified within twelve (12) calendar days after the date of notification of such acceptance, except if the 12th day falls on a Saturday, Sunday or holiday, then the conditions will be fulfilled if the required documents are received before 12 o'clock noon on the day following the holiday, or the Monday following the Saturday or Sunday, and as a guarantee thereof, herewith submits a bid bond as required.

The undersigned agrees, if awarded the Contract, to complete the work on or before (Date – TBD). The undersigned also agrees, if awarded the Contract, that no more than 80% of contract amount will be sublet to other contractors.

Signed _____

By _____

Address _____

Date _____

NOTE: If bidder is a corporation, write State of Incorporation, and if partnership, give full names of all partners.

END OF SECTION

SECTION 00 43 13

BID SECURITY FORM

KNOW ALL BY THESE PRESENTS, THAT WE, the undersigned, as PRINCIPAL _____ and _____ as SURETY, are hereby held and firmly bound unto the Treasurer of the UNIVERSITY OF MAINE SYSTEM in the penal sum of _____ 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 _____ day of _____, 20__.

The condition of the above obligation is such that whereas the Principal has submitted to **University of Maine, UNIVERSITY OF SOUTHERN MAINE** a certain proposal, attached hereto and hereby made a part hereof, to enter into a contract in writing for the **Science Building C300 Chemistry Lab, #2014-023**.

NOW THEREFORE,

(a) If said proposal shall be rejected, or, in the alternate

(b) If said proposal 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 proposal) and shall furnish a bond for 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 proposal, 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 bond shall be in no way impaired or affected by any extension of the time within which the principal may accept such proposal, further said Surety does hereby waive notice of any such extension.

In the event suit is brought upon this bond by the Treasurer of the UNIVERSITY OF MAINE SYSTEM, Surety shall pay reasonable attorneys' fees and costs incurred by the Treasurer of the UNIVERSITY OF MAINE SYSTEM in such suit.

IN WITNESS WHEREOF, the Principal and 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.

_____
PRINCIPAL

By: _____
L.S.

_____
SURETY

_____
SURETY ADDRESS

By: _____
L.S.

END OF SECTION

SECTION 00 52 13

CONTRACT AGREEMENT FORM

UNIVERSITY OF MAINE SYSTEM

Construction Contract Agreement

THIS AGREEMENT is made and entered into the _____ day of 20__, by and between the Contractor * Contractor and Address * and the University of Maine System acting by and through the University of **UNIVERSITY OF SOUTHERN MAINE, P. O. Box 9300, 25 Bedford Street, Portland, ME 04104-9300**

WITNESSETH: That the Owner and the Contractor for the considerations hereinafter named agree as follows:

ARTICLE 1. SCOPE OF THE WORK

The Contractor shall furnish all of the materials and perform all of the work described in the Contract Documents entitled UNIVERSITY OF SOUTHERN MAINE/SCIENCE BUILDING C300 CHEMISTRY LAB, prepared by LAVALLEE BRENSINGER ARCHITECTS, acting as and in these Contract Documents entitled the Architect and/or Engineer.

ARTICLE 2: START AND TIME OF COMPLETION

The date of the commencement of work shall be the date of this Agreement and shall be substantially completed on or before (Date – TBD) subject to adjustments as provided in the Contract Documents.

The Contractor and the Contractor's surety, if any, shall be liable for and shall pay the Owner the following stipulated liquidated damages for each calendar day of delay after the date established for Substantial Completion until the Work is substantially complete: _____ Dollars $ _____ per calendar day.

ARTICLE 3: THE CONTRACT SUM

The Owner shall pay the Contractor for the performance of the Contract as follows _____ Dollars $ _____ subject to adjustments as provided in the Contract Documents.

The Contract Sum is based upon the following alternatives and Unit Prices, if any, which are described in the Contract Documents and are hereby accepted by the Owner:

Alternate (1) _____ Alternate (2) _____ Alternate (3) _____

Unit Prices

Item _____ Price _____

Item _____ Price _____

Final payment shall be made after completion and acceptance of the work as provided in the Contract Documents.

ARTICLE 4: THE CONTRACT DOCUMENTS

The Contract Documents for this project, except for modifications issued after the execution of this agreement consist of:

.1 This agreement.

.2 AIA Document A201-2007, General Conditions of the Contract for Construction, as modified by University of Maine System 00 73 00.01 Supplementary Conditions to A201-2007.

.3 The Specifications as outlined in the Project Manual (University of Southern Maine/Science Building C300 Chemistry Lab, dated July 21, 2015.

.4 The Drawings as listed in the Project Manual.

.5 The Addenda (List the addenda and dates issued). TBD

.6 Other documents if any.

ARTICLE 5: OWNER'S REPRESENTATIVES

The Owner's Representative on this project will be Robert W. Bertram, who is authorized to sign contracts and other legal documents related to this project on behalf of the Owner.

The Owner's Project Manager on this project will be Nancy Theriault.

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

IN WITNESS WHEREOF, the parties hereto have executed this Agreement in triplicate on the day and year first above written.

UNIVERSITY OF MAINE SYSTEM___
Company

_____
Company

By: _____
Robert W. Bertram
Executive Director of Facilities Management
University of Southern Maine for the
University of Maine System

By: _____
Title

_____
Witness

_____
Witness

END OF SECTION

SECTION 00 61 13.13

PERFORMANCE BOND FORM

Bond No. _____

KNOW ALL BY THESE PRESENTS THAT (1) _____ (2) _____ of (3) _____ and State of _____, as PRINCIPAL, and (4) _____, a corporation duly organized under the laws of the State of _____ and having a usual place of business in _____, as SURETY, are held and firmly bound unto the University of Maine System in the sum of _____ Dollars ($ _____), to be paid said Treasurer of the University of Maine System, or successor in office, for which payment well and truly to be made, Principal and Surety bind themselves, their heirs, executors and administrators, successors and assigns, jointly and severally by these presents.

The condition of this obligation is such that if the Principal shall promptly and faithfully perform the Contract entered into on the (5) _____ day of _____, A.D., 20____ for the construction of (6) _____ then this obligation shall be null and void; otherwise, it shall remain in full force and effect.

The Surety hereby waives notice of any alteration or extension of time made by the University of Maine System.

Signed and sealed this (5) _____ day of _____, 20_____.

WITNESSES:	SIGNATURES:
_____	_____ LS
_____	_____ LS
_____	_____ LS

Bonding Company Agent:

Company: _____
Street: _____
City, State, Zip: _____
Telephone: _____

(1.) Correct name of Contractor
(2.) A corporation, a partnership, or an individual, as the case may be.
(3.) Contractor's address with City name
(4.) Correct name of Surety
(5.) Same date as that of contract.
(6.) Name of Project as designated in contract

If Contractor is partnership, all partners should execute bond. A Power of Attorney document, together with a statement that it still is in effect shall be provided by the person executing this bond. Bond must be countersigned by a Resident Maine Agent.

****DO NOT ALTER LANGUAGE****

END OF SECTION

SECTION 00 61 13.16

PAYMENT BOND FORM

Bond No. _____

KNOW ALL BY THESE PRESENTS THAT (1) _____ (2) _____ of _____ and State of _____, as PRINCIPAL, and (3) _____, a corporation duly organized under the laws of the State of _____ and having a usual place of business in _____, as SURETY, are held and firmly bound unto the University of Maine System in the sum of _____ Dollars ($ _____) for the use and benefit of claimants* as herein below defined, for the payment whereof Principal and Surety bind themselves, their heirs, executors and administrators, successors and assigns, jointly and severally by these presents.

The condition of this 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 contemplated in the Contract entered into on the (4)_____ day of _____, A.D., 20_____, for the construction of (5)_____, and shall fully reimburse the obligee for all outlay and expense which said obligee may incur in making good any default of said principal, then this obligation shall be null and void; otherwise, it shall remain in full force and effect.

*A Claimant is defined as one having a direct contract with the Principal or with a subcontractor of the Principal for labor, material, or both, used or reasonably required for use in the performance of the contract.

Signed and sealed this (6) _____ day of _____, 20_____.

WITNESSES:

SIGNATURES:

_____ By LS _____

_____ By LS _____

_____ By LS _____

Bonding Company Agent:

Company: _____

Street: _____

City, State, Zip: _____

Telephone: _____

(1.) Correct name of Contractor

(2.) A corporation, a partnership, or an individual, as the case may be.

(3.) Correct name of Surety

(4.) Same date as that of contract.

(5.) Name of Project as designated in contract

(6.) Same date as that of contract.

If Contractor is partnership, all partners should execute bond.

A Power of Attorney document, together with a statement that it still is in effect shall be provided by the person executing this bond.

Bond must be countersigned by a Resident Maine Agent.

****DO NOT ALTER LANGUAGE****

END OF SECTION

SECTION 00 62 16
CERTIFICATE OF INSURANCE FORM (AIA G715 AND ACORD)

GENERAL

1.01 CERTIFICATE OF INSURANCE FORM APPLICABLE TO THIS CONTRACT

A. AIA Document G715 – Supplemental Attachment for ACORD Certificate of Insurance 25-S, 1991 Edition, attached, is the Certificate of Insurance Form between the Owner and Contractor.

END OF SECTION

AIA® Document G715™ – 1991

Supplemental Attachment for ACORD Certificate of Insurance 25-S

(This document replaces AIA Document G705, Certificate of Insurance.)

PROJECT *(Name and address)*:

INSURED UNIVERSITY OF MAINE SYSTEM
16 Central Street, Bangor, ME 04401

		Yes	No	N/A
A.	**General Liability**			
1.	Does the General Aggregate apply to this Project only?	☐	☐	☐
2.	Does this policy include coverage for:			
a.	Premises - Operations?	☐	☐	☐
b.	Explosion, Collapse and Underground Hazards?	☐	☐	☐
c.	Personal Injury Coverage?	☐	☐	☐
d.	Products Coverage?	☐	☐	☐
e.	Completed Operations?	☐	☐	☐
f.	Contractual Coverage for the Insured's obligations in A201?	☐	☐	☐
3.	If coverage is written on a claims-made basis, what is the:			
a.	Retroactive Date?			
b.	Extended Reporting Date?			
B.	**Worker's Compensation**			
1.	If the Insured is exempt from Worker's Compensation statutes, does the Insured carry the equivalent Voluntary Compensation coverage?	☐	☐	☐
C.	**Final Payment Information**			
1.	Is this certificate being furnished in connection with the Contractor's request for final payment in accordance with the requirements of Sections 9.10.2 and 11.1.3 of AIA Document A201, General Conditions of the Contract for Construction?	☐	☐	☐
2.	If so, and if the policy period extends beyond termination of the Contract for Construction, is Completed Operations coverage for this Project continued for the balance of the policy period?	☐	☐	☐
D.	**Termination Provisions**			
1.	Has each policy shown on the certificate and this Supplement been endorsed to provide the holder with 30 days notice of cancellation and/or expiration? List below any policies which do not contain this notice.	☐	☐	☐
E.	**Other Provisions**			

Authorized Representative

Date of Issue

SECTION 00 62 16.10

CERTIFICATE OF LIABILITY FORM (ACORD)

GENERAL

1.01 CERTIFICATE OF LIABILITY FORM APPLICABLE TO THIS CONTRACT

A. ACORD Certificate of Liability Insurance, 1988 Edition, sample attached, is the Certificate of Liability Insurance Form between the Owner and Contractor.

END OF SECTION

ACORD™ CERTIFICATE OF LIABILITY INSURANCE

DATE (MM/DD/YY)

PRODUCER

THIS CERTIFICATE IS ISSUED AS A MATTER OF INFORMATION ONLY AND CONFERS NO RIGHTS UPON THE CERTIFICATE HOLDER. THIS CERTIFICATE DOES NOT AMEND, EXTEND OR ALTER THE COVERAGE AFFORDED BY THE POLICIES BELOW.

INSURERS AFFORDING COVERAGE

INSURED

INSURER A:
INSURER B:
INSURER C:
INSURER D:
INSURER E:

COVERAGES

THE POLICIES OF INSURANCE LISTED BELOW HAVE BEEN ISSUED TO THE INSURED NAMED ABOVE FOR THE POLICY PERIOD INDICATED. NOTWITHSTANDING ANY REQUIREMENT, TERM OR CONDITION OF ANY CONTRACT OR OTHER DOCUMENT WITH RESPECT TO WHICH THIS CERTIFICATE MAY BE ISSUED OR MAY PERTAIN, THE INSURANCE AFFORDED BY THE POLICIES DESCRIBED HEREIN IS SUBJECT TO ALL THE TERMS, EXCLUSIONS AND CONDITIONS OF SUCH POLICIES. AGGREGATE LIMITS SHOWN MAY HAVE BEEN REDUCED BY PAID CLAIMS.

INSR LTR	TYPE OF INSURANCE	POLICY NUMBER	POLICY EFFECTIVE DATE (MM/DD/YY)	POLICY EXPIRATION DATE (MM/DD/YY)	LIMITS	
	GENERAL LIABILITY				EACH OCCURRENCE	$
	☐ COMMERCIAL GENERAL LIABILITY				FIRE DAMAGE (Any one fire)	$
	☐ CLAIMS MADE ☐ OCCUR				MED EXP (Any one person)	$
	_____				PERSONAL & ADV INJURY	$
	_____				GENERAL AGGREGATE	$
	GEN'L AGGREGATE LIMIT APPLIES PER:				PRODUCTS - COMP/OP AGG	$
	☐ POLICY ☐ PRO-JECT ☐ LOC					
	AUTOMOBILE LIABILITY				COMBINED SINGLE LIMIT (Ea accident)	$
	☐ ANY AUTO					
	☐ ALL OWNED AUTOS				BODILY INJURY (Per person)	$
	☐ SCHEDULED AUTOS					
	☐ HIRED AUTOS				BODILY INJURY (Per accident)	$
	☐ NON-OWNED AUTOS					
	_____				PROPERTY DAMAGE (Per accident)	$
	GARAGE LIABILITY				AUTO ONLY - EA ACCIDENT	$
	☐ ANY AUTO				OTHER THAN AUTO ONLY: EA ACC	$
					AGG	$
	EXCESS LIABILITY				EACH OCCURRENCE	$
	☐ OCCUR ☐ CLAIMS MADE				AGGREGATE	$
						$
	☐ DEDUCTIBLE					$
	☐ RETENTION $					$
	WORKERS COMPENSATION AND EMPLOYERS' LIABILITY				☐ WC STATU-TORY LIMITS ☐ OTH-ER	
					E.L. EACH ACCIDENT	$
					E.L. DISEASE - EA EMPLOYEE	$
					E.L. DISEASE - POLICY LIMIT	$
	OTHER					

DESCRIPTION OF OPERATIONS/LOCATIONS/VEHICLES/EXCLUSIONS ADDED BY ENDORSEMENT/SPECIAL PROVISIONS

CERTIFICATE HOLDER

☐ ADDITIONAL INSURED; INSURER LETTER: ____

CANCELLATION

SHOULD ANY OF THE ABOVE DESCRIBED POLICIES BE CANCELLED BEFORE THE EXPIRATION DATE THEREOF, THE ISSUING INSURER WILL ENDEAVOR TO MAIL _____ DAYS WRITTEN NOTICE TO THE CERTIFICATE HOLDER NAMED TO THE LEFT, BUT FAILURE TO DO SO SHALL IMPOSE NO OBLIGATION OR LIABILITY OF ANY KIND UPON THE INSURER, ITS AGENTS OR REPRESENTATIVES.

AUTHORIZED REPRESENTATIVE

IMPORTANT

If the certificate holder is an ADDITIONAL INSURED, the policy(ies) must be endorsed. A statement on this certificate does not confer rights to the certificate holder in lieu of such endorsement(s).

If SUBROGATION IS WAIVED, subject to the terms and conditions of the policy, certain policies may require an endorsement. A statement on this certificate does not confer rights to the certificate holder in lieu of such endorsement(s).

DISCLAIMER

The Certificate of Insurance on the reverse side of this form does not constitute a contract between the issuing insurer(s), authorized representative or producer, and the certificate holder, nor does it affirmatively or negatively amend, extend or alter the coverage afforded by the policies listed thereon.

SECTION 00 62 16.12
COMMERCIAL GENERAL LIABILITY CG 20 10 07 04

GENERAL

1.01 COMMERCIAL GENERAL LIABILITY FORM APPLICABLE TO THIS CONTRACT

A. Additional Insured – Owners, Lessees or Contractors – Scheduled Person or Organization, 2004 Edition, sample attached, is the Commercial General Liability Form between the Owner and Contractor.

END OF SECTION

POLICY NUMBER:

COMMERCIAL GENERAL LIABILITY
CG 20 10 07 04

THIS ENDORSEMENT CHANGES THE POLICY. PLEASE READ IT CAREFULLY.

ADDITIONAL INSURED – OWNERS, LESSEES OR CONTRACTORS – SCHEDULED PERSON OR ORGANIZATION

This endorsement modifies insurance provided under the following:

COMMERCIAL GENERAL LIABILITY COVERAGE PART

SCHEDULE

Name Of Additional Insured Person(s) Or Organization(s):	Location(s) Of Covered Operations
Information required to complete this Schedule, if not shown above, will be shown in the Declarations.	

A. **Section II – Who Is An Insured** is amended to include as an additional insured the person(s) or organization(s) shown in the Schedule, but only with respect to liability for "bodily injury", "property damage" or "personal and advertising injury" caused, in whole or in part, by:

1. Your acts or omissions; or
2. The acts or omissions of those acting on your behalf;

in the performance of your ongoing operations for the additional insured(s) at the location(s) designated above.

B. With respect to the insurance afforded to these additional insureds, the following additional exclusions apply:

This insurance does not apply to "bodily injury" or "property damage" occurring after:

1. All work, including materials, parts or equipment furnished in connection with such work, on the project (other than service, maintenance or repairs) to be performed by or on behalf of the additional insured(s) at the location of the covered operations has been completed; or
2. That portion of "your work" out of which the injury or damage arises has been put to its intended use by any person or organization other than another contractor or subcontractor engaged in performing operations for a principal as a part of the same project.

SECTION 00 62 16.13

ADDITIONAL INSURED - OWNERS, LESSEES, OR CONTRACTORS - COMPLETED OPERATIONS (ISO CG 20 37 07 04)

GENERAL

1.**01 CERTIFICATE OF INSURANCE FORM APPLICABLE TO THIS CONTRACT**

A. Additional Insured - Owners, Lessees, or Contractors – Completed Operations (ISO CG 20 37 07 04), 2004 Edition, sample attached, is the Additional Insured - Owners, Lessees, or Contractors – Completed Operations Form between the Owner and Contractor.

END OF SECTION

POLICY NUMBER:

COMMERCIAL GENERAL LIABILITY
CG 20 37 07 04

THIS ENDORSEMENT CHANGES THE POLICY. PLEASE READ IT CAREFULLY.

ADDITIONAL INSURED – OWNERS, LESSEES OR CONTRACTORS – COMPLETED OPERATIONS

This endorsement modifies insurance provided under the following:

COMMERCIAL GENERAL LIABILITY COVERAGE PART

SCHEDULE

Name Of Additional Insured Person(s) Or Organization(s):	Location And Description Of Completed Operations
Information required to complete this Schedule, if not shown above, will be shown in the Declarations.	

Section II – Who Is An Insured is amended to include as an additional insured the person(s) or organization(s) shown in the Schedule, but only with respect to liability for "bodily injury" or "property damage" caused, in whole or in part, by "your work" at the location designated and described in the schedule of this endorsement performed for that additional insured and included in the "products-completed operations hazard".

SECTION 00 62 16.14
DESIGNATED LOCATION(S) GENERAL AGGREGATE LIMIT (ISO CG 25 04 03 97)

GENERAL

1.01 CERTIFICATE OF LIABILITY FORM APPLICABLE TO THIS CONTRACT

A. Designated Location(s) General Aggregate Limit (ISO CG 25 04 03 97), 1996 Edition, sample attached, is the Designated Location(s) General Aggregate Limit Form between the Owner and Contractor.

END OF SECTION

POLICY NUMBER:

COMMERCIAL GENERAL LIABILITY
CG 25 04 03 97

THIS ENDORSEMENT CHANGES THE POLICY. PLEASE READ IT CAREFULLY.

DESIGNATED LOCATION(S) GENERAL AGGREGATE LIMIT

This endorsement modifies insurance provided under the following:

COMMERCIAL GENERAL LIABILITY COVERAGE PART

SCHEDULE

Designated Location(s):

(If no entry appears above, information required to complete this endorsement will be shown in the Declarations as applicable to this endorsement.)

A. For all sums which the insured becomes legally obligated to pay as damages caused by "occurrences" under COVERAGE **A** (SECTION **I**), and for all medical expenses caused by accidents under COVERAGE **C** (SECTION **I**), which can be attributed only to operations at a single designated "location" shown in the Schedule above:

1. A separate Designated Location General Aggregate Limit applies to each designated "location", and that limit is equal to the amount of the General Aggregate Limit shown in the Declarations.

2. The Designated Location General Aggregate Limit is the most we will pay for the sum of all damages under COVERAGE **A,** except damages because of "bodily injury" or "property damage" included in the "products-completed operations hazard", and for medical expenses under COVERAGE **C** regardless of the number of:

a. Insureds;

b. Claims made or "suits" brought; or

c. Persons or organizations making claims or bringing "suits".

3. Any payments made under COVERAGE **A** for damages or under COVERAGE **C** for medical expenses shall reduce the Designated Location General Aggregate Limit for that designated "location". Such payments shall not reduce the General Aggregate Limit shown in the Declarations nor shall they reduce any other Designated Location General Aggregate Limit for any other designated "location" shown in the Schedule above.

4. The limits shown in the Declarations for Each Occurrence, Fire Damage and Medical Expense continue to apply. However, instead of being subject to the General Aggregate Limit shown in the Declarations, such limits will be subject to the applicable Designated Location General Aggregate Limit.

   ☐

B. For all sums which the insured becomes legally obligated to pay as damages caused by "occurrences" under COVERAGE **A** (SECTION **I**), and for all medical expenses caused by accidents under COVERAGE **C** (SECTION **I**), which cannot be attributed only to operations at a single designated "location" shown in the Schedule above:

1. Any payments made under COVERAGE **A** for damages or under COVERAGE **C** for medical expenses shall reduce the amount available under the General Aggregate Limit or the Products-Completed Operations Aggregate Limit, whichever is applicable; and

2. Such payments shall not reduce any Designated Location General Aggregate Limit.

C. When coverage for liability arising out of the "products-completed operations hazard" is provided, any payments for damages because of "bodily injury" or "property damage" included in the "products-completed operations hazard" will reduce the Products-Completed Operations Aggregate Limit, and not reduce the General Aggregate Limit nor the Designated Location General Aggregate Limit.

D. For the purposes of this endorsement, the **Definitions** Section is amended by the addition of the following definition:

"Location" means premises involving the same or connecting lots, or premises whose connection is interrupted only by a street, roadway, waterway or right-of-way of a railroad.

E. The provisions of Limits Of Insurance (SECTION **III**) not otherwise modified by this endorsement shall continue to apply as stipulated.

SECTION 00 62 73
SCHEDULE OF VALUES FORM (AIA G703)

GENERAL

1.01 CERTIFICATE OF VALUES FORM APPLICABLE TO THIS CONTRACT

A. Schedule of Values Form (AIA G703), 1992 Edition, sample attached, is the Schedule of Values Form between the Owner and Contractor.

END OF SECTION

AIA® Document G703™ – 1992

Continuation Sheet University of Maine System Project

AIA Document G702, APPLICATION AND CERTIFICATION FOR PAYMENT, containing Contractor's signed certification is attached.
In tabulations below, amounts are in US dollars.
Use Column I on Contracts where variable retainage for line items may apply.

APPLICATION NO: 001
APPLICATION DATE:
PERIOD TO:
ARCHITECT'S PROJECT NO:

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

SECTION 00 62 76

APPLICATION FOR PAYMENT FORM (AIA G702)

GENERAL

1.01 CERTIFICATE OF APPLICATION FOR PAYMENT FORM APPLICABLE TO THIS CONTRACT

A. Application for Payment Form (AIA G702), 1992 Edition, sample attached, is the Application for Payment Form between the Owner and Contractor.

END OF SECTION

00 62 76

AIA® Document G702™ – 1992

Application and Certificate for Payment

TO OWNER: University of Maine System
16 Central Street, Bangor, ME
04401-5106

PROJECT: University of Maine System Project

APPLICATION NO: 001
PERIOD TO:
CONTRACT FOR:
CONTRACT DATE:
PROJECT NOS: / /

Distribution to:
OWNER:
ARCHITECT:
CONTRACTOR:
FIELD:
OTHER:

FROM CONTRACTOR:

VIA ARCHITECT:

CONTRACTOR'S APPLICATION FOR PAYMENT

Application is made for payment, as shown below, in connection with the Contract.
Continuation Sheet, AIA Document G703, is attached.

1. ORIGINAL CONTRACT SUM		$ 0.00
2. NET CHANGE BY CHANGE ORDERS		$ 0.00
3. CONTRACT SUM TO DATE (Line 1 ± 2)		$ 0.00
4. TOTAL COMPLETED & STORED TO DATE (Column G on G703)		$ 0.00
5. RETAINAGE:		
a. 0 % of Completed Work (Column D + E on G703)	$ 0.00	
b. 0 % of Stored Material (Column F on G703)	$ 0.00	
Total Retainage (Lines 5a + 5b or Total in Column I of G703)		$ 0.00
6. TOTAL EARNED LESS RETAINAGE (Line 4 Less Line 5 Total)		$ 0.00
7. LESS PREVIOUS CERTIFICATES FOR PAYMENT (Line 6 from prior Certificate)		$ 0.00
8. CURRENT PAYMENT DUE		$ 0.00
9. BALANCE TO FINISH, INCLUDING RETAINAGE (Line 3 less Line 6)	$ 0.00	

CHANGE ORDER SUMMARY	ADDITIONS	DEDUCTIONS
Total changes approved in previous months by Owner	$ 0.00	$ 0.00
Total approved this Month	$ 0.00	$ 0.00
TOTALS	$ 0.00	$ 0.00
NET CHANGES by Change Order	$ 0.00	

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

CONTRACTOR:

By: _____ Date: _____

State of:

County of:

Subscribed and sworn to before me this day of

Notary Public:
My Commission expires:

ARCHITECT'S CERTIFICATE FOR PAYMENT

In accordance with the Contract Documents, based on on-site observations and the data comprising this application, the Architect certifies to the Owner that to the best of the Architect's knowledge, information and belief the Work has progressed as indicated, the quality of the Work is in accordance with the Contract Documents, and the Contractor is entitled to payment of the AMOUNT CERTIFIED.

AMOUNT CERTIFIED ..... $ 0.00

(Attach explanation if amount certified differs from the amount applied. Initial all figures on this Application and on the Continuation Sheet that are changed to conform with the amount certified.)

ARCHITECT:

By: _____ Date: _____

This Certificate is not negotiable. The AMOUNT CERTIFIED is payable only to the Contractor named herein. Issuance, payment and acceptance of payment are without prejudice to any rights of the Owner or Contractor under this Contract.

SECTION 00 62 76.13

SALES TAX FORM

Date _____

TO: _____
Vendor Name

_____
Vendor Address

_____
Vendor City State Zip

I hereby certify under penalties of perjury, that:

I am engaged in the performance of a construction contract on a project for the University of Maine System which is a Sales Tax exempt organization under the Maine Sales and Use Tax Law, Section 1760, subsection 2 and 16;

This Project is titled: Science Building C300 Chemistry Lab, #2014-023
Project Title

This project is located at: University of Southern Maine, Portland, Maine
Campus Name or Town

This certificate is issued to cover purchases of materials that will be permanently incorporated into the real property belonging to the exempt organization or government agency indicated above.

Signed: _____
Authorized Signature

FIRM _____

_____

END OF SECTION

SECTION 00 62 76.16
CONSENT OF SURETY TO REDUCTION OF RETAINAGE FORM (AIA G707A)

GENERAL

1.01 CERTIFICATE OF SURETY FORM APPLICABLE TO THIS CONTRACT

A. Consent of Surety to Reduction of Retainage Form (AIA G707A), 1994 Edition, sample attached, is the Consent of Surety to Reduction of Retainage Form between the Owner and Contractor.

END OF SECTION

AIA® Document G707A™ – 1994

Consent of Surety to Reduction in or Partial Release of Retainage

PROJECT: *(Name and address)* University of Maine System Project	**ARCHITECT'S PROJECT NUMBER:**	OWNER: ☐ ARCHITECT: ☐
	CONTRACT FOR:	CONTRACTOR: ☐
TO OWNER: *(Name and address)* University of Maine System 16 Central Street Bangor, ME 04401-5106	**CONTRACT DATED:**	SURETY: ☐ OTHER: ☐

In accordance with the provisions of the Contract between the Owner and the Contractor as indicated above, the
(Insert name and address of Surety)

, SURETY,

on bond of
(Insert name and address of Contractor)

, CONTRACTOR,

hereby approves the reduction in or partial release of retainage to the Contractor as follows:

The Surety agrees that such reduction in or partial release of retainage to the Contractor shall not relieve the Surety of any of its obligations to
(Insert name and address of Owner)

, OWNER,

as set forth in said Surety's bond.

IN WITNESS WHEREOF, the Surety has hereunto set its hand on this date:
(Insert in writing the month followed by the numeric date and year.)

_____
(Surety)

_____
(Signature of authorized representative)

Attest:
(Seal):

_____
(Printed name and title)

SECTION 00 62 79
STORED MATERIAL FORM

GENERAL

1.01 CERTIFICATE OF STORED MATERIAL FORM APPLICABLE TO THIS CONTRACT

A. Stored Material Form (UMS Form ver 1.0 06/02/2010), 2010 Edition, sample attached, is the Stored Material Form between the Owner and Contractor.

END OF SECTION

STORED MATERIALS

University of Maine - University of Southern Maine
25 Bedford Street, Portland, Maine 04104

Project Title: Science Building C300 Chemistry Lab, #2014-023
Location: _____
Contractor: _____

Materials and/or equipment (hereinafter "Materials") that have not yet been incorporated into the work may be delivered and suitably stored, at the site or some other location agreed upon by the Owner. The Materials listed below have been estimated at 100% of the cost and will be stored at _____. The Owner will reimburse the Contractor based upon the prices included on the Schedule of Values Form, 00 62 73(AIA G703), less the cost of installation. The Contractor must complete sufficient copies of this Stored Materials Form, 00 62 79, to accompany the Application for Payment. The Contractor shall secure the signature of its bonding company on all forms and shall also provide a Power of Attorney from the bonding company.

SCHEDULE

Qty	Material/Equipment	Item in AIA G703		Unit Wholesale Price	Extended Wholesale Price
		Item No	Unit Price		
				Total	

Surety _____ By: _____
Attorney-in-Fact

Power of Attorney Must be Attached

Date: _____

BILL OF SALE

The Contractor, _____, (will store/has stored) certain Materials (at the site of this project/at an approved warehouse/at bonded warehouse) and will be paid in accordance with the provisions of the General Conditions of the Contract for Construction. In consideration of the sum of $_____ paid to the contractor by the Owner, and, incompliance with the provisions of the Contract, and, with the intention to be legally bound, the Contractor does hereby grant, bargain, sell and deliver unto the Owner, it successors and assigns, all and singular, the Materials described in the schedule above. The Contractor agrees that:

1. Contractor has good title to the Materials, free and clear of all liens and encumbrances, and title is granted to the Owner;

2. The Materials will be used only in the construction of the above referenced project, under the provisions of the Contract, and will not be diverted elsewhere without the prior written consent of the Owner;

3. The Materials have been delivered to and are at the places approved for storage, and they are clearly marked and identified as the property of the Owner and are stored in a safe and secure manner to protect from damage or loss;

4. The Contractor will pay all expenses in connection with the sale, delivery, storage, protection and insurance of Materials granted to the Owner.

5. The Contractor will remain responsible for the Materials, which will remain under its custody and control for all losses, and will fully indemnify the Owner for the cost of the Materials should the Materials be lost or damaged or stolen, regardless of exclusions in insurance policies required under this document. The contractor has insured the Materials against loss or damage by fire (with extended coverage), theft and burglary, with loss payable to the Owner;

6. The Contractor agrees that the quantities of Materials set forth in the Schedule of Values Form represents the maximum quantities for which it may be entitled to payment under the provisions of the contract;

7. The following information is included with this form:

    (1) An Application for Payment;
    (2) An invoice or copy of an invoice for Materials stored;
    (3) Evidence of payment, or when payment has not been made, a letter on the Contractor's letterhead authorizing payment to be made jointly to the Contractor and the Supplier;
    (4) Photographs showing the stored Materials and its location;
    (5) a fire and theft insurance policy rider for the stored Materials.
    (6) a warehouseman's receipt acknowledging that the Materials being stored at the warehouse are being held for the benefit of the Contractor or/or University.

Witness:

_____ By: _____ (SEAL)
Principal/Contractor-Individual

Witness:

_____
Principal/Contractor-Individual

_____ _____ (SEAL)

_____ _____ (SEAL)

_____ _____ (SEAL)

_____ _____ (SEAL)

Attest:

_____
Principal/Contractor-Corporation

_____ By: _____
Secretary President

SECTION 00 63 13
REQUEST FOR INFORMATION (AIA G716)

GENERAL

1.01 REQUEST FOR INFORMATION FORM APPLICABLE TO THIS CONTRACT

A. Request for Information (AIA G716), 2004 Edition, sample attached, is the Request for Information Form between the Owner and Contractor.

END OF SECTION

AIA® Document G716™ – 2004

Request for Information ("RFI")

TO: **FROM:**

PROJECT: **ISSUE DATE:** **RFI No.** 001
University of Maine System Project

REQUESTED REPLY DATE:
PROJECT NUMBERS: / **COPIES TO:**

RFI DESCRIPTION: *(Fully describe the question or type of information requested.)*

REFERENCES/ATTACHMENTS: *(List specific documents researched when seeking the information requested.)*
SPECIFICATIONS: **DRAWINGS:** **OTHER:**

SENDER'S RECOMMENDATION: *(If RFI concerns a site or construction condition, the sender may provide a recommended solution, including cost and/or schedule considerations.)*

RECEIVER'S REPLY: *(Provide answer to RFI, including cost and/or schedule considerations.)*

BY **DATE** **COPIES TO**

Note: This reply is not an authorization to proceed with work involving additional cost, time or both. If any reply requires a change to the Contract Documents, a Change Order, Construction Change Directive or a Minor Change in the work must be executed in accordance with the Contract Documents.

SECTION 00 63 33

SUPPLEMENTAL INSTRUCTION FORM (AIA G710)

GENERAL

1.01 SUPPLEMENTAL INSTRUCTION FORM APPLICABLE TO THIS CONTRACT

A. Supplemental Instruction Form (AIA G710), 1992 Edition, sample attached, is the Supplemental Instruction Form between the Owner and Contractor.

END OF SECTION

AIA® Document G710™ – 1992

Architect's Supplemental Instructions

PROJECT *(Name and address)*:
University of Maine System Project

ARCHITECT'S SUPPLEMENTAL INSTRUCTION NO:

OWNER: ☐
ARCHITECT: ☐
CONSULTANT: ☐
CONTRACTOR: ☐
FIELD: ☐
OTHER: ☐

OWNER *(Name and address)*:
University of Maine System
16 Central Street
Bangor, ME 04401-5106

DATE OF ISSUANCE:

CONTRACT FOR:

FROM ARCHITECT *(Name and address)*:

CONTRACT DATE:

TO CONTRACTOR *(Name and address)*:

ARCHITECT'S PROJECT NUMBER:

The Work shall be carried out in accordance with the following supplemental instructions issued in accordance with the Contract Documents without change in Contract Sum or Contract Time. Proceeding with the Work in accordance with these instructions indicates your acknowledgment that there will be no change in the Contract Sum or Contract Time.

DESCRIPTION:

ATTACHMENTS:
(Here insert listing of documents that support description.)

ISSUED BY THE ARCHITECT:

_____ _____
(Signature) *(Printed name and title)*

SECTION 00 63 46

CONSTRUCTION CHANGE DIRECTIVE FORM (AIA G714)

GENERAL

1.01 CONSTRUCTION CHANGE DIRECTIVE FORM APPLICABLE TO THIS CONTRACT

A. Construction Change Directive Form (AIA G714), 2007 Edition, sample attached, is the Construction Change Directive Form between the Owner and Contractor.

END OF SECTION

AIA® Document G714™ – 2007

Construction Change Directive

PROJECT: *(Name and address)* University of Maine System Project **TO CONTRACTOR:** *(Name and address)*	**DIRECTIVE NUMBER:** **DATE:** **CONTRACT FOR:** **CONTRACT DATED:** **ARCHITECT'S PROJECT NUMBER:**	OWNER: ☐ ARCHITECT: ☐ CONSULTANT: ☐ CONTRACTOR: ☐ FIELD: ☐ OTHER: ☐

You are hereby directed to make the following change(s) in this Contract:
(Describe briefly any proposed changes or list any attached information in the alternative)

PROPOSED ADJUSTMENTS

1. The proposed basis of adjustment to the Contract Sum or Guaranteed Maximum Price is:
   - ☒ • Lump Sum decrease of $0.00
   - ☐ • Unit Price of $ per
   - ☐ • As provided in Section 7.3.3 of AIA Document A201-2007
   - ☐ • As follows:

2. The Contract Time is proposed to ( ). The proposed adjustment, if any, is days.

When signed by the Owner and Architect and received by the Contractor, this document becomes effective IMMEDIATELY as a Construction Change Directive (CCD), and the Contractor shall proceed with the change(s) described above.

Contractor signature indicates agreement with the proposed adjustments in Contract Sum and Contract Time set forth in this CCD.

ARCHITECT *(Firm name)*	**OWNER** *(Firm name)*	**CONTRACTOR** *(Firm name)*
ADDRESS	**ADDRESS**	**ADDRESS**
BY *(Signature)*	**BY** *(Signature)*	**BY** *(Signature)*
(Typed name)	*(Typed name)*	*(Typed name)*
DATE	**DATE**	**DATE**

SECTION 00 63 57
CHANGE ORDER REQUEST FORM (AIA G709)

GENERAL

1.01 CHANGE ORDER REQUEST FORM APPLICABLE TO THIS CONTRACT

A. Change Order Request Form (AIA G709), 2001 Edition, sample attached, is the Work Change Proposal Request Form between the Owner and Contractor.

END OF SECTION

AIA® Document G709™ – 2001

Work Changes Proposal Request

PROJECT *(Name and address):*
University of Maine System Project

OWNER *(Name and address)*:

FROM ARCHITECT *(Name and address)*:

TO CONTRACTOR *(Name and address)*:

PROPOSAL REQUEST NUMBER:

DATE OF ISSUANCE:

CONTRACT FOR:

CONTRACT DATE:

ARCHITECT'S PROJECT NUMBER:

OWNER: ☐
ARCHITECT: ☐
CONSULTANT: ☐
CONTRACTOR: ☐
FIELD: ☐
OTHER: ☐

Please submit an itemized proposal for changes in the Contract Sum and Contract Time for proposed modifications to the Contract Documents described herein. Within ( ) days, the Contractor must submit this proposal or notify the Architect, in writing, of the date on which proposal submission is anticipated.

THIS IS NOT A CHANGE ORDER, A CONSTRUCTION CHANGE DIRECTIVE OR A DIRECTION TO PROCEED WITH THE WORK DESCRIBED IN THE PROPOSED MODIFICATIONS.

DESCRIPTION *(Insert a written description of the Work)*:

ATTACHMENTS *(List attached documents that support description)*:

REQUESTED BY THE ARCHITECT:

(Signature) _____ *(Printed name and title)* _____

SECTION 00 63 63

CHANGE ORDER FORM (AIA G701)

GENERAL

1.01 CHANGE ORDER FORM APPLICABLE TO THIS CONTRACT

A. Change Order Form (AIA G701), 2001 Edition, sample attached, is the Change Order Form between the Owner and Contractor.

END OF SECTION

AIA® Document G701™ – 2001

Change Order

PROJECT *(Name and address):* University of Maine System Project	**CHANGE ORDER NUMBER:**	OWNER: ☐
	DATE:	ARCHITECT: ☐
TO CONTRACTOR *(Name and address):*	**ARCHITECT'S PROJECT NUMBER:**	CONTRACTOR: ☐
	CONTRACT DATE:	FIELD: ☐
	CONTRACT FOR:	OTHER: ☐

THE CONTRACT IS CHANGED AS FOLLOWS:
(Include, where applicable, any undisputed amount attributable to previously executed Construction Change Directives)

The original Contract Sum was	$	0.00
The net change by previously authorized Change Orders	$	0.00
The Contract Sum prior to this Change Order was	$	0.00
The Contract Sum will be increased by this Change Order in the amount of	$	0.00
The new Contract Sum including this Change Order will be	$	0.00

The Contract Time will be increased by Zero (0) days.
The date of Substantial Completion as of the date of this Change Order therefore is

NOTE: This Change Order does not include changes in the Contract Sum, Contract Time or Guaranteed Maximum Price which have been authorized by Construction Change Directive until the cost and time have been agreed upon by both the Owner and Contractor, in which case a Change Order is executed to supersede the Construction Change Directive.

NOT VALID UNTIL SIGNED BY THE ARCHITECT, CONTRACTOR AND OWNER.

ARCHITECT *(Firm name)*	**CONTRACTOR** *(Firm name)*	**OWNER** *(Firm name)*
ADDRESS	**ADDRESS**	**ADDRESS**
BY *(Signature)*	**BY** *(Signature)*	**BY** *(Signature)*
(Typed name)	*(Typed name)*	*(Typed name)*
DATE	**DATE**	**DATE**

SECTION 00 65 16
CERTIFICATE OF SUBSTANTIAL COMPLETION
FORM (AIA G704)

GENERAL

1.01 CERTIFICATE OF SUBSTANTIAL COMPLETION FORM APPLICABLE TO THIS CONTRACT

A. Certificate of Substantial Completion Form (AIA G704), 2000 Edition, sample attached, is the Certificate of Substantial Completion Form between the Owner and Contractor.

END OF SECTION

AIA® Document G704™ – 2000

Certificate of Substantial Completion

PROJECT:
(Name and address):
University of Maine System Project

PROJECT NUMBER: /
CONTRACT FOR: General Construction
CONTRACT DATE:

OWNER: ☐
ARCHITECT: ☐
CONTRACTOR: ☐
FIELD: ☐
OTHER: ☐

TO OWNER:
(Name and address):
University of Maine System
16 Central Street
Bangor, ME 04401-5106

TO CONTRACTOR:
(Name and address):

PROJECT OR PORTION OF THE PROJECT DESIGNATED FOR PARTIAL OCCUPANCY OR USE SHALL INCLUDE:

The Work performed under this Contract has been reviewed and found, to the Architect's best knowledge, information and belief, to be substantially complete. Substantial Completion is the stage in the progress of the Work when the Work or designated portion is sufficiently complete in accordance with the Contract Documents so that the Owner can occupy or utilize the Work for its intended use. The date of Substantial Completion of the Project or portion designated above is the date of issuance established by this Certificate, which is also the date of commencement of applicable warranties required by the Contract Documents, except as stated below:

Warranty **Date of Commencement**

ARCHITECT	BY	DATE OF ISSUANCE

A list of items to be completed or corrected is attached hereto. The failure to include any items on such list does not alter the responsibility of the Contractor to complete all Work in accordance with the Contract Documents. Unless otherwise agreed to in writing, the date of commencement of warranties for items on the attached list will be the date of issuance of the final Certificate of Payment or the date of final payment.

Cost estimate of Work that is incomplete or defective: $0.00

The Contractor will complete or correct the Work on the list of items attached hereto within Zero (0) days from the above date of Substantial Completion.

CONTRACTOR	BY	DATE

The Owner accepts the Work or designated portion as substantially complete and will assume full possession at (time) on (date).

OWNER	BY	DATE

The responsibilities of the Owner and Contractor for security, maintenance, heat, utilities, damage to the Work and insurance shall be as follows:
(Note: Owner's and Contractor's legal and insurance counsel should determine and review insurance requirements and coverage.)

SECTION 00 65 19

CERTIFICATE OF COMPLETION FORM-13

University of Maine System
Certificate of Completion
(Final)

CONTRACT DATED: To Be Determined

PROJECT NAME: **Science Building C300 Chemistry Lab, #2014-023**

SUBTANTIAL COMPLETION DATE: TBD

FINAL COMPLETION is defined, in accordance with Article 9 of the General Conditions, as the date certified by the Architect when all the Work of the Project is fully complete, the Close-Out requirements of Paragraph 9.10 of the General Conditions have been completed, including the Close-Out Meeting and approval of Close-Out by the Architect, in accordance with Subparagraph 9.10.2, and the Contract fully performed in accordance with the Contract Documents, and the Contractor entitled to final payment.

The CONTRACTOR certifies that the Work is fully completed and was completed on or before _____, 20_____, and submits herewith:

Application for Final Payment (AIA G702, or equal)
Affidavit of Payments (AIA G706, or equal)
Consent of Surety (AIA G707, or equal)
Release of Liens (AIA G706A, or equal)
Waiver of Lien

CONTRACTOR:

By: _____ Date: _____

The Architect has inspected the Work and has determined that the Date of Final Completion was_____, 20_____.

ARCHITECT:

By: _____ Date: _____

The OWNER hereby accepts the Work as fully complete and will make final payment.

By: _____
Campus Signature Authority
Title
University of
Date: _____

END OF SECTION

SECTION 00 65 19.13

AFFIDAVIT OF PAYMENT OF DEBTS AND CLAIMS FORM (AIA G706)

GENERAL

1.01 CERTIFICATE OF AFFIDAVIT FORM APPLICABLE TO THIS CONTRACT

A. Affidavit of Payment of Debts and Claims Form (AIA G706), 1994 Edition, sample attached, is the Affidavit of Payment of Debts and Claims Form between the Owner and Contractor.

END OF SECTION

AIA® Document G706™ – 1994

Contractor's Affidavit of Payment of Debts and Claims

PROJECT: *(Name and address)* University of Maine System Project	**ARCHITECT'S PROJECT NUMBER:**	OWNER: ☐ ARCHITECT: ☐ CONTRACTOR: ☐
	CONTRACT FOR: General Construction	SURETY: ☐
TO OWNER: *(Name and address)*	**CONTRACT DATED:**	OTHER: ☐

STATE OF:
COUNTY OF:

The undersigned hereby certifies that, except as listed below, payment has been made in full and all obligations have otherwise been satisfied for all materials and equipment furnished, for all work, labor, and services performed, and for all known indebtedness and claims against the Contractor for damages arising in any manner in connection with the performance of the Contract referenced above for which the Owner or Owner's property might in any way be held responsible or encumbered.

EXCEPTIONS:

SUPPORTING DOCUMENTS ATTACHED HERETO:

1. Consent of Surety to Final Payment. Whenever Surety is involved, Consent of Surety is required. AIA Document G707, Consent of Surety, may be used for this purpose

Indicate Attachment ☐ Yes ☒ No

The following supporting documents should be attached hereto if required by the Owner:

1. Contractor's Release or Waiver of Liens, conditional upon receipt of final payment.

2. Separate Releases or Waivers of Liens from Subcontractors and material and equipment suppliers, to the extent required by the Owner, accompanied by a list thereof.

3. Contractor's Affidavit of Release of Liens (AIA Document G706A).

CONTRACTOR: *(Name and address)*

BY: _____
(Signature of authorized representative)

_____
(Printed name and title)

Subscribed and sworn to before me on this date:

Notary Public:
My Commission Expires:

SECTION 00 65 19.16

AFFIDAVIT OF RELEASE OF LIENS FORM (AIA G706A)

GENERAL

1.01 CERTIFICATE OF AFFIDAVIT FORM APPLICABLE TO THIS CONTRACT

A. Affidavit of Release of Liens Form (AIA G706A), 1994 Edition, sample attached, is the Affidavit of Release of Liens Form between the Owner and Contractor.

END OF SECTION

AIA® Document G706A™ – 1994

Contractor's Affidavit of Release of Liens

PROJECT: *(Name and address)*
University of Maine System Project2

ARCHITECT'S PROJECT NUMBER:

CONTRACT FOR: General Construction

CONTRACT DATED:

OWNER: ☐
ARCHITECT: ☐
CONTRACTOR: ☐
SURETY: ☐
OTHER: ☐

TO OWNER: *(Name and address)*
University of Maine System
16 Central Street
Bangor, ME 04401-5106

STATE OF: Maine
COUNTY OF:

The undersigned hereby certifies that to the best of the undersigned's knowledge, information and belief, except as listed below, the Releases or Waivers of Lien attached hereto include the Contractor, all Subcontractors, all suppliers of materials and equipment, and all performers of Work, labor or services who have or may have liens or encumbrances or the right to assert liens or encumbrances against any property of the Owner arising in any manner out of the performance of the Contract referenced above.

EXCEPTIONS:

SUPPORTING DOCUMENTS ATTACHED HERETO:

1. Contractor's Release or Waiver of Liens, conditional upon receipt of final payment.

2. Separate Releases or Waivers of Liens from Subcontractors and material and equipment suppliers, to the extent required by the Owner, accompanied by a list thereof.

CONTRACTOR: *(Name and address)*

BY:

(Signature of authorized representative)

(Printed name and title)

Subscribed and sworn to before me on this date:

Notary Public:
My Commission Expires:

SECTION 00 65 19.17

WAIVER OF LIEN

Date:

State of Maine

County of

TO: Office of Facilities
University of Maine System
16 Central Street
Bangor, ME 04401

SUBJECT _____

Project Name _____

Project Location _____

Upon receipt of the sum of _____ (being the balance due us under the existing contract or subcontract agreement for work on the Subject Project) the undersigned agrees that it will waive and release the University of Maine System from any and all lien or claim or right to lien on the Subject Project under the Statutes of the State of Maine relating to liens for labor, materials and/or subcontracts furnished for the Subject Project on premises belonging to the University of Maine System.

Signed: _____
Authorized Signature

Title _____

Firm Name: _____

NOTARY

Subscribed and sworn to before me this _____ day of _____, 20_____.

_____
Signature Notary Public

END OF SECTION

SECTION 00 65 19.19

CONSENT OF SURETY TO FINAL PAYMENT FORM (AIA G707)

GENERAL

1.01 CERTIFICATE OF SURETY FORM APPLICABLE TO THIS CONTRACT

A. Consent of Surety to Final Payment Form (AIA G707), 1994 Edition, sample attached, is the Consent of Surety to Final Payment Form between the Owner and Contractor.

END OF SECTION

AIA® Document G707™ – 1994

Consent Of Surety to Final Payment

PROJECT: *(Name and address)* University of Maine System Project	**ARCHITECT'S PROJECT NUMBER:**	OWNER: ☐
	CONTRACT FOR:	ARCHITECT: ☐
TO OWNER: *(Name and address)* University of Maine System 16 Central Street Bangor, ME 04401-5106	**CONTRACT DATED:**	CONTRACTOR: ☐ SURETY: ☐ OTHER: ☐

In accordance with the provisions of the Contract between the Owner and the Contractor as indicated above, the
(Insert name and address of Surety)

, SURETY,

on bond of
(Insert name and address of Contractor)

, CONTRACTOR,

hereby approves of the final payment to the Contractor, and agrees that final payment to the Contractor shall not relieve the Surety of any of its obligations to
(Insert name and address of Owner)

, OWNER,

as set forth in said Surety's bond.

IN WITNESS WHEREOF, the Surety has hereunto set its hand on this date:
(Insert in writing the month followed by the numeric date and year.)

_____
(Surety)

_____
(Signature of authorized representative)

Attest:
(Seal):

_____
(Printed name and title)

SECTION 00 72 00
GENERAL CONDITIONS

GENERAL

1.01 FORM OF GENERAL CONDITIONS APPLICABLE TO THIS CONTRACT

A. AIA Document A201 - General Conditions of the Contract for Construction, 2007 Edition, attached, is the General Conditions between the Owner and Contractor.

1.02 SUPPLEMENTARY GENERAL CONDITIONS APPLICABLE TO THIS CONTRACT

A. Refer to Document 00 73 00.01 – University of Maine System Supplementary General Conditions to AIA A201-2007, for amendments to these General Conditions.

END OF DOCUMENT

AIA® Document A201™ – 2007

General Conditions of the Contract for Construction

for the following PROJECT:
(Name and location or address)
University of Maine System Project

THE OWNER:
(Name, legal status and address)
University of Maine System
16 Central Street
Bangor, ME 04401-5106

THE ARCHITECT:
(Name, legal status and address)

ADDITIONS AND DELETIONS:
The author of this document has added information needed for its completion. The author may also have revised the text of the original AIA standard form. An *Additions and Deletions Report* that notes added information as well as revisions to the standard form text is available from the author and should be reviewed. A vertical line in the left margin of this document indicates where the author has added necessary information and where the author has added to or deleted from the original AIA text.

This document has important legal consequences. Consultation with an attorney is encouraged with respect to its completion or modification.

TABLE OF ARTICLES

INDEX
(Numbers and Topics in Bold are Section Headings)

ARTICLE 1 GENERAL PROVISIONS

§ 1.1 BASIC DEFINITIONS

§ 1.1.1 THE CONTRACT DOCUMENTS

The Contract Documents are enumerated in the Agreement between the Owner and Contractor (hereinafter the Agreement) and consist of the Agreement, Conditions of the Contract (General, Supplementary and other Conditions), Drawings, Specifications, Addenda issued prior to execution of the Contract, other documents listed in the Agreement and Modifications issued after execution of the Contract. A Modification is (1) a written amendment to the Contract signed by both parties, (2) a Change Order, (3) a Construction Change Directive or (4) a written order for a minor change in the Work issued by the Architect. Unless specifically enumerated in the Agreement, the Contract Documents do not include the advertisement or invitation to bid, Instructions to Bidders, sample forms, other information furnished by the Owner in anticipation of receiving bids or proposals, the Contractor's bid or proposal, or portions of Addenda relating to bidding requirements.

§ 1.1.2 THE CONTRACT

The Contract Documents form the Contract for Construction. The Contract represents the entire and integrated agreement between the parties hereto and supersedes prior negotiations, representations or agreements, either written or oral. The Contract may be amended or modified only by a Modification. The Contract Documents shall not be construed to create a contractual relationship of any kind (1) between the Contractor and the Architect or the Architect's consultants, (2) between the Owner and a Subcontractor or a Sub-subcontractor, (3) between the Owner and the Architect or the Architect's consultants or (4) between any persons or entities other than the Owner and the Contractor. The Architect shall, however, be entitled to performance and enforcement of obligations under the Contract intended to facilitate performance of the Architect's duties.

§ 1.1.3 THE WORK

The term "Work" means the construction and services required by the Contract Documents, whether completed or partially completed, and includes all other labor, materials, equipment and services provided or to be provided by the Contractor to fulfill the Contractor's obligations. The Work may constitute the whole or a part of the Project.

§ 1.1.4 THE PROJECT

The Project is the total construction of which the Work performed under the Contract Documents may be the whole or a part and which may include construction by the Owner and by separate contractors.

§ 1.1.5 THE DRAWINGS

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

§ 1.1.6 THE SPECIFICATIONS

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

§ 1.1.7 INSTRUMENTS OF SERVICE

Instruments of Service are representations, in any medium of expression now known or later developed, of the tangible and intangible creative work performed by the Architect and the Architect's consultants under their respective professional services agreements. Instruments of Service may include, without limitation, studies, surveys, models, sketches, drawings, specifications, and other similar materials.

§ 1.1.8 INITIAL DECISION MAKER

The Initial Decision Maker is the person identified in the Agreement to render initial decisions on Claims in accordance with Section 15.2 and certify termination of the Agreement under Section 14.2.2.

§ 1.2 CORRELATION AND INTENT OF THE CONTRACT DOCUMENTS

§ 1.2.1 The intent of the Contract Documents is to include all items necessary for the proper execution and completion of the Work by the Contractor. The Contract Documents are complementary, and what is required by one shall be as binding as if required by all; performance by the Contractor shall be required only to the extent consistent with the Contract Documents and reasonably inferable from them as being necessary to produce the indicated results.

§ 1.2.2 Organization of the Specifications into divisions, sections and articles, and arrangement of Drawings shall not control the Contractor in dividing the Work among Subcontractors or in establishing the extent of Work to be performed by any trade.

§ 1.2.3 Unless otherwise stated in the Contract Documents, words that have well-known technical or construction industry meanings are used in the Contract Documents in accordance with such recognized meanings.

§ 1.3 CAPITALIZATION

Terms capitalized in these General Conditions include those that are (1) specifically defined, (2) the titles of numbered articles or (3) the titles of other documents published by the American Institute of Architects.

§ 1.4 INTERPRETATION

In the interest of brevity the Contract Documents frequently omit modifying words such as "all" and "any" and articles such as "the" and "an," but the fact that a modifier or an article is absent from one statement and appears in another is not intended to affect the interpretation of either statement.

§ 1.5 OWNERSHIP AND USE OF DRAWINGS, SPECIFICATIONS AND OTHER INSTRUMENTS OF SERVICE

§ 1.5.1 The Architect and the Architect's consultants shall be deemed the authors and owners of their respective Instruments of Service, including the Drawings and Specifications, and will retain all common law, statutory and other reserved rights, including copyrights. The Contractor, Subcontractors, Sub-subcontractors, and material or equipment suppliers shall not own or claim a copyright in the Instruments of Service. Submittal or distribution to meet official regulatory requirements or for other purposes in connection with this Project is not to be construed as publication in derogation of the Architect's or Architect's consultants' reserved rights.

§ 1.5.2 The Contractor, Subcontractors, Sub-subcontractors and material or equipment suppliers are authorized to use and reproduce the Instruments of Service provided to them solely and exclusively for execution of the Work. All copies made under this authorization shall bear the copyright notice, if any, shown on the Instruments of Service. The Contractor, Subcontractors, Sub-subcontractors, and material or equipment suppliers may not use the Instruments of Service on other projects or for additions to this Project outside the scope of the Work without the specific written consent of the Owner, Architect and the Architect's consultants.

§ 1.6 TRANSMISSION OF DATA IN DIGITAL FORM

If the parties intend to transmit Instruments of Service or any other information or documentation in digital form, they shall endeavor to establish necessary protocols governing such transmissions, unless otherwise already provided in the Agreement or the Contract Documents.

ARTICLE 2 OWNER

§ 2.1 GENERAL

§ 2.1.1 The Owner is the person or entity identified as such in the Agreement and is referred to throughout the Contract Documents as if singular in number. The Owner shall designate in writing a representative who shall have express authority to bind the Owner with respect to all matters requiring the Owner's approval or authorization. Except as otherwise provided in Section 4.2.1, the Architect does not have such authority. The term "Owner" means the Owner or the Owner's authorized representative.

§ 2.1.2 The Owner shall furnish to the Contractor within fifteen days after receipt of a written request, information necessary and relevant for the Contractor to evaluate, give notice of or enforce mechanic's lien rights. Such information shall include a correct statement of the record legal title to the property on which the Project is located, usually referred to as the site, and the Owner's interest therein.

§ 2.2 INFORMATION AND SERVICES REQUIRED OF THE OWNER

§ 2.2.1 Prior to commencement of the Work, the Contractor may request in writing that the Owner provide reasonable evidence that the Owner has made financial arrangements to fulfill the Owner's obligations under the Contract. Thereafter, the Contractor may only request such evidence if (1) the Owner fails to make payments to the Contractor as the Contract Documents require; (2) a change in the Work materially changes the Contract Sum; or (3) the Contractor identifies in writing a reasonable concern regarding the Owner's ability to make payment when due. The Owner shall furnish such evidence as a condition precedent to commencement or continuation of the Work or the

portion of the Work affected by a material change. After the Owner furnishes the evidence, the Owner shall not materially vary such financial arrangements without prior notice to the Contractor.

§ 2.2.2 Except for permits and fees that are the responsibility of the Contractor under the Contract Documents, including those required under Section 3.7.1, the Owner shall secure and pay for necessary approvals, easements, assessments and charges required for construction, use or occupancy of permanent structures or for permanent changes in existing facilities.

§ 2.2.3 The Owner shall furnish surveys describing physical characteristics, legal limitations and utility locations for the site of the Project, and a legal description of the site. The Contractor shall be entitled to rely on the accuracy of information furnished by the Owner but shall exercise proper precautions relating to the safe performance of the Work.

§ 2.2.4 The Owner shall furnish information or services required of the Owner by the Contract Documents with reasonable promptness. The Owner shall also furnish any other information or services under the Owner's control and relevant to the Contractor's performance of the Work with reasonable promptness after receiving the Contractor's written request for such information or services.

§ 2.2.5 Unless otherwise provided in the Contract Documents, the Owner shall furnish to the Contractor one copy of the Contract Documents for purposes of making reproductions pursuant to Section 1.5.2.

§ 2.3 OWNER'S RIGHT TO STOP THE WORK

If the Contractor fails to correct Work that is not in accordance with the requirements of the Contract Documents as required by Section 12.2 or repeatedly fails to carry out Work in accordance with the Contract Documents, the Owner may issue a written order to the Contractor to stop the Work, or any portion thereof, until the cause for such order has been eliminated; however, the right of the Owner to stop the Work shall not give rise to a duty on the part of the Owner to exercise this right for the benefit of the Contractor or any other person or entity, except to the extent required by Section 6.1.3.

§ 2.4 OWNER'S RIGHT TO CARRY OUT THE WORK

If the Contractor defaults or neglects to carry out the Work in accordance with the Contract Documents and fails within a ten-day period after receipt of written notice from the Owner to commence and continue correction of such default or neglect with diligence and promptness, the Owner may, without prejudice to other remedies the Owner may have, correct such deficiencies. In such case an appropriate Change Order shall be issued deducting from payments then or thereafter due the Contractor the reasonable cost of correcting such deficiencies, including Owner's expenses and compensation for the Architect's additional services made necessary by such default, neglect or failure. Such action by the Owner and amounts charged to the Contractor are both subject to prior approval of the Architect. If payments then or thereafter due the Contractor are not sufficient to cover such amounts, the Contractor shall pay the difference to the Owner.

ARTICLE 3 CONTRACTOR

§ 3.1 GENERAL

§ 3.1.1 The Contractor is the person or entity identified as such in the Agreement and is referred to throughout the Contract Documents as if singular in number. The Contractor shall be lawfully licensed, if required in the jurisdiction where the Project is located. The Contractor shall designate in writing a representative who shall have express authority to bind the Contractor with respect to all matters under this Contract. The term "Contractor" means the Contractor or the Contractor's authorized representative.

§ 3.1.2 The Contractor shall perform the Work in accordance with the Contract Documents.

§ 3.1.3 The Contractor shall not be relieved of obligations to perform the Work in accordance with the Contract Documents either by activities or duties of the Architect in the Architect's administration of the Contract, or by tests, inspections or approvals required or performed by persons or entities other than the Contractor.

§ 3.2 REVIEW OF CONTRACT DOCUMENTS AND FIELD CONDITIONS BY CONTRACTOR

§ 3.2.1 Execution of the Contract by the Contractor is a representation that the Contractor has visited the site, become generally familiar with local conditions under which the Work is to be performed and correlated personal observations with requirements of the Contract Documents.

§ 3.2.2 Because the Contract Documents are complementary, the Contractor shall, before starting each portion of the Work, carefully study and compare the various Contract Documents relative to that portion of the Work, as well as the information furnished by the Owner pursuant to Section 2.2.3, shall take field measurements of any existing conditions related to that portion of the Work, and shall observe any conditions at the site affecting it. These obligations are for the purpose of facilitating coordination and construction by the Contractor and are not for the purpose of discovering errors, omissions, or inconsistencies in the Contract Documents; however, the Contractor shall promptly report to the Architect any errors, inconsistencies or omissions discovered by or made known to the Contractor as a request for information in such form as the Architect may require. It is recognized that the Contractor's review is made in the Contractor's capacity as a contractor and not as a licensed design professional, unless otherwise specifically provided in the Contract Documents.

§ 3.2.3 The Contractor is not required to ascertain that the Contract Documents are in accordance with applicable laws, statutes, ordinances, codes, rules and regulations, or lawful orders of public authorities, but the Contractor shall promptly report to the Architect any nonconformity discovered by or made known to the Contractor as a request for information in such form as the Architect may require.

§ 3.2.4 If the Contractor believes that additional cost or time is involved because of clarifications or instructions the Architect issues in response to the Contractor's notices or requests for information pursuant to Sections 3.2.2 or 3.2.3, the Contractor shall make Claims as provided in Article 15. If the Contractor fails to perform the obligations of Sections 3.2.2 or 3.2.3, the Contractor shall pay such costs and damages to the Owner as would have been avoided if the Contractor had performed such obligations. If the Contractor performs those obligations, the Contractor shall not be liable to the Owner or Architect for damages resulting from errors, inconsistencies or omissions in the Contract Documents, for differences between field measurements or conditions and the Contract Documents, or for nonconformities of the Contract Documents to applicable laws, statutes, ordinances, codes, rules and regulations, and lawful orders of public authorities.

§ 3.3 SUPERVISION AND CONSTRUCTION PROCEDURES

§ 3.3.1 The Contractor shall supervise and direct the Work, using the Contractor's best skill and attention. The Contractor shall be solely responsible for, and have control over, construction means, methods, techniques, sequences and procedures and for coordinating all portions of the Work under the Contract, unless the Contract Documents give other specific instructions concerning these matters. If the Contract Documents give specific instructions concerning construction means, methods, techniques, sequences or procedures, the Contractor shall evaluate the jobsite safety thereof and, except as stated below, shall be fully and solely responsible for the jobsite safety of such means, methods, techniques, sequences or procedures. If the Contractor determines that such means, methods, techniques, sequences or procedures may not be safe, the Contractor shall give timely written notice to the Owner and Architect and shall not proceed with that portion of the Work without further written instructions from the Architect. If the Contractor is then instructed to proceed with the required means, methods, techniques, sequences or procedures without acceptance of changes proposed by the Contractor, the Owner shall be solely responsible for any loss or damage arising solely from those Owner-required means, methods, techniques, sequences or procedures.

§ 3.3.2 The Contractor shall be responsible to the Owner for acts and omissions of the Contractor's employees, Subcontractors and their agents and employees, and other persons or entities performing portions of the Work for, or on behalf of, the Contractor or any of its Subcontractors.

§ 3.3.3 The Contractor shall be responsible for inspection of portions of Work already performed to determine that such portions are in proper condition to receive subsequent Work.

§ 3.4 LABOR AND MATERIALS

§ 3.4.1 Unless otherwise provided in the Contract Documents, the Contractor shall provide and pay for labor, materials, equipment, tools, construction equipment and machinery, water, heat, utilities, transportation, and other facilities and services necessary for proper execution and completion of the Work, whether temporary or permanent and whether or not incorporated or to be incorporated in the Work.

§ 3.4.2 Except in the case of minor changes in the Work authorized by the Architect in accordance with Sections 3.12.8 or 7.4, the Contractor may make substitutions only with the consent of the Owner, after evaluation by the Architect and in accordance with a Change Order or Construction Change Directive.

§ 3.4.3 The Contractor shall enforce strict discipline and good order among the Contractor's employees and other persons carrying out the Work. The Contractor shall not permit employment of unfit persons or persons not properly skilled in tasks assigned to them.

§ 3.5 WARRANTY

The Contractor warrants to the Owner and Architect that materials and equipment furnished under the Contract will be of good quality and new unless the Contract Documents require or permit otherwise. The Contractor further warrants that the Work will conform to the requirements of the Contract Documents and will be free from defects, except for those inherent in the quality of the Work the Contract Documents require or permit. Work, materials, or equipment not conforming to these requirements may be considered defective. The Contractor's warranty excludes remedy for damage or defect caused by abuse, alterations to the Work not executed by the Contractor, improper or insufficient maintenance, improper operation, or normal wear and tear and normal usage. If required by the Architect, the Contractor shall furnish satisfactory evidence as to the kind and quality of materials and equipment.

§ 3.6 TAXES

The Contractor shall pay sales, consumer, use and similar taxes for the Work provided by the Contractor that are legally enacted when bids are received or negotiations concluded, whether or not yet effective or merely scheduled to go into effect.

§ 3.7 PERMITS, FEES, NOTICES, AND COMPLIANCE WITH LAWS

§ 3.7.1 Unless otherwise provided in the Contract Documents, the Contractor shall secure and pay for the building permit as well as for other permits, fees, licenses, and inspections by government agencies necessary for proper execution and completion of the Work that are customarily secured after execution of the Contract and legally required at the time bids are received or negotiations concluded.

§ 3.7.2 The Contractor shall comply with and give notices required by applicable laws, statutes, ordinances, codes, rules and regulations, and lawful orders of public authorities applicable to performance of the Work.

§ 3.7.3 If the Contractor performs Work knowing it to be contrary to applicable laws, statutes, ordinances, codes, rules and regulations, or lawful orders of public authorities, the Contractor shall assume appropriate responsibility for such Work and shall bear the costs attributable to correction.

§ 3.7.4 Concealed or Unknown Conditions. If the Contractor encounters conditions at the site that are (1) subsurface or otherwise concealed physical conditions that differ materially from those indicated in the Contract Documents or (2) unknown physical conditions of an unusual nature, that differ materially from those ordinarily found to exist and generally recognized as inherent in construction activities of the character provided for in the Contract Documents, the Contractor shall promptly provide notice to the Owner and the Architect before conditions are disturbed and in no event later than 21 days after first observance of the conditions. The Architect will promptly investigate such conditions and, if the Architect determines that they differ materially and cause an increase or decrease in the Contractor's cost of, or time required for, performance of any part of the Work, will recommend an equitable adjustment in the Contract Sum or Contract Time, or both. If the Architect determines that the conditions at the site are not materially different from those indicated in the Contract Documents and that no change in the terms of the Contract is justified, the Architect shall promptly notify the Owner and Contractor in writing, stating the reasons. If either party disputes the Architect's determination or recommendation, that party may proceed as provided in Article 15.

§ 3.7.5 If, in the course of the Work, the Contractor encounters human remains or recognizes the existence of burial markers, archaeological sites or wetlands not indicated in the Contract Documents, the Contractor shall immediately suspend any operations that would affect them and shall notify the Owner and Architect. Upon receipt of such notice, the Owner shall promptly take any action necessary to obtain governmental authorization required to resume the operations. The Contractor shall continue to suspend such operations until otherwise instructed by the Owner but shall continue with all other operations that do not affect those remains or features. Requests for adjustments in the Contract Sum and Contract Time arising from the existence of such remains or features may be made as provided in Article 15.

§ 3.8 ALLOWANCES

§ 3.8.1 The Contractor shall include in the Contract Sum all allowances stated in the Contract Documents. Items covered by allowances shall be supplied for such amounts and by such persons or entities as the Owner may direct, but the Contractor shall not be required to employ persons or entities to whom the Contractor has reasonable objection.

§ 3.8.2 Unless otherwise provided in the Contract Documents,

.1 allowances shall cover the cost to the Contractor of materials and equipment delivered at the site and all required taxes, less applicable trade discounts;

.2 Contractor's costs for unloading and handling at the site, labor, installation costs, overhead, profit and other expenses contemplated for stated allowance amounts shall be included in the Contract Sum but not in the allowances; and

.3 whenever costs are more than or less than allowances, the Contract Sum shall be adjusted accordingly by Change Order. The amount of the Change Order shall reflect (1) the difference between actual costs and the allowances under Section 3.8.2.1 and (2) changes in Contractor's costs under Section 3.8.2.2.

§ 3.8.3 Materials and equipment under an allowance shall be selected by the Owner with reasonable promptness.

§ 3.9 SUPERINTENDENT

§ 3.9.1 The Contractor shall employ a competent superintendent and necessary assistants who shall be in attendance at the Project site during performance of the Work. The superintendent shall represent the Contractor, and communications given to the superintendent shall be as binding as if given to the Contractor.

§ 3.9.2 The Contractor, as soon as practicable after award of the Contract, shall furnish in writing to the Owner through the Architect the name and qualifications of a proposed superintendent. The Architect may reply within 14 days to the Contractor in writing stating (1) whether the Owner or the Architect has reasonable objection to the proposed superintendent or (2) that the Architect requires additional time to review. Failure of the Architect to reply within the 14 day period shall constitute notice of no reasonable objection.

§ 3.9.3 The Contractor shall not employ a proposed superintendent to whom the Owner or Architect has made reasonable and timely objection. The Contractor shall not change the superintendent without the Owner's consent, which shall not unreasonably be withheld or delayed.

§ 3.10 CONTRACTOR'S CONSTRUCTION SCHEDULES

§ 3.10.1 The Contractor, promptly after being awarded the Contract, shall prepare and submit for the Owner's and Architect's information a Contractor's construction schedule for the Work. The schedule shall not exceed time limits current under the Contract Documents, shall be revised at appropriate intervals as required by the conditions of the Work and Project, shall be related to the entire Project to the extent required by the Contract Documents, and shall provide for expeditious and practicable execution of the Work.

§ 3.10.2 The Contractor shall prepare a submittal schedule, promptly after being awarded the Contract and thereafter as necessary to maintain a current submittal schedule, and shall submit the schedule(s) for the Architect's approval. The Architect's approval shall not unreasonably be delayed or withheld. The submittal schedule shall (1) be coordinated with the Contractor's construction schedule, and (2) allow the Architect reasonable time to review submittals. If the Contractor fails to submit a submittal schedule, the Contractor shall not be entitled to any increase in Contract Sum or extension of Contract Time based on the time required for review of submittals.

§ 3.10.3 The Contractor shall perform the Work in general accordance with the most recent schedules submitted to the Owner and Architect.

§ 3.11 DOCUMENTS AND SAMPLES AT THE SITE

The Contractor shall maintain at the site for the Owner one copy of the Drawings, Specifications, Addenda, Change Orders and other Modifications, in good order and marked currently to indicate field changes and selections made during construction, and one copy of approved Shop Drawings, Product Data, Samples and similar required submittals. These shall be available to the Architect and shall be delivered to the Architect for submittal to the Owner upon completion of the Work as a record of the Work as constructed.

§ 3.12 SHOP DRAWINGS, PRODUCT DATA AND SAMPLES

§ 3.12.1 Shop Drawings are drawings, diagrams, schedules and other data specially prepared for the Work by the Contractor or a Subcontractor, Sub-subcontractor, manufacturer, supplier or distributor to illustrate some portion of the Work.

§ 3.12.2 Product Data are illustrations, standard schedules, performance charts, instructions, brochures, diagrams and other information furnished by the Contractor to illustrate materials or equipment for some portion of the Work.

§ 3.12.3 Samples are physical examples that illustrate materials, equipment or workmanship and establish standards by which the Work will be judged.

§ 3.12.4 Shop Drawings, Product Data, Samples and similar submittals are not Contract Documents. Their purpose is to demonstrate the way by which the Contractor proposes to conform to the information given and the design concept expressed in the Contract Documents for those portions of the Work for which the Contract Documents require submittals. Review by the Architect is subject to the limitations of Section 4.2.7. Informational submittals upon which the Architect is not expected to take responsive action may be so identified in the Contract Documents. Submittals that are not required by the Contract Documents may be returned by the Architect without action.

§ 3.12.5 The Contractor shall review for compliance with the Contract Documents, approve and submit to the Architect Shop Drawings, Product Data, Samples and similar submittals required by the Contract Documents in accordance with the submittal schedule approved by the Architect or, in the absence of an approved submittal schedule, with reasonable promptness and in such sequence as to cause no delay in the Work or in the activities of the Owner or of separate contractors.

§ 3.12.6 By submitting Shop Drawings, Product Data, Samples and similar submittals, the Contractor represents to the Owner and Architect that the Contractor has (1) reviewed and approved them, (2) determined and verified materials, field measurements and field construction criteria related thereto, or will do so and (3) checked and coordinated the information contained within such submittals with the requirements of the Work and of the Contract Documents.

§ 3.12.7 The Contractor shall perform no portion of the Work for which the Contract Documents require submittal and review of Shop Drawings, Product Data, Samples or similar submittals until the respective submittal has been approved by the Architect.

§ 3.12.8 The Work shall be in accordance with approved submittals except that the Contractor shall not be relieved of responsibility for deviations from requirements of the Contract Documents by the Architect's approval of Shop Drawings, Product Data, Samples or similar submittals unless the Contractor has specifically informed the Architect in writing of such deviation at the time of submittal and (1) the Architect has given written approval to the specific deviation as a minor change in the Work, or (2) a Change Order or Construction Change Directive has been issued authorizing the deviation. The Contractor shall not be relieved of responsibility for errors or omissions in Shop Drawings, Product Data, Samples or similar submittals by the Architect's approval thereof.

§ 3.12.9 The Contractor shall direct specific attention, in writing or on resubmitted Shop Drawings, Product Data, Samples or similar submittals, to revisions other than those requested by the Architect on previous submittals. In the absence of such written notice, the Architect's approval of a resubmission shall not apply to such revisions.

§ 3.12.10 The Contractor shall not be required to provide professional services that constitute the practice of architecture or engineering unless such services are specifically required by the Contract Documents for a portion of the Work or unless the Contractor needs to provide such services in order to carry out the Contractor's responsibilities for construction means, methods, techniques, sequences and procedures. The Contractor shall not be required to provide professional services in violation of applicable law. If professional design services or certifications by a design professional related to systems, materials or equipment are specifically required of the Contractor by the Contract Documents, the Owner and the Architect will specify all performance and design criteria that such services must satisfy. The Contractor shall cause such services or certifications to be provided by a properly licensed design professional, whose signature and seal shall appear on all drawings, calculations, specifications, certifications, Shop Drawings and other submittals prepared by such professional. Shop Drawings and other submittals related to the Work designed or certified by such professional, if prepared by others, shall bear such professional's written approval when submitted to the Architect. The Owner and the Architect shall be entitled to rely upon the adequacy, accuracy and

completeness of the services, certifications and approvals performed or provided by such design professionals, provided the Owner and Architect have specified to the Contractor all performance and design criteria that such services must satisfy. Pursuant to this Section 3.12.10, the Architect will review, approve or take other appropriate action on submittals only for the limited purpose of checking for conformance with information given and the design concept expressed in the Contract Documents. The Contractor shall not be responsible for the adequacy of the performance and design criteria specified in the Contract Documents.

§ 3.13 USE OF SITE

The Contractor shall confine operations at the site to areas permitted by applicable laws, statutes, ordinances, codes, rules and regulations, and lawful orders of public authorities and the Contract Documents and shall not unreasonably encumber the site with materials or equipment.

§ 3.14 CUTTING AND PATCHING

§ 3.14.1 The Contractor shall be responsible for cutting, fitting or patching required to complete the Work or to make its parts fit together properly. All areas requiring cutting, fitting and patching shall be restored to the condition existing prior to the cutting, fitting and patching, unless otherwise required by the Contract Documents.

§ 3.14.2 The Contractor shall not damage or endanger a portion of the Work or fully or partially completed construction of the Owner or separate contractors by cutting, patching or otherwise altering such construction, or by excavation. The Contractor shall not cut or otherwise alter such construction by the Owner or a separate contractor except with written consent of the Owner and of such separate contractor; such consent shall not be unreasonably withheld. The Contractor shall not unreasonably withhold from the Owner or a separate contractor the Contractor's consent to cutting or otherwise altering the Work.

§ 3.15 CLEANING UP

§ 3.15.1 The Contractor shall keep the premises and surrounding area free from accumulation of waste materials or rubbish caused by operations under the Contract. At completion of the Work, the Contractor shall remove waste materials, rubbish, the Contractor's tools, construction equipment, machinery and surplus materials from and about the Project.

§ 3.15.2 If the Contractor fails to clean up as provided in the Contract Documents, the Owner may do so and Owner shall be entitled to reimbursement from the Contractor.

§ 3.16 ACCESS TO WORK

The Contractor shall provide the Owner and Architect access to the Work in preparation and progress wherever located.

§ 3.17 ROYALTIES, PATENTS AND COPYRIGHTS

The Contractor shall pay all royalties and license fees. The Contractor shall defend suits or claims for infringement of copyrights and patent rights and shall hold the Owner and Architect harmless from loss on account thereof, but shall not be responsible for such defense or loss when a particular design, process or product of a particular manufacturer or manufacturers is required by the Contract Documents, or where the copyright violations are contained in Drawings, Specifications or other documents prepared by the Owner or Architect. However, if the Contractor has reason to believe that the required design, process or product is an infringement of a copyright or a patent, the Contractor shall be responsible for such loss unless such information is promptly furnished to the Architect.

§ 3.18 INDEMNIFICATION

§ 3.18.1 To the fullest extent permitted by law the Contractor shall indemnify and hold harmless the Owner, Architect, Architect's consultants, and agents and employees of any of them from and against claims, damages, losses and expenses, including but not limited to attorneys' fees, arising out of or resulting from performance of the Work, provided that such claim, damage, loss or expense is attributable to bodily injury, sickness, disease or death, or to injury to or destruction of tangible property (other than the Work itself), but only to the extent caused by the negligent acts or omissions of the Contractor, a Subcontractor, anyone directly or indirectly employed by them or anyone for whose acts they may be liable, regardless of whether or not such claim, damage, loss or expense is caused in part by a party indemnified hereunder. Such obligation shall not be construed to negate, abridge, or reduce other rights or obligations of indemnity which would otherwise exist as to a party or person described in this Section 3.18.

§ 3.18.2 In claims against any person or entity indemnified under this Section 3.18 by an employee of the Contractor, a Subcontractor, anyone directly or indirectly employed by them or anyone for whose acts they may be liable, the indemnification obligation under Section 3.18.1 shall not be limited by a limitation on amount or type of damages, compensation or benefits payable by or for the Contractor or a Subcontractor under workers' compensation acts, disability benefit acts or other employee benefit acts.

ARTICLE 4 ARCHITECT

§ 4.1 GENERAL

§ 4.1.1 The Owner shall retain an architect lawfully licensed to practice architecture or an entity lawfully practicing architecture in the jurisdiction where the Project is located. That person or entity is identified as the Architect in the Agreement and is referred to throughout the Contract Documents as if singular in number.

§ 4.1.2 Duties, responsibilities and limitations of authority of the Architect as set forth in the Contract Documents shall not be restricted, modified or extended without written consent of the Owner, Contractor and Architect. Consent shall not be unreasonably withheld.

§ 4.1.3 If the employment of the Architect is terminated, the Owner shall employ a successor architect as to whom the Contractor has no reasonable objection and whose status under the Contract Documents shall be that of the Architect.

§ 4.2 ADMINISTRATION OF THE CONTRACT

§ 4.2.1 The Architect will provide administration of the Contract as described in the Contract Documents and will be an Owner's representative during construction until the date the Architect issues the final Certificate For Payment. The Architect will have authority to act on behalf of the Owner only to the extent provided in the Contract Documents.

§ 4.2.2 The Architect will visit the site at intervals appropriate to the stage of construction, or as otherwise agreed with the Owner, to become generally familiar with the progress and quality of the portion of the Work completed, and to determine in general if the Work observed is being performed in a manner indicating that the Work, when fully completed, will be in accordance with the Contract Documents. However, the Architect will not be required to make exhaustive or continuous on-site inspections to check the quality or quantity of the Work. The Architect will not have control over, charge of, or responsibility for, the construction means, methods, techniques, sequences or procedures, or for the safety precautions and programs in connection with the Work, since these are solely the Contractor's rights and responsibilities under the Contract Documents, except as provided in Section 3.3.1.

§ 4.2.3 On the basis of the site visits, the Architect will keep the Owner reasonably informed about the progress and quality of the portion of the Work completed, and report to the Owner (1) known deviations from the Contract Documents and from the most recent construction schedule submitted by the Contractor, and (2) defects and deficiencies observed in the Work. The Architect will not be responsible for the Contractor's failure to perform the Work in accordance with the requirements of the Contract Documents. The Architect will not have control over or charge of and will not be responsible for acts or omissions of the Contractor, Subcontractors, or their agents or employees, or any other persons or entities performing portions of the Work.

§ 4.2.4 COMMUNICATIONS FACILITATING CONTRACT ADMINISTRATION

Except as otherwise provided in the Contract Documents or when direct communications have been specially authorized, the Owner and Contractor shall endeavor to communicate with each other through the Architect about matters arising out of or relating to the Contract. Communications by and with the Architect's consultants shall be through the Architect. Communications by and with Subcontractors and material suppliers shall be through the Contractor. Communications by and with separate contractors shall be through the Owner.

§ 4.2.5 Based on the Architect's evaluations of the Contractor's Applications for Payment, the Architect will review and certify the amounts due the Contractor and will issue Certificates for Payment in such amounts.

§ 4.2.6 The Architect has authority to reject Work that does not conform to the Contract Documents. Whenever the Architect considers it necessary or advisable, the Architect will have authority to require inspection or testing of the Work in accordance with Sections 13.5.2 and 13.5.3, whether or not such Work is fabricated, installed or completed. However, neither this authority of the Architect nor a decision made in good faith either to exercise or not to exercise such authority shall give rise to a duty or responsibility of the Architect to the Contractor, Subcontractors, material and equipment suppliers, their agents or employees, or other persons or entities performing portions of the Work.

§ 4.2.7 The Architect will review and approve, or take other appropriate action upon, the Contractor's submittals such as Shop Drawings, Product Data and Samples, but only for the limited purpose of checking for conformance with information given and the design concept expressed in the Contract Documents. The Architect's action will be taken in accordance with the submittal schedule approved by the Architect or, in the absence of an approved submittal schedule, with reasonable promptness while allowing sufficient time in the Architect's professional judgment to permit adequate review. Review of such submittals is not conducted for the purpose of determining the accuracy and completeness of other details such as dimensions and quantities, or for substantiating instructions for installation or performance of equipment or systems, all of which remain the responsibility of the Contractor as required by the Contract Documents. The Architect's review of the Contractor's submittals shall not relieve the Contractor of the obligations under Sections 3.3, 3.5 and 3.12. The Architect's review shall not constitute approval of safety precautions or, unless otherwise specifically stated by the Architect, of any construction means, methods, techniques, sequences or procedures. The Architect's approval of a specific item shall not indicate approval of an assembly of which the item is a component.

§ 4.2.8 The Architect will prepare Change Orders and Construction Change Directives, and may authorize minor changes in the Work as provided in Section 7.4. The Architect will investigate and make determinations and recommendations regarding concealed and unknown conditions as provided in Section 3.7.4.

§ 4.2.9 The Architect will conduct inspections to determine the date or dates of Substantial Completion and the date of final completion; issue Certificates of Substantial Completion pursuant to Section 9.8; receive and forward to the Owner, for the Owner's review and records, written warranties and related documents required by the Contract and assembled by the Contractor pursuant to Section 9.10; and issue a final Certificate for Payment pursuant to Section 9.10.

§ 4.2.10 If the Owner and Architect agree, the Architect will provide one or more project representatives to assist in carrying out the Architect's responsibilities at the site. The duties, responsibilities and limitations of authority of such project representatives shall be as set forth in an exhibit to be incorporated in the Contract Documents.

§ 4.2.11 The Architect will interpret and decide matters concerning performance under, and requirements of, the Contract Documents on written request of either the Owner or Contractor. The Architect's response to such requests will be made in writing within any time limits agreed upon or otherwise with reasonable promptness.

§ 4.2.12 Interpretations and decisions of the Architect will be consistent with the intent of, and reasonably inferable from, the Contract Documents and will be in writing or in the form of drawings. When making such interpretations and decisions, the Architect will endeavor to secure faithful performance by both Owner and Contractor, will not show partiality to either and will not be liable for results of interpretations or decisions rendered in good faith.

§ 4.2.13 The Architect's decisions on matters relating to aesthetic effect will be final if consistent with the intent expressed in the Contract Documents.

§ 4.2.14 The Architect will review and respond to requests for information about the Contract Documents. The Architect's response to such requests will be made in writing within any time limits agreed upon or otherwise with reasonable promptness. If appropriate, the Architect will prepare and issue supplemental Drawings and Specifications in response to the requests for information.

ARTICLE 5 SUBCONTRACTORS

§ 5.1 DEFINITIONS

§ 5.1.1 A Subcontractor is a person or entity who has a direct contract with the Contractor to perform a portion of the Work at the site. The term "Subcontractor" is referred to throughout the Contract Documents as if singular in number and means a Subcontractor or an authorized representative of the Subcontractor. The term "Subcontractor" does not include a separate contractor or subcontractors of a separate contractor.

§ 5.1.2 A Sub-subcontractor is a person or entity who has a direct or indirect contract with a Subcontractor to perform a portion of the Work at the site. The term "Sub-subcontractor" is referred to throughout the Contract Documents as if singular in number and means a Sub-subcontractor or an authorized representative of the Sub-subcontractor.

§ 5.2 AWARD OF SUBCONTRACTS AND OTHER CONTRACTS FOR PORTIONS OF THE WORK

§ 5.2.1 Unless otherwise stated in the Contract Documents or the bidding requirements, the Contractor, as soon as practicable after award of the Contract, shall furnish in writing to the Owner through the Architect the names of persons or entities (including those who are to furnish materials or equipment fabricated to a special design) proposed for each principal portion of the Work. The Architect may reply within 14 days to the Contractor in writing stating (1) whether the Owner or the Architect has reasonable objection to any such proposed person or entity or (2) that the Architect requires additional time for review. Failure of the Owner or Architect to reply within the 14 day period shall constitute notice of no reasonable objection.

§ 5.2.2 The Contractor shall not contract with a proposed person or entity to whom the Owner or Architect has made reasonable and timely objection. The Contractor shall not be required to contract with anyone to whom the Contractor has made reasonable objection.

§ 5.2.3 If the Owner or Architect has reasonable objection to a person or entity proposed by the Contractor, the Contractor shall propose another to whom the Owner or Architect has no reasonable objection. If the proposed but rejected Subcontractor was reasonably capable of performing the Work, the Contract Sum and Contract Time shall be increased or decreased by the difference, if any, occasioned by such change, and an appropriate Change Order shall be issued before commencement of the substitute Subcontractor's Work. However, no increase in the Contract Sum or Contract Time shall be allowed for such change unless the Contractor has acted promptly and responsively in submitting names as required.

§ 5.2.4 The Contractor shall not substitute a Subcontractor, person or entity previously selected if the Owner or Architect makes reasonable objection to such substitution.

§ 5.3 SUBCONTRACTUAL RELATIONS

By appropriate agreement, written where legally required for validity, the Contractor shall require each Subcontractor, to the extent of the Work to be performed by the Subcontractor, to be bound to the Contractor by terms of the Contract Documents, and to assume toward the Contractor all the obligations and responsibilities, including the responsibility for safety of the Subcontractor's Work, which the Contractor, by these Documents, assumes toward the Owner and Architect. Each subcontract agreement shall preserve and protect the rights of the Owner and Architect under the Contract Documents with respect to the Work to be performed by the Subcontractor so that subcontracting thereof will not prejudice such rights, and shall allow to the Subcontractor, unless specifically provided otherwise in the subcontract agreement, the benefit of all rights, remedies and redress against the Contractor that the Contractor, by the Contract Documents, has against the Owner. Where appropriate, the Contractor shall require each Subcontractor to enter into similar agreements with Sub-subcontractors. The Contractor shall make available to each proposed Subcontractor, prior to the execution of the subcontract agreement, copies of the Contract Documents to which the Subcontractor will be bound, and, upon written request of the Subcontractor, identify to the Subcontractor terms and conditions of the proposed subcontract agreement that may be at variance with the Contract Documents. Subcontractors will similarly make copies of applicable portions of such documents available to their respective proposed Sub-subcontractors.

§ 5.4 CONTINGENT ASSIGNMENT OF SUBCONTRACTS

§ 5.4.1 Each subcontract agreement for a portion of the Work is assigned by the Contractor to the Owner, provided that

.1 assignment is effective only after termination of the Contract by the Owner for cause pursuant to Section 14.2 and only for those subcontract agreements that the Owner accepts by notifying the Subcontractor and Contractor in writing; and

.2 assignment is subject to the prior rights of the surety, if any, obligated under bond relating to the Contract.

When the Owner accepts the assignment of a subcontract agreement, the Owner assumes the Contractor's rights and obligations under the subcontract.

§ 5.4.2 Upon such assignment, if the Work has been suspended for more than 30 days, the Subcontractor's compensation shall be equitably adjusted for increases in cost resulting from the suspension.

§ 5.4.3 Upon such assignment to the Owner under this Section 5.4, the Owner may further assign the subcontract to a successor contractor or other entity. If the Owner assigns the subcontract to a successor contractor or other entity, the

Owner shall nevertheless remain legally responsible for all of the successor contractor's obligations under the subcontract.

ARTICLE 6 CONSTRUCTION BY OWNER OR BY SEPARATE CONTRACTORS

§ 6.1 OWNER'S RIGHT TO PERFORM CONSTRUCTION AND TO AWARD SEPARATE CONTRACTS

§ 6.1.1 The Owner reserves the right to perform construction or operations related to the Project with the Owner's own forces, and to award separate contracts in connection with other portions of the Project or other construction or operations on the site under Conditions of the Contract identical or substantially similar to these including those portions related to insurance and waiver of subrogation. If the Contractor claims that delay or additional cost is involved because of such action by the Owner, the Contractor shall make such Claim as provided in Article 15.

§ 6.1.2 When separate contracts are awarded for different portions of the Project or other construction or operations on the site, the term "Contractor" in the Contract Documents in each case shall mean the Contractor who executes each separate Owner-Contractor Agreement.

§ 6.1.3 The Owner shall provide for coordination of the activities of the Owner's own forces and of each separate contractor with the Work of the Contractor, who shall cooperate with them. The Contractor shall participate with other separate contractors and the Owner in reviewing their construction schedules. The Contractor shall make any revisions to the construction schedule deemed necessary after a joint review and mutual agreement. The construction schedules shall then constitute the schedules to be used by the Contractor, separate contractors and the Owner until subsequently revised.

§ 6.1.4 Unless otherwise provided in the Contract Documents, when the Owner performs construction or operations related to the Project with the Owner's own forces, the Owner shall be deemed to be subject to the same obligations and to have the same rights that apply to the Contractor under the Conditions of the Contract, including, without excluding others, those stated in Article 3, this Article 6 and Articles 10, 11 and 12.

§ 6.2 MUTUAL RESPONSIBILITY

§ 6.2.1 The Contractor shall afford the Owner and separate contractors reasonable opportunity for introduction and storage of their materials and equipment and performance of their activities, and shall connect and coordinate the Contractor's construction and operations with theirs as required by the Contract Documents.

§ 6.2.2 If part of the Contractor's Work depends for proper execution or results upon construction or operations by the Owner or a separate contractor, the Contractor shall, prior to proceeding with that portion of the Work, promptly report to the Architect apparent discrepancies or defects in such other construction that would render it unsuitable for such proper execution and results. Failure of the Contractor so to report shall constitute an acknowledgment that the Owner's or separate contractor's completed or partially completed construction is fit and proper to receive the Contractor's Work, except as to defects not then reasonably discoverable.

§ 6.2.3 The Contractor shall reimburse the Owner for costs the Owner incurs that are payable to a separate contractor because of the Contractor's delays, improperly timed activities or defective construction. The Owner shall be responsible to the Contractor for costs the Contractor incurs because of a separate contractor's delays, improperly timed activities, damage to the Work or defective construction.

§ 6.2.4 The Contractor shall promptly remedy damage the Contractor wrongfully causes to completed or partially completed construction or to property of the Owner or separate contractors as provided in Section 10.2.5.

§ 6.2.5 The Owner and each separate contractor shall have the same responsibilities for cutting and patching as are described for the Contractor in Section 3.14.

§ 6.3 OWNER'S RIGHT TO CLEAN UP

If a dispute arises among the Contractor, separate contractors and the Owner as to the responsibility under their respective contracts for maintaining the premises and surrounding area free from waste materials and rubbish, the Owner may clean up and the Architect will allocate the cost among those responsible.

ARTICLE 7 CHANGES IN THE WORK

§ 7.1 GENERAL

§ 7.1.1 Changes in the Work may be accomplished after execution of the Contract, and without invalidating the Contract, by Change Order, Construction Change Directive or order for a minor change in the Work, subject to the limitations stated in this Article 7 and elsewhere in the Contract Documents.

§ 7.1.2 A Change Order shall be based upon agreement among the Owner, Contractor and Architect; a Construction Change Directive requires agreement by the Owner and Architect and may or may not be agreed to by the Contractor; an order for a minor change in the Work may be issued by the Architect alone.

§ 7.1.3 Changes in the Work shall be performed under applicable provisions of the Contract Documents, and the Contractor shall proceed promptly, unless otherwise provided in the Change Order, Construction Change Directive or order for a minor change in the Work.

§ 7.2 CHANGE ORDERS

§ 7.2.1 A Change Order is a written instrument prepared by the Architect and signed by the Owner, Contractor and Architect stating their agreement upon all of the following:

.1 The change in the Work;
.2 The amount of the adjustment, if any, in the Contract Sum; and
.3 The extent of the adjustment, if any, in the Contract Time.

§ 7.3 CONSTRUCTION CHANGE DIRECTIVES

§ 7.3.1 A Construction Change Directive is a written order prepared by the Architect and signed by the Owner and Architect, directing a change in the Work prior to agreement on adjustment, if any, in the Contract Sum or Contract Time, or both. The Owner may by Construction Change Directive, without invalidating the Contract, order changes in the Work within the general scope of the Contract consisting of additions, deletions or other revisions, the Contract Sum and Contract Time being adjusted accordingly.

§ 7.3.2 A Construction Change Directive shall be used in the absence of total agreement on the terms of a Change Order.

§ 7.3.3 If the Construction Change Directive provides for an adjustment to the Contract Sum, the adjustment shall be based on one of the following methods:

.1 Mutual acceptance of a lump sum properly itemized and supported by sufficient substantiating data to permit evaluation;
.2 Unit prices stated in the Contract Documents or subsequently agreed upon;
.3 Cost to be determined in a manner agreed upon by the parties and a mutually acceptable fixed or percentage fee; or
.4 As provided in Section 7.3.7.

§ 7.3.4 If unit prices are stated in the Contract Documents or subsequently agreed upon, and if quantities originally contemplated are materially changed in a proposed Change Order or Construction Change Directive so that application of such unit prices to quantities of Work proposed will cause substantial inequity to the Owner or Contractor, the applicable unit prices shall be equitably adjusted.

§ 7.3.5 Upon receipt of a Construction Change Directive, the Contractor shall promptly proceed with the change in the Work involved and advise the Architect of the Contractor's agreement or disagreement with the method, if any, provided in the Construction Change Directive for determining the proposed adjustment in the Contract Sum or Contract Time.

§ 7.3.6 A Construction Change Directive signed by the Contractor indicates the Contractor's agreement therewith, including adjustment in Contract Sum and Contract Time or the method for determining them. Such agreement shall be effective immediately and shall be recorded as a Change Order.

§ 7.3.7 If the Contractor does not respond promptly or disagrees with the method for adjustment in the Contract Sum, the Architect shall determine the method and the adjustment on the basis of reasonable expenditures and savings of those performing the Work attributable to the change, including, in case of an increase in the Contract Sum, an amount

for overhead and profit as set forth in the Agreement, or if no such amount is set forth in the Agreement, a reasonable amount. In such case, and also under Section 7.3.3.3, the Contractor shall keep and present, in such form as the Architect may prescribe, an itemized accounting together with appropriate supporting data. Unless otherwise provided in the Contract Documents, costs for the purposes of this Section 7.3.7 shall be limited to the following:

.1 Costs of labor, including social security, old age and unemployment insurance, fringe benefits required by agreement or custom, and workers' compensation insurance;

.2 Costs of materials, supplies and equipment, including cost of transportation, whether incorporated or consumed;

.3 Rental costs of machinery and equipment, exclusive of hand tools, whether rented from the Contractor or others;

.4 Costs of premiums for all bonds and insurance, permit fees, and sales, use or similar taxes related to the Work; and

.5 Additional costs of supervision and field office personnel directly attributable to the change.

§ 7.3.8 The amount of credit to be allowed by the Contractor to the Owner for a deletion or change that results in a net decrease in the Contract Sum shall be actual net cost as confirmed by the Architect. When both additions and credits covering related Work or substitutions are involved in a change, the allowance for overhead and profit shall be figured on the basis of net increase, if any, with respect to that change.

§ 7.3.9 Pending final determination of the total cost of a Construction Change Directive to the Owner, the Contractor may request payment for Work completed under the Construction Change Directive in Applications for Payment. The Architect will make an interim determination for purposes of monthly certification for payment for those costs and certify for payment the amount that the Architect determines, in the Architect's professional judgment, to be reasonably justified. The Architect's interim determination of cost shall adjust the Contract Sum on the same basis as a Change Order, subject to the right of either party to disagree and assert a Claim in accordance with Article 15.

§ 7.3.10 When the Owner and Contractor agree with a determination made by the Architect concerning the adjustments in the Contract Sum and Contract Time, or otherwise reach agreement upon the adjustments, such agreement shall be effective immediately and the Architect will prepare a Change Order. Change Orders may be issued for all or any part of a Construction Change Directive.

§ 7.4 MINOR CHANGES IN THE WORK

The Architect has authority to order minor changes in the Work not involving adjustment in the Contract Sum or extension of the Contract Time and not inconsistent with the intent of the Contract Documents. Such changes will be effected by written order signed by the Architect and shall be binding on the Owner and Contractor.

ARTICLE 8 TIME

§ 8.1 DEFINITIONS

§ 8.1.1 Unless otherwise provided, Contract Time is the period of time, including authorized adjustments, allotted in the Contract Documents for Substantial Completion of the Work.

§ 8.1.2 The date of commencement of the Work is the date established in the Agreement.

§ 8.1.3 The date of Substantial Completion is the date certified by the Architect in accordance with Section 9.8.

§ 8.1.4 The term "day" as used in the Contract Documents shall mean calendar day unless otherwise specifically defined.

§ 8.2 PROGRESS AND COMPLETION

§ 8.2.1 Time limits stated in the Contract Documents are of the essence of the Contract. By executing the Agreement the Contractor confirms that the Contract Time is a reasonable period for performing the Work.

§ 8.2.2 The Contractor shall not knowingly, except by agreement or instruction of the Owner in writing, prematurely commence operations on the site or elsewhere prior to the effective date of insurance required by Article 11 to be furnished by the Contractor and Owner. The date of commencement of the Work shall not be changed by the effective date of such insurance.

§ 8.2.3 The Contractor shall proceed expeditiously with adequate forces and shall achieve Substantial Completion within the Contract Time.

§ 8.3 DELAYS AND EXTENSIONS OF TIME

§ 8.3.1 If the Contractor is delayed at any time in the commencement or progress of the Work by an act or neglect of the Owner or Architect, or of an employee of either, or of a separate contractor employed by the Owner; or by changes ordered in the Work; or by labor disputes, fire, unusual delay in deliveries, unavoidable casualties or other causes beyond the Contractor's control; or by delay authorized by the Owner pending mediation and arbitration; or by other causes that the Architect determines may justify delay, then the Contract Time shall be extended by Change Order for such reasonable time as the Architect may determine.

§ 8.3.2 Claims relating to time shall be made in accordance with applicable provisions of Article 15.

§ 8.3.3 This Section 8.3 does not preclude recovery of damages for delay by either party under other provisions of the Contract Documents.

ARTICLE 9 PAYMENTS AND COMPLETION

§ 9.1 CONTRACT SUM

The Contract Sum is stated in the Agreement and, including authorized adjustments, is the total amount payable by the Owner to the Contractor for performance of the Work under the Contract Documents.

§ 9.2 SCHEDULE OF VALUES

Where the Contract is based on a stipulated sum or Guaranteed Maximum Price, the Contractor shall submit to the Architect, before the first Application for Payment, a schedule of values allocating the entire Contract Sum to the various portions of the Work and prepared in such form and supported by such data to substantiate its accuracy as the Architect may require. This schedule, unless objected to by the Architect, shall be used as a basis for reviewing the Contractor's Applications for Payment.

§ 9.3 APPLICATIONS FOR PAYMENT

§ 9.3.1 At least ten days before the date established for each progress payment, the Contractor shall submit to the Architect an itemized Application for Payment prepared in accordance with the schedule of values, if required under Section 9.2., for completed portions of the Work. Such application shall be notarized, if required, and supported by such data substantiating the Contractor's right to payment as the Owner or Architect may require, such as copies of requisitions from Subcontractors and material suppliers, and shall reflect retainage if provided for in the Contract Documents.

§ 9.3.1.1 As provided in Section 7.3.9, such applications may include requests for payment on account of changes in the Work that have been properly authorized by Construction Change Directives, or by interim determinations of the Architect, but not yet included in Change Orders.

§ 9.3.1.2 Applications for Payment shall not include requests for payment for portions of the Work for which the Contractor does not intend to pay a Subcontractor or material supplier, unless such Work has been performed by others whom the Contractor intends to pay.

§ 9.3.2 Unless otherwise provided in the Contract Documents, payments shall be made on account of materials and equipment delivered and suitably stored at the site for subsequent incorporation in the Work. If approved in advance by the Owner, payment may similarly be made for materials and equipment suitably stored off the site at a location agreed upon in writing. Payment for materials and equipment stored on or off the site shall be conditioned upon compliance by the Contractor with procedures satisfactory to the Owner to establish the Owner's title to such materials and equipment or otherwise protect the Owner's interest, and shall include the costs of applicable insurance, storage and transportation to the site for such materials and equipment stored off the site.

§ 9.3.3 The Contractor warrants that title to all Work covered by an Application for Payment will pass to the Owner no later than the time of payment. The Contractor further warrants that upon submittal of an Application for Payment all Work for which Certificates for Payment have been previously issued and payments received from the Owner shall, to the best of the Contractor's knowledge, information and belief, be free and clear of liens, claims, security interests or

encumbrances in favor of the Contractor, Subcontractors, material suppliers, or other persons or entities making a claim by reason of having provided labor, materials and equipment relating to the Work.

§ 9.4 CERTIFICATES FOR PAYMENT

§ 9.4.1 The Architect will, within seven days after receipt of the Contractor's Application for Payment, either issue to the Owner a Certificate for Payment, with a copy to the Contractor, for such amount as the Architect determines is properly due, or notify the Contractor and Owner in writing of the Architect's reasons for withholding certification in whole or in part as provided in Section 9.5.1.

§ 9.4.2 The issuance of a Certificate for Payment will constitute a representation by the Architect to the Owner, based on the Architect's evaluation of the Work and the data comprising the Application for Payment, that, to the best of the Architect's knowledge, information and belief, the Work has progressed to the point indicated and that the quality of the Work is in accordance with the Contract Documents. The foregoing representations are subject to an evaluation of the Work for conformance with the Contract Documents upon Substantial Completion, to results of subsequent tests and inspections, to correction of minor deviations from the Contract Documents prior to completion and to specific qualifications expressed by the Architect. The issuance of a Certificate for Payment will further constitute a representation that the Contractor is entitled to payment in the amount certified. However, the issuance of a Certificate for Payment will not be a representation that the Architect has (1) made exhaustive or continuous on-site inspections to check the quality or quantity of the Work, (2) reviewed construction means, methods, techniques, sequences or procedures, (3) reviewed copies of requisitions received from Subcontractors and material suppliers and other data requested by the Owner to substantiate the Contractor's right to payment, or (4) made examination to ascertain how or for what purpose the Contractor has used money previously paid on account of the Contract Sum.

§ 9.5 DECISIONS TO WITHHOLD CERTIFICATION

§ 9.5.1 The Architect may withhold a Certificate for Payment in whole or in part, to the extent reasonably necessary to protect the Owner, if in the Architect's opinion the representations to the Owner required by Section 9.4.2 cannot be made. If the Architect is unable to certify payment in the amount of the Application, the Architect will notify the Contractor and Owner as provided in Section 9.4.1. If the Contractor and Architect cannot agree on a revised amount, the Architect will promptly issue a Certificate for Payment for the amount for which the Architect is able to make such representations to the Owner. The Architect may also withhold a Certificate for Payment or, because of subsequently discovered evidence, may nullify the whole or a part of a Certificate for Payment previously issued, to such extent as may be necessary in the Architect's opinion to protect the Owner from loss for which the Contractor is responsible, including loss resulting from acts and omissions described in Section 3.3.2, because of

- **.1** defective Work not remedied;
- **.2** third party claims filed or reasonable evidence indicating probable filing of such claims unless security acceptable to the Owner is provided by the Contractor;
- **.3** failure of the Contractor to make payments properly to Subcontractors or for labor, materials or equipment;
- **.4** reasonable evidence that the Work cannot be completed for the unpaid balance of the Contract Sum;
- **.5** damage to the Owner or a separate contractor;
- **.6** reasonable evidence that the Work will not be completed within the Contract Time, and that the unpaid balance would not be adequate to cover actual or liquidated damages for the anticipated delay; or
- **.7** repeated failure to carry out the Work in accordance with the Contract Documents.

§ 9.5.2 When the above reasons for withholding certification are removed, certification will be made for amounts previously withheld.

§ 9.5.3 If the Architect withholds certification for payment under Section 9.5.1.3, the Owner may, at its sole option, issue joint checks to the Contractor and to any Subcontractor or material or equipment suppliers to whom the Contractor failed to make payment for Work properly performed or material or equipment suitably delivered. If the Owner makes payments by joint check, the Owner shall notify the Architect and the Architect will reflect such payment on the next Certificate for Payment.

§ 9.6 PROGRESS PAYMENTS

§ 9.6.1 After the Architect has issued a Certificate for Payment, the Owner shall make payment in the manner and within the time provided in the Contract Documents, and shall so notify the Architect.

§ 9.6.2 The Contractor shall pay each Subcontractor no later than seven days after receipt of payment from the Owner the amount to which the Subcontractor is entitled, reflecting percentages actually retained from payments to the Contractor on account of the Subcontractor's portion of the Work. The Contractor shall, by appropriate agreement with each Subcontractor, require each Subcontractor to make payments to Sub-subcontractors in a similar manner.

§ 9.6.3 The Architect will, on request, furnish to a Subcontractor, if practicable, information regarding percentages of completion or amounts applied for by the Contractor and action taken thereon by the Architect and Owner on account of portions of the Work done by such Subcontractor.

§ 9.6.4 The Owner has the right to request written evidence from the Contractor that the Contractor has properly paid Subcontractors and material and equipment suppliers amounts paid by the Owner to the Contractor for subcontracted Work. If the Contractor fails to furnish such evidence within seven days, the Owner shall have the right to contact Subcontractors to ascertain whether they have been properly paid. Neither the Owner nor Architect shall have an obligation to pay or to see to the payment of money to a Subcontractor, except as may otherwise be required by law.

§ 9.6.5 Contractor payments to material and equipment suppliers shall be treated in a manner similar to that provided in Sections 9.6.2, 9.6.3 and 9.6.4.

§ 9.6.6 A Certificate for Payment, a progress payment, or partial or entire use or occupancy of the Project by the Owner shall not constitute acceptance of Work not in accordance with the Contract Documents.

§ 9.6.7 Unless the Contractor provides the Owner with a payment bond in the full penal sum of the Contract Sum, payments received by the Contractor for Work properly performed by Subcontractors and suppliers shall be held by the Contractor for those Subcontractors or suppliers who performed Work or furnished materials, or both, under contract with the Contractor for which payment was made by the Owner. Nothing contained herein shall require money to be placed in a separate account and not commingled with money of the Contractor, shall create any fiduciary liability or tort liability on the part of the Contractor for breach of trust or shall entitle any person or entity to an award of punitive damages against the Contractor for breach of the requirements of this provision.

§ 9.7 FAILURE OF PAYMENT

If the Architect does not issue a Certificate for Payment, through no fault of the Contractor, within seven days after receipt of the Contractor's Application for Payment, or if the Owner does not pay the Contractor within seven days after the date established in the Contract Documents the amount certified by the Architect or awarded by binding dispute resolution, then the Contractor may, upon seven additional days' written notice to the Owner and Architect, stop the Work until payment of the amount owing has been received. The Contract Time shall be extended appropriately and the Contract Sum shall be increased by the amount of the Contractor's reasonable costs of shut-down, delay and start-up, plus interest as provided for in the Contract Documents.

§ 9.8 SUBSTANTIAL COMPLETION

§ 9.8.1 Substantial Completion is the stage in the progress of the Work when the Work or designated portion thereof is sufficiently complete in accordance with the Contract Documents so that the Owner can occupy or utilize the Work for its intended use.

§ 9.8.2 When the Contractor considers that the Work, or a portion thereof which the Owner agrees to accept separately, is substantially complete, the Contractor shall prepare and submit to the Architect a comprehensive list of items to be completed or corrected prior to final payment. Failure to include an item on such list does not alter the responsibility of the Contractor to complete all Work in accordance with the Contract Documents.

§ 9.8.3 Upon receipt of the Contractor's list, the Architect will make an inspection to determine whether the Work or designated portion thereof is substantially complete. If the Architect's inspection discloses any item, whether or not included on the Contractor's list, which is not sufficiently complete in accordance with the Contract Documents so that the Owner can occupy or utilize the Work or designated portion thereof for its intended use, the Contractor shall, before issuance of the Certificate of Substantial Completion, complete or correct such item upon notification by the Architect. In such case, the Contractor shall then submit a request for another inspection by the Architect to determine Substantial Completion.

§ 9.8.4 When the Work or designated portion thereof is substantially complete, the Architect will prepare a Certificate of Substantial Completion that shall establish the date of Substantial Completion, shall establish responsibilities of the Owner and Contractor for security, maintenance, heat, utilities, damage to the Work and insurance, and shall fix the time within which the Contractor shall finish all items on the list accompanying the Certificate. Warranties required by the Contract Documents shall commence on the date of Substantial Completion of the Work or designated portion thereof unless otherwise provided in the Certificate of Substantial Completion.

§ 9.8.5 The Certificate of Substantial Completion shall be submitted to the Owner and Contractor for their written acceptance of responsibilities assigned to them in such Certificate. Upon such acceptance and consent of surety, if any, the Owner shall make payment of retainage applying to such Work or designated portion thereof. Such payment shall be adjusted for Work that is incomplete or not in accordance with the requirements of the Contract Documents.

§ 9.9 PARTIAL OCCUPANCY OR USE

§ 9.9.1 The Owner may occupy or use any completed or partially completed portion of the Work at any stage when such portion is designated by separate agreement with the Contractor, provided such occupancy or use is consented to by the insurer as required under Section 11.3.1.5 and authorized by public authorities having jurisdiction over the Project. Such partial occupancy or use may commence whether or not the portion is substantially complete, provided the Owner and Contractor have accepted in writing the responsibilities assigned to each of them for payments, retainage, if any, security, maintenance, heat, utilities, damage to the Work and insurance, and have agreed in writing concerning the period for correction of the Work and commencement of warranties required by the Contract Documents. When the Contractor considers a portion substantially complete, the Contractor shall prepare and submit a list to the Architect as provided under Section 9.8.2. Consent of the Contractor to partial occupancy or use shall not be unreasonably withheld. The stage of the progress of the Work shall be determined by written agreement between the Owner and Contractor or, if no agreement is reached, by decision of the Architect.

§ 9.9.2 Immediately prior to such partial occupancy or use, the Owner, Contractor and Architect shall jointly inspect the area to be occupied or portion of the Work to be used in order to determine and record the condition of the Work.

§ 9.9.3 Unless otherwise agreed upon, partial occupancy or use of a portion or portions of the Work shall not constitute acceptance of Work not complying with the requirements of the Contract Documents.

§ 9.10 FINAL COMPLETION AND FINAL PAYMENT

§ 9.10.1 Upon receipt of the Contractor's written notice that the Work is ready for final inspection and acceptance and upon receipt of a final Application for Payment, the Architect will promptly make such inspection and, when the Architect finds the Work acceptable under the Contract Documents and the Contract fully performed, the Architect will promptly issue a final Certificate for Payment stating that to the best of the Architect's knowledge, information and belief, and on the basis of the Architect's on-site visits and inspections, the Work has been completed in accordance with terms and conditions of the Contract Documents and that the entire balance found to be due the Contractor and noted in the final Certificate is due and payable. The Architect's final Certificate for Payment will constitute a further representation that conditions listed in Section 9.10.2 as precedent to the Contractor's being entitled to final payment have been fulfilled.

§ 9.10.2 Neither final payment nor any remaining retained percentage shall become due until the Contractor submits to the Architect (1) an affidavit that payrolls, bills for materials and equipment, and other indebtedness connected with the Work for which the Owner or the Owner's property might be responsible or encumbered (less amounts withheld by Owner) have been paid or otherwise satisfied, (2) a certificate evidencing that insurance required by the Contract Documents to remain in force after final payment is currently in effect and will not be canceled or allowed to expire until at least 30 days' prior written notice has been given to the Owner, (3) a written statement that the Contractor knows of no substantial reason that the insurance will not be renewable to cover the period required by the Contract Documents, (4) consent of surety, if any, to final payment and (5), if required by the Owner, other data establishing payment or satisfaction of obligations, such as receipts, releases and waivers of liens, claims, security interests or encumbrances arising out of the Contract, to the extent and in such form as may be designated by the Owner. If a Subcontractor refuses to furnish a release or waiver required by the Owner, the Contractor may furnish a bond satisfactory to the Owner to indemnify the Owner against such lien. If such lien remains unsatisfied after payments are made, the Contractor shall refund to the Owner all money that the Owner may be compelled to pay in discharging such lien, including all costs and reasonable attorneys' fees.

§ 9.10.3 If, after Substantial Completion of the Work, final completion thereof is materially delayed through no fault of the Contractor or by issuance of Change Orders affecting final completion, and the Architect so confirms, the Owner shall, upon application by the Contractor and certification by the Architect, and without terminating the Contract, make payment of the balance due for that portion of the Work fully completed and accepted. If the remaining balance for Work not fully completed or corrected is less than retainage stipulated in the Contract Documents, and if bonds have been furnished, the written consent of surety to payment of the balance due for that portion of the Work fully completed and accepted shall be submitted by the Contractor to the Architect prior to certification of such payment. Such payment shall be made under terms and conditions governing final payment, except that it shall not constitute a waiver of claims.

§ 9.10.4 The making of final payment shall constitute a waiver of Claims by the Owner except those arising from

- **.1** liens, Claims, security interests or encumbrances arising out of the Contract and unsettled;
- **.2** failure of the Work to comply with the requirements of the Contract Documents; or
- **.3** terms of special warranties required by the Contract Documents.

§ 9.10.5 Acceptance of final payment by the Contractor, a Subcontractor or material supplier shall constitute a waiver of claims by that payee except those previously made in writing and identified by that payee as unsettled at the time of final Application for Payment.

ARTICLE 10 PROTECTION OF PERSONS AND PROPERTY

§ 10.1 SAFETY PRECAUTIONS AND PROGRAMS

The Contractor shall be responsible for initiating, maintaining and supervising all safety precautions and programs in connection with the performance of the Contract.

§ 10.2 SAFETY OF PERSONS AND PROPERTY

§ 10.2.1 The Contractor shall take reasonable precautions for safety of, and shall provide reasonable protection to prevent damage, injury or loss to

- **.1** employees on the Work and other persons who may be affected thereby;
- **.2** the Work and materials and equipment to be incorporated therein, whether in storage on or off the site, under care, custody or control of the Contractor or the Contractor's Subcontractors or Sub-subcontractors; and
- **.3** other property at the site or adjacent thereto, such as trees, shrubs, lawns, walks, pavements, roadways, structures and utilities not designated for removal, relocation or replacement in the course of construction.

§ 10.2.2 The Contractor shall comply with and give notices required by applicable laws, statutes, ordinances, codes, rules and regulations, and lawful orders of public authorities bearing on safety of persons or property or their protection from damage, injury or loss.

§ 10.2.3 The Contractor shall erect and maintain, as required by existing conditions and performance of the Contract, reasonable safeguards for safety and protection, including posting danger signs and other warnings against hazards, promulgating safety regulations and notifying owners and users of adjacent sites and utilities.

§ 10.2.4 When use or storage of explosives or other hazardous materials or equipment or unusual methods are necessary for execution of the Work, the Contractor shall exercise utmost care and carry on such activities under supervision of properly qualified personnel.

§ 10.2.5 The Contractor shall promptly remedy damage and loss (other than damage or loss insured under property insurance required by the Contract Documents) to property referred to in Sections 10.2.1.2 and 10.2.1.3 caused in whole or in part by the Contractor, a Subcontractor, a Sub-subcontractor, or anyone directly or indirectly employed by any of them, or by anyone for whose acts they may be liable and for which the Contractor is responsible under Sections 10.2.1.2 and 10.2.1.3, except damage or loss attributable to acts or omissions of the Owner or Architect or anyone directly or indirectly employed by either of them, or by anyone for whose acts either of them may be liable, and not attributable to the fault or negligence of the Contractor. The foregoing obligations of the Contractor are in addition to the Contractor's obligations under Section 3.18.

§ 10.2.6 The Contractor shall designate a responsible member of the Contractor's organization at the site whose duty shall be the prevention of accidents. This person shall be the Contractor's superintendent unless otherwise designated by the Contractor in writing to the Owner and Architect.

§ 10.2.7 The Contractor shall not permit any part of the construction or site to be loaded so as to cause damage or create an unsafe condition.

§ 10.2.8 INJURY OR DAMAGE TO PERSON OR PROPERTY

If either party suffers injury or damage to person or property because of an act or omission of the other party, or of others for whose acts such party is legally responsible, written notice of such injury or damage, whether or not insured, shall be given to the other party within a reasonable time not exceeding 21 days after discovery. The notice shall provide sufficient detail to enable the other party to investigate the matter.

§ 10.3 HAZARDOUS MATERIALS

§ 10.3.1 The Contractor is responsible for compliance with any requirements included in the Contract Documents regarding hazardous materials. If the Contractor encounters a hazardous material or substance not addressed in the Contract Documents and if reasonable precautions will be inadequate to prevent foreseeable bodily injury or death to persons resulting from a material or substance, including but not limited to asbestos or polychlorinated biphenyl (PCB), encountered on the site by the Contractor, the Contractor shall, upon recognizing the condition, immediately stop Work in the affected area and report the condition to the Owner and Architect in writing.

§ 10.3.2 Upon receipt of the Contractor's written notice, the Owner shall obtain the services of a licensed laboratory to verify the presence or absence of the material or substance reported by the Contractor and, in the event such material or substance is found to be present, to cause it to be rendered harmless. Unless otherwise required by the Contract Documents, the Owner shall furnish in writing to the Contractor and Architect the names and qualifications of persons or entities who are to perform tests verifying the presence or absence of such material or substance or who are to perform the task of removal or safe containment of such material or substance. The Contractor and the Architect will promptly reply to the Owner in writing stating whether or not either has reasonable objection to the persons or entities proposed by the Owner. If either the Contractor or Architect has an objection to a person or entity proposed by the Owner, the Owner shall propose another to whom the Contractor and the Architect have no reasonable objection. When the material or substance has been rendered harmless, Work in the affected area shall resume upon written agreement of the Owner and Contractor. By Change Order, the Contract Time shall be extended appropriately and the Contract Sum shall be increased in the amount of the Contractor's reasonable additional costs of shut-down, delay and start-up.

§ 10.3.3 To the fullest extent permitted by law, the Owner shall indemnify and hold harmless the Contractor, Subcontractors, Architect, Architect's consultants and agents and employees of any of them from and against claims, damages, losses and expenses, including but not limited to attorneys' fees, arising out of or resulting from performance of the Work in the affected area if in fact the material or substance presents the risk of bodily injury or death as described in Section 10.3.1 and has not been rendered harmless, provided that such claim, damage, loss or expense is attributable to bodily injury, sickness, disease or death, or to injury to or destruction of tangible property (other than the Work itself), except to the extent that such damage, loss or expense is due to the fault or negligence of the party seeking indemnity.

§ 10.3.4 The Owner shall not be responsible under this Section 10.3 for materials or substances the Contractor brings to the site unless such materials or substances are required by the Contract Documents. The Owner shall be responsible for materials or substances required by the Contract Documents, except to the extent of the Contractor's fault or negligence in the use and handling of such materials or substances.

§ 10.3.5 The Contractor shall indemnify the Owner for the cost and expense the Owner incurs (1) for remediation of a material or substance the Contractor brings to the site and negligently handles, or (2) where the Contractor fails to perform its obligations under Section 10.3.1, except to the extent that the cost and expense are due to the Owner's fault or negligence.

§ 10.3.6 If, without negligence on the part of the Contractor, the Contractor is held liable by a government agency for the cost of remediation of a hazardous material or substance solely by reason of performing Work as required by the Contract Documents, the Owner shall indemnify the Contractor for all cost and expense thereby incurred.

§ 10.4 EMERGENCIES
In an emergency affecting safety of persons or property, the Contractor shall act, at the Contractor's discretion, to prevent threatened damage, injury or loss. Additional compensation or extension of time claimed by the Contractor on account of an emergency shall be determined as provided in Article 15 and Article 7.

ARTICLE 11 INSURANCE AND BONDS
§ 11.1 CONTRACTOR'S LIABILITY INSURANCE
§ 11.1.1 The Contractor shall purchase from and maintain in a company or companies lawfully authorized to do business in the jurisdiction in which the Project is located such insurance as will protect the Contractor from claims set forth below which may arise out of or result from the Contractor's operations and completed operations under the Contract and for which the Contractor may be legally liable, whether such operations be by the Contractor or by a Subcontractor or by anyone directly or indirectly employed by any of them, or by anyone for whose acts any of them may be liable:

.1 Claims under workers' compensation, disability benefit and other similar employee benefit acts that are applicable to the Work to be performed;
.2 Claims for damages because of bodily injury, occupational sickness or disease, or death of the Contractor's employees;
.3 Claims for damages because of bodily injury, sickness or disease, or death of any person other than the Contractor's employees;
.4 Claims for damages insured by usual personal injury liability coverage;
.5 Claims for damages, other than to the Work itself, because of injury to or destruction of tangible property, including loss of use resulting therefrom;
.6 Claims for damages because of bodily injury, death of a person or property damage arising out of ownership, maintenance or use of a motor vehicle;
.7 Claims for bodily injury or property damage arising out of completed operations; and
.8 Claims involving contractual liability insurance applicable to the Contractor's obligations under Section 3.18.

§ 11.1.2 The insurance required by Section 11.1.1 shall be written for not less than limits of liability specified in the Contract Documents or required by law, whichever coverage is greater. Coverages, whether written on an occurrence or claims-made basis, shall be maintained without interruption from the date of commencement of the Work until the date of final payment and termination of any coverage required to be maintained after final payment, and, with respect to the Contractor's completed operations coverage, until the expiration of the period for correction of Work or for such other period for maintenance of completed operations coverage as specified in the Contract Documents.

§ 11.1.3 Certificates of insurance acceptable to the Owner shall be filed with the Owner prior to commencement of the Work and thereafter upon renewal or replacement of each required policy of insurance. These certificates and the insurance policies required by this Section 11.1 shall contain a provision that coverages afforded under the policies will not be canceled or allowed to expire until at least 30 days' prior written notice has been given to the Owner. An additional certificate evidencing continuation of liability coverage, including coverage for completed operations, shall be submitted with the final Application for Payment as required by Section 9.10.2 and thereafter upon renewal or replacement of such coverage until the expiration of the time required by Section 11.1.2. Information concerning reduction of coverage on account of revised limits or claims paid under the General Aggregate, or both, shall be furnished by the Contractor with reasonable promptness.

§ 11.1.4 The Contractor shall cause the commercial liability coverage required by the Contract Documents to include (1) the Owner, the Architect and the Architect's Consultants as additional insureds for claims caused in whole or in part by the Contractor's negligent acts or omissions during the Contractor's operations; and (2) the Owner as an additional insured for claims caused in whole or in part by the Contractor's negligent acts or omissions during the Contractor's completed operations.

§ 11.2 OWNER'S LIABILITY INSURANCE
The Owner shall be responsible for purchasing and maintaining the Owner's usual liability insurance.

§ 11.3 PROPERTY INSURANCE

§ 11.3.1 Unless otherwise provided, the Owner shall purchase and maintain, in a company or companies lawfully authorized to do business in the jurisdiction in which the Project is located, property insurance written on a builder's risk "all-risk" or equivalent policy form in the amount of the initial Contract Sum, plus value of subsequent Contract Modifications and cost of materials supplied or installed by others, comprising total value for the entire Project at the site on a replacement cost basis without optional deductibles. Such property insurance shall be maintained, unless otherwise provided in the Contract Documents or otherwise agreed in writing by all persons and entities who are beneficiaries of such insurance, until final payment has been made as provided in Section 9.10 or until no person or entity other than the Owner has an insurable interest in the property required by this Section 11.3 to be covered, whichever is later. This insurance shall include interests of the Owner, the Contractor, Subcontractors and Sub-subcontractors in the Project.

§ 11.3.1.1 Property insurance shall be on an "all-risk" or equivalent policy form and shall include, without limitation, insurance against the perils of fire (with extended coverage) and physical loss or damage including, without duplication of coverage, theft, vandalism, malicious mischief, collapse, earthquake, flood, windstorm, falsework, testing and startup, temporary buildings and debris removal including demolition occasioned by enforcement of any applicable legal requirements, and shall cover reasonable compensation for Architect's and Contractor's services and expenses required as a result of such insured loss.

§ 11.3.1.2 If the Owner does not intend to purchase such property insurance required by the Contract and with all of the coverages in the amount described above, the Owner shall so inform the Contractor in writing prior to commencement of the Work. The Contractor may then effect insurance that will protect the interests of the Contractor, Subcontractors and Sub-subcontractors in the Work, and by appropriate Change Order the cost thereof shall be charged to the Owner. If the Contractor is damaged by the failure or neglect of the Owner to purchase or maintain insurance as described above, without so notifying the Contractor in writing, then the Owner shall bear all reasonable costs properly attributable thereto.

§ 11.3.1.3 If the property insurance requires deductibles, the Owner shall pay costs not covered because of such deductibles.

§ 11.3.1.4 This property insurance shall cover portions of the Work stored off the site, and also portions of the Work in transit.

§ 11.3.1.5 Partial occupancy or use in accordance with Section 9.9 shall not commence until the insurance company or companies providing property insurance have consented to such partial occupancy or use by endorsement or otherwise. The Owner and the Contractor shall take reasonable steps to obtain consent of the insurance company or companies and shall, without mutual written consent, take no action with respect to partial occupancy or use that would cause cancellation, lapse or reduction of insurance.

§ 11.3.2 BOILER AND MACHINERY INSURANCE

The Owner shall purchase and maintain boiler and machinery insurance required by the Contract Documents or by law, which shall specifically cover such insured objects during installation and until final acceptance by the Owner; this insurance shall include interests of the Owner, Contractor, Subcontractors and Sub-subcontractors in the Work, and the Owner and Contractor shall be named insureds.

§ 11.3.3 LOSS OF USE INSURANCE

The Owner, at the Owner's option, may purchase and maintain such insurance as will insure the Owner against loss of use of the Owner's property due to fire or other hazards, however caused. The Owner waives all rights of action against the Contractor for loss of use of the Owner's property, including consequential losses due to fire or other hazards however caused.

§ 11.3.4 If the Contractor requests in writing that insurance for risks other than those described herein or other special causes of loss be included in the property insurance policy, the Owner shall, if possible, include such insurance, and the cost thereof shall be charged to the Contractor by appropriate Change Order.

§ 11.3.5 If during the Project construction period the Owner insures properties, real or personal or both, at or adjacent to the site by property insurance under policies separate from those insuring the Project, or if after final payment

property insurance is to be provided on the completed Project through a policy or policies other than those insuring the Project during the construction period, the Owner shall waive all rights in accordance with the terms of Section 11.3.7 for damages caused by fire or other causes of loss covered by this separate property insurance. All separate policies shall provide this waiver of subrogation by endorsement or otherwise.

§ 11.3.6 Before an exposure to loss may occur, the Owner shall file with the Contractor a copy of each policy that includes insurance coverages required by this Section 11.3. Each policy shall contain all generally applicable conditions, definitions, exclusions and endorsements related to this Project. Each policy shall contain a provision that the policy will not be canceled or allowed to expire, and that its limits will not be reduced, until at least 30 days' prior written notice has been given to the Contractor.

§ 11.3.7 WAIVERS OF SUBROGATION

The Owner and Contractor waive all rights against (1) each other and any of their subcontractors, sub-subcontractors, agents and employees, each of the other, and (2) the Architect, Architect's consultants, separate contractors described in Article 6, if any, and any of their subcontractors, sub-subcontractors, agents and employees, for damages caused by fire or other causes of loss to the extent covered by property insurance obtained pursuant to this Section 11.3 or other property insurance applicable to the Work, except such rights as they have to proceeds of such insurance held by the Owner as fiduciary. The Owner or Contractor, as appropriate, shall require of the Architect, Architect's consultants, separate contractors described in Article 6, if any, and the subcontractors, sub-subcontractors, agents and employees of any of them, by appropriate agreements, written where legally required for validity, similar waivers each in favor of other parties enumerated herein. The policies shall provide such waivers of subrogation by endorsement or otherwise. A waiver of subrogation shall be effective as to a person or entity even though that person or entity would otherwise have a duty of indemnification, contractual or otherwise, did not pay the insurance premium directly or indirectly, and whether or not the person or entity had an insurable interest in the property damaged.

§ 11.3.8 A loss insured under the Owner's property insurance shall be adjusted by the Owner as fiduciary and made payable to the Owner as fiduciary for the insureds, as their interests may appear, subject to requirements of any applicable mortgagee clause and of Section 11.3.10. The Contractor shall pay Subcontractors their just shares of insurance proceeds received by the Contractor, and by appropriate agreements, written where legally required for validity, shall require Subcontractors to make payments to their Sub-subcontractors in similar manner.

§ 11.3.9 If required in writing by a party in interest, the Owner as fiduciary shall, upon occurrence of an insured loss, give bond for proper performance of the Owner's duties. The cost of required bonds shall be charged against proceeds received as fiduciary. The Owner shall deposit in a separate account proceeds so received, which the Owner shall distribute in accordance with such agreement as the parties in interest may reach, or as determined in accordance with the method of binding dispute resolution selected in the Agreement between the Owner and Contractor. If after such loss no other special agreement is made and unless the Owner terminates the Contract for convenience, replacement of damaged property shall be performed by the Contractor after notification of a Change in the Work in accordance with Article 7.

§ 11.3.10 The Owner as fiduciary shall have power to adjust and settle a loss with insurers unless one of the parties in interest shall object in writing within five days after occurrence of loss to the Owner's exercise of this power; if such objection is made, the dispute shall be resolved in the manner selected by the Owner and Contractor as the method of binding dispute resolution in the Agreement. If the Owner and Contractor have selected arbitration as the method of binding dispute resolution, the Owner as fiduciary shall make settlement with insurers or, in the case of a dispute over distribution of insurance proceeds, in accordance with the directions of the arbitrators.

§ 11.4 PERFORMANCE BOND AND PAYMENT BOND

§ 11.4.1 The Owner shall have the right to require the Contractor to furnish bonds covering faithful performance of the Contract and payment of obligations arising thereunder as stipulated in bidding requirements or specifically required in the Contract Documents on the date of execution of the Contract.

§ 11.4.2 Upon the request of any person or entity appearing to be a potential beneficiary of bonds covering payment of obligations arising under the Contract, the Contractor shall promptly furnish a copy of the bonds or shall authorize a copy to be furnished.

ARTICLE 12 UNCOVERING AND CORRECTION OF WORK

§ 12.1 UNCOVERING OF WORK

§ 12.1.1 If a portion of the Work is covered contrary to the Architect's request or to requirements specifically expressed in the Contract Documents, it must, if requested in writing by the Architect, be uncovered for the Architect's examination and be replaced at the Contractor's expense without change in the Contract Time.

§ 12.1.2 If a portion of the Work has been covered that the Architect has not specifically requested to examine prior to its being covered, the Architect may request to see such Work and it shall be uncovered by the Contractor. If such Work is in accordance with the Contract Documents, costs of uncovering and replacement shall, by appropriate Change Order, be at the Owner's expense. If such Work is not in accordance with the Contract Documents, such costs and the cost of correction shall be at the Contractor's expense unless the condition was caused by the Owner or a separate contractor in which event the Owner shall be responsible for payment of such costs.

§ 12.2 CORRECTION OF WORK

§ 12.2.1 BEFORE OR AFTER SUBSTANTIAL COMPLETION

The Contractor shall promptly correct Work rejected by the Architect or failing to conform to the requirements of the Contract Documents, whether discovered before or after Substantial Completion and whether or not fabricated, installed or completed. Costs of correcting such rejected Work, including additional testing and inspections, the cost of uncovering and replacement, and compensation for the Architect's services and expenses made necessary thereby, shall be at the Contractor's expense.

§ 12.2.2 AFTER SUBSTANTIAL COMPLETION

§ 12.2.2.1 In addition to the Contractor's obligations under Section 3.5, if, within one year after the date of Substantial Completion of the Work or designated portion thereof or after the date for commencement of warranties established under Section 9.9.1, or by terms of an applicable special warranty required by the Contract Documents, any of the Work is found to be not in accordance with the requirements of the Contract Documents, the Contractor shall correct it promptly after receipt of written notice from the Owner to do so unless the Owner has previously given the Contractor a written acceptance of such condition. The Owner shall give such notice promptly after discovery of the condition. During the one-year period for correction of Work, if the Owner fails to notify the Contractor and give the Contractor an opportunity to make the correction, the Owner waives the rights to require correction by the Contractor and to make a claim for breach of warranty. If the Contractor fails to correct nonconforming Work within a reasonable time during that period after receipt of notice from the Owner or Architect, the Owner may correct it in accordance with Section 2.4.

§ 12.2.2.2 The one-year period for correction of Work shall be extended with respect to portions of Work first performed after Substantial Completion by the period of time between Substantial Completion and the actual completion of that portion of the Work.

§ 12.2.2.3 The one-year period for correction of Work shall not be extended by corrective Work performed by the Contractor pursuant to this Section 12.2.

§ 12.2.3 The Contractor shall remove from the site portions of the Work that are not in accordance with the requirements of the Contract Documents and are neither corrected by the Contractor nor accepted by the Owner.

§ 12.2.4 The Contractor shall bear the cost of correcting destroyed or damaged construction, whether completed or partially completed, of the Owner or separate contractors caused by the Contractor's correction or removal of Work that is not in accordance with the requirements of the Contract Documents.

§ 12.2.5 Nothing contained in this Section 12.2 shall be construed to establish a period of limitation with respect to other obligations the Contractor has under the Contract Documents. Establishment of the one-year period for correction of Work as described in Section 12.2.2 relates only to the specific obligation of the Contractor to correct the Work, and has no relationship to the time within which the obligation to comply with the Contract Documents may be sought to be enforced, nor to the time within which proceedings may be commenced to establish the Contractor's liability with respect to the Contractor's obligations other than specifically to correct the Work.

§ 12.3 ACCEPTANCE OF NONCONFORMING WORK

If the Owner prefers to accept Work that is not in accordance with the requirements of the Contract Documents, the Owner may do so instead of requiring its removal and correction, in which case the Contract Sum will be reduced as appropriate and equitable. Such adjustment shall be effected whether or not final payment has been made.

ARTICLE 13 MISCELLANEOUS PROVISIONS

§ 13.1 GOVERNING LAW

The Contract shall be governed by the law of the place where the Project is located except that, if the parties have selected arbitration as the method of binding dispute resolution, the Federal Arbitration Act shall govern Section 15.4.

§ 13.2 SUCCESSORS AND ASSIGNS

§ 13.2.1 The Owner and Contractor respectively bind themselves, their partners, successors, assigns and legal representatives to covenants, agreements and obligations contained in the Contract Documents. Except as provided in Section 13.2.2, neither party to the Contract shall assign the Contract as a whole without written consent of the other. If either party attempts to make such an assignment without such consent, that party shall nevertheless remain legally responsible for all obligations under the Contract.

§ 13.2.2 The Owner may, without consent of the Contractor, assign the Contract to a lender providing construction financing for the Project, if the lender assumes the Owner's rights and obligations under the Contract Documents. The Contractor shall execute all consents reasonably required to facilitate such assignment.

§ 13.3 WRITTEN NOTICE

Written notice shall be deemed to have been duly served if delivered in person to the individual, to a member of the firm or entity, or to an officer of the corporation for which it was intended; or if delivered at, or sent by registered or certified mail or by courier service providing proof of delivery to, the last business address known to the party giving notice.

§ 13.4 RIGHTS AND REMEDIES

§ 13.4.1 Duties and obligations imposed by the Contract Documents and rights and remedies available thereunder shall be in addition to and not a limitation of duties, obligations, rights and remedies otherwise imposed or available by law.

§ 13.4.2 No action or failure to act by the Owner, Architect or Contractor shall constitute a waiver of a right or duty afforded them under the Contract, nor shall such action or failure to act constitute approval of or acquiescence in a breach there under, except as may be specifically agreed in writing.

§ 13.5 TESTS AND INSPECTIONS

§ 13.5.1 Tests, inspections and approvals of portions of the Work shall be made as required by the Contract Documents and by applicable laws, statutes, ordinances, codes, rules and regulations or lawful orders of public authorities. Unless otherwise provided, the Contractor shall make arrangements for such tests, inspections and approvals with an independent testing laboratory or entity acceptable to the Owner, or with the appropriate public authority, and shall bear all related costs of tests, inspections and approvals. The Contractor shall give the Architect timely notice of when and where tests and inspections are to be made so that the Architect may be present for such procedures. The Owner shall bear costs of (1) tests, inspections or approvals that do not become requirements until after bids are received or negotiations concluded, and (2) tests, inspections or approvals where building codes or applicable laws or regulations prohibit the Owner from delegating their cost to the Contractor.

§ 13.5.2 If the Architect, Owner or public authorities having jurisdiction determine that portions of the Work require additional testing, inspection or approval not included under Section 13.5.1, the Architect will, upon written authorization from the Owner, instruct the Contractor to make arrangements for such additional testing, inspection or approval by an entity acceptable to the Owner, and the Contractor shall give timely notice to the Architect of when and where tests and inspections are to be made so that the Architect may be present for such procedures. Such costs, except as provided in Section 13.5.3, shall be at the Owner's expense.

§ 13.5.3 If such procedures for testing, inspection or approval under Sections 13.5.1 and 13.5.2 reveal failure of the portions of the Work to comply with requirements established by the Contract Documents, all costs made necessary by

such failure including those of repeated procedures and compensation for the Architect's services and expenses shall be at the Contractor's expense.

§ 13.5.4 Required certificates of testing, inspection or approval shall, unless otherwise required by the Contract Documents, be secured by the Contractor and promptly delivered to the Architect.

§ 13.5.5 If the Architect is to observe tests, inspections or approvals required by the Contract Documents, the Architect will do so promptly and, where practicable, at the normal place of testing.

§ 13.5.6 Tests or inspections conducted pursuant to the Contract Documents shall be made promptly to avoid unreasonable delay in the Work.

§ 13.6 INTEREST

Payments due and unpaid under the Contract Documents shall bear interest from the date payment is due at such rate as the parties may agree upon in writing or, in the absence thereof, at the legal rate prevailing from time to time at the place where the Project is located.

§ 13.7 TIME LIMITS ON CLAIMS

The Owner and Contractor shall commence all claims and causes of action, whether in contract, tort, breach of warranty or otherwise, against the other arising out of or related to the Contract in accordance with the requirements of the final dispute resolution method selected in the Agreement within the time period specified by applicable law, but in any case not more than 10 years after the date of Substantial Completion of the Work. The Owner and Contractor waive all claims and causes of action not commenced in accordance with this Section 13.7.

ARTICLE 14 TERMINATION OR SUSPENSION OF THE CONTRACT

§ 14.1 TERMINATION BY THE CONTRACTOR

§ 14.1.1 The Contractor may terminate the Contract if the Work is stopped for a period of 30 consecutive days through no act or fault of the Contractor or a Subcontractor, Sub-subcontractor or their agents or employees or any other persons or entities performing portions of the Work under direct or indirect contract with the Contractor, for any of the following reasons:

.1 Issuance of an order of a court or other public authority having jurisdiction that requires all Work to be stopped;

.2 An act of government, such as a declaration of national emergency that requires all Work to be stopped;

.3 Because the Architect has not issued a Certificate for Payment and has not notified the Contractor of the reason for withholding certification as provided in Section 9.4.1, or because the Owner has not made payment on a Certificate for Payment within the time stated in the Contract Documents; or

.4 The Owner has failed to furnish to the Contractor promptly, upon the Contractor's request, reasonable evidence as required by Section 2.2.1.

§ 14.1.2 The Contractor may terminate the Contract if, through no act or fault of the Contractor or a Subcontractor, Sub-subcontractor or their agents or employees or any other persons or entities performing portions of the Work under direct or indirect contract with the Contractor, repeated suspensions, delays or interruptions of the entire Work by the Owner as described in Section 14.3 constitute in the aggregate more than 100 percent of the total number of days scheduled for completion, or 120 days in any 365-day period, whichever is less.

§ 14.1.3 If one of the reasons described in Section 14.1.1 or 14.1.2 exists, the Contractor may, upon seven days' written notice to the Owner and Architect, terminate the Contract and recover from the Owner payment for Work executed, including reasonable overhead and profit, costs incurred by reason of such termination, and damages.

§ 14.1.4 If the Work is stopped for a period of 60 consecutive days through no act or fault of the Contractor or a Subcontractor or their agents or employees or any other persons performing portions of the Work under contract with the Contractor because the Owner has repeatedly failed to fulfill the Owner's obligations under the Contract Documents with respect to matters important to the progress of the Work, the Contractor may, upon seven additional days' written notice to the Owner and the Architect, terminate the Contract and recover from the Owner as provided in Section 14.1.3.

§ 14.2 TERMINATION BY THE OWNER FOR CAUSE

§ 14.2.1 The Owner may terminate the Contract if the Contractor

.1 repeatedly refuses or fails to supply enough properly skilled workers or proper materials;

.2 fails to make payment to Subcontractors for materials or labor in accordance with the respective agreements between the Contractor and the Subcontractors;

.3 repeatedly disregards applicable laws, statutes, ordinances, codes, rules and regulations, or lawful orders of a public authority; or

.4 otherwise is guilty of substantial breach of a provision of the Contract Documents.

§ 14.2.2 When any of the above reasons exist, the Owner, upon certification by the Initial Decision Maker that sufficient cause exists to justify such action, may without prejudice to any other rights or remedies of the Owner and after giving the Contractor and the Contractor's surety, if any, seven days' written notice, terminate employment of the Contractor and may, subject to any prior rights of the surety:

.1 Exclude the Contractor from the site and take possession of all materials, equipment, tools, and construction equipment and machinery thereon owned by the Contractor;

.2 Accept assignment of subcontracts pursuant to Section 5.4; and

.3 Finish the Work by whatever reasonable method the Owner may deem expedient. Upon written request of the Contractor, the Owner shall furnish to the Contractor a detailed accounting of the costs incurred by the Owner in finishing the Work.

§ 14.2.3 When the Owner terminates the Contract for one of the reasons stated in Section 14.2.1, the Contractor shall not be entitled to receive further payment until the Work is finished.

§ 14.2.4 If the unpaid balance of the Contract Sum exceeds costs of finishing the Work, including compensation for the Architect's services and expenses made necessary thereby, and other damages incurred by the Owner and not expressly waived, such excess shall be paid to the Contractor. If such costs and damages exceed the unpaid balance, the Contractor shall pay the difference to the Owner. The amount to be paid to the Contractor or Owner, as the case may be, shall be certified by the Initial Decision Maker, upon application, and this obligation for payment shall survive termination of the Contract.

§ 14.3 SUSPENSION BY THE OWNER FOR CONVENIENCE

§ 14.3.1 The Owner may, without cause, order the Contractor in writing to suspend, delay or interrupt the Work in whole or in part for such period of time as the Owner may determine.

§ 14.3.2 The Contract Sum and Contract Time shall be adjusted for increases in the cost and time caused by suspension, delay or interruption as described in Section 14.3.1. Adjustment of the Contract Sum shall include profit. No adjustment shall be made to the extent

.1 that performance is, was or would have been so suspended, delayed or interrupted by another cause for which the Contractor is responsible; or

.2 that an equitable adjustment is made or denied under another provision of the Contract.

§ 14.4 TERMINATION BY THE OWNER FOR CONVENIENCE

§ 14.4.1 The Owner may, at any time, terminate the Contract for the Owner's convenience and without cause.

§ 14.4.2 Upon receipt of written notice from the Owner of such termination for the Owner's convenience, the Contractor shall

.1 cease operations as directed by the Owner in the notice;

.2 take actions necessary, or that the Owner may direct, for the protection and preservation of the Work; and

.3 except for Work directed to be performed prior to the effective date of termination stated in the notice, terminate all existing subcontracts and purchase orders and enter into no further subcontracts and purchase orders.

§ 14.4.3 In case of such termination for the Owner's convenience, the Contractor shall be entitled to receive payment for Work executed, and costs incurred by reason of such termination, along with reasonable overhead and profit on the Work not executed.

ARTICLE 15 CLAIMS AND DISPUTES

§ 15.1 CLAIMS

§ 15.1.1 DEFINITION

A Claim is a demand or assertion by one of the parties seeking, as a matter of right, payment of money, or other relief with respect to the terms of the Contract. The term "Claim" also includes other disputes and matters in question between the Owner and Contractor arising out of or relating to the Contract. The responsibility to substantiate Claims shall rest with the party making the Claim.

§ 15.1.2 NOTICE OF CLAIMS

Claims by either the Owner or Contractor must be initiated by written notice to the other party and to the Initial Decision Maker with a copy sent to the Architect, if the Architect is not serving as the Initial Decision Maker. Claims by either party must be initiated within 21 days after occurrence of the event giving rise to such Claim or within 21 days after the claimant first recognizes the condition giving rise to the Claim, whichever is later.

§ 15.1.3 CONTINUING CONTRACT PERFORMANCE

Pending final resolution of a Claim, except as otherwise agreed in writing or as provided in Section 9.7 and Article 14, the Contractor shall proceed diligently with performance of the Contract and the Owner shall continue to make payments in accordance with the Contract Documents. The Architect will prepare Change Orders and issue Certificates for Payment in accordance with the decisions of the Initial Decision Maker.

§ 15.1.4 CLAIMS FOR ADDITIONAL COST

If the Contractor wishes to make a Claim for an increase in the Contract Sum, written notice as provided herein shall be given before proceeding to execute the Work. Prior notice is not required for Claims relating to an emergency endangering life or property arising under Section 10.4.

§ 15.1.5 CLAIMS FOR ADDITIONAL TIME

§ 15.1.5.1 If the Contractor wishes to make a Claim for an increase in the Contract Time, written notice as provided herein shall be given. The Contractor's Claim shall include an estimate of cost and of probable effect of delay on progress of the Work. In the case of a continuing delay, only one Claim is necessary.

§ 15.1.5.2 If adverse weather conditions are the basis for a Claim for additional time, such Claim shall be documented by data substantiating that weather conditions were abnormal for the period of time, could not have been reasonably anticipated and had an adverse effect on the scheduled construction.

§ 15.1.6 CLAIMS FOR CONSEQUENTIAL DAMAGES

The Contractor and Owner waive Claims against each other for consequential damages arising out of or relating to this Contract. This mutual waiver includes

.1 damages incurred by the Owner for rental expenses, for losses of use, income, profit, financing, business and reputation, and for loss of management or employee productivity or of the services of such persons; and

.2 damages incurred by the Contractor for principal office expenses including the compensation of personnel stationed there, for losses of financing, business and reputation, and for loss of profit except anticipated profit arising directly from the Work.

This mutual waiver is applicable, without limitation, to all consequential damages due to either party's termination in accordance with Article 14. Nothing contained in this Section 15.1.6 shall be deemed to preclude an award of liquidated damages, when applicable, in accordance with the requirements of the Contract Documents.

§ 15.2 INITIAL DECISION

§ 15.2.1 Claims, excluding those arising under Sections 10.3, 10.4, 11.3.9, and 11.3.10, shall be referred to the Initial Decision Maker for initial decision. The Architect will serve as the Initial Decision Maker, unless otherwise indicated in the Agreement. Except for those Claims excluded by this Section 15.2.1, an initial decision shall be required as a condition precedent to mediation of any Claim arising prior to the date final payment is due, unless 30 days have passed after the Claim has been referred to the Initial Decision Maker with no decision having been rendered. Unless the Initial Decision Maker and all affected parties agree, the Initial Decision Maker will not decide disputes between the Contractor and persons or entities other than the Owner.

§ 15.2.2 The Initial Decision Maker will review Claims and within ten days of the receipt of a Claim take one or more of the following actions: (1) request additional supporting data from the claimant or a response with supporting data from the other party, (2) reject the Claim in whole or in part, (3) approve the Claim, (4) suggest a compromise, or (5) advise the parties that the Initial Decision Maker is unable to resolve the Claim if the Initial Decision Maker lacks sufficient information to evaluate the merits of the Claim or if the Initial Decision Maker concludes that, in the Initial Decision Maker's sole discretion, it would be inappropriate for the Initial Decision Maker to resolve the Claim.

§ 15.2.3 In evaluating Claims, the Initial Decision Maker may, but shall not be obligated to, consult with or seek information from either party or from persons with special knowledge or expertise who may assist the Initial Decision Maker in rendering a decision. The Initial Decision Maker may request the Owner to authorize retention of such persons at the Owner's expense.

§ 15.2.4 If the Initial Decision Maker requests a party to provide a response to a Claim or to furnish additional supporting data, such party shall respond, within ten days after receipt of such request, and shall either (1) provide a response on the requested supporting data, (2) advise the Initial Decision Maker when the response or supporting data will be furnished or (3) advise the Initial Decision Maker that no supporting data will be furnished. Upon receipt of the response or supporting data, if any, the Initial Decision Maker will either reject or approve the Claim in whole or in part.

§ 15.2.5 The Initial Decision Maker will render an initial decision approving or rejecting the Claim, or indicating that the Initial Decision Maker is unable to resolve the Claim. This initial decision shall (1) be in writing; (2) state the reasons therefor; and (3) notify the parties and the Architect, if the Architect is not serving as the Initial Decision Maker, of any change in the Contract Sum or Contract Time or both. The initial decision shall be final and binding on the parties but subject to mediation and, if the parties fail to resolve their dispute through mediation, to binding dispute resolution.

§ 15.2.6 Either party may file for mediation of an initial decision at any time, subject to the terms of Section 15.2.6.1.

§ 15.2.6.1 Either party may, within 30 days from the date of an initial decision, demand in writing that the other party file for mediation within 60 days of the initial decision. If such a demand is made and the party receiving the demand fails to file for mediation within the time required, then both parties waive their rights to mediate or pursue binding dispute resolution proceedings with respect to the initial decision.

§ 15.2.7 In the event of a Claim against the Contractor, the Owner may, but is not obligated to, notify the surety, if any, of the nature and amount of the Claim. If the Claim relates to a possibility of a Contractor's default, the Owner may, but is not obligated to, notify the surety and request the surety's assistance in resolving the controversy.

§ 15.2.8 If a Claim relates to or is the subject of a mechanic's lien, the party asserting such Claim may proceed in accordance with applicable law to comply with the lien notice or filing deadlines.

§ 15.3 MEDIATION

§ 15.3.1 Claims, disputes, or other matters in controversy arising out of or related to the Contract except those waived as provided for in Sections 9.10.4, 9.10.5, and 15.1.6 shall be subject to mediation as a condition precedent to binding dispute resolution.

§ 15.3.2 The parties shall endeavor to resolve their Claims by mediation which, unless the parties mutually agree otherwise, shall be administered by the American Arbitration Association in accordance with its Construction Industry Mediation Procedures in effect on the date of the Agreement. A request for mediation shall be made in writing, delivered to the other party to the Contract, and filed with the person or entity administering the mediation. The request may be made concurrently with the filing of binding dispute resolution proceedings but, in such event, mediation shall proceed in advance of binding dispute resolution proceedings, which shall be stayed pending mediation for a period of 60 days from the date of filing, unless stayed for a longer period by agreement of the parties or court order. If an arbitration is stayed pursuant to this Section 15.3.2, the parties may nonetheless proceed to the selection of the arbitrator(s) and agree upon a schedule for later proceedings.

§ 15.3.3 The parties shall share the mediator's fee and any filing fees equally. The mediation shall be held in the place where the Project is located, unless another location is mutually agreed upon. Agreements reached in mediation shall be enforceable as settlement agreements in any court having jurisdiction thereof.

§ 15.4 ARBITRATION

§ 15.4.1 If the parties have selected arbitration as the method for binding dispute resolution in the Agreement, any Claim subject to, but not resolved by, mediation shall be subject to arbitration which, unless the parties mutually agree otherwise, shall be administered by the American Arbitration Association in accordance with its Construction Industry Arbitration Rules in effect on the date of the Agreement. A demand for arbitration shall be made in writing, delivered to the other party to the Contract, and filed with the person or entity administering the arbitration. The party filing a notice of demand for arbitration must assert in the demand all Claims then known to that party on which arbitration is permitted to be demanded.

§ 15.4.1.1 A demand for arbitration shall be made no earlier than concurrently with the filing of a request for mediation, but in no event shall it be made after the date when the institution of legal or equitable proceedings based on the Claim would be barred by the applicable statute of limitations. For statute of limitations purposes, receipt of a written demand for arbitration by the person or entity administering the arbitration shall constitute the institution of legal or equitable proceedings based on the Claim.

§ 15.4.2 The award rendered by the arbitrator or arbitrators shall be final, and judgment may be entered upon it in accordance with applicable law in any court having jurisdiction thereof.

§ 15.4.3 The foregoing agreement to arbitrate and other agreements to arbitrate with an additional person or entity duly consented to by parties to the Agreement shall be specifically enforceable under applicable law in any court having jurisdiction thereof.

§ 15.4.4 CONSOLIDATION OR JOINDER

§ 15.4.4.1 Either party, at its sole discretion, may consolidate an arbitration conducted under this Agreement with any other arbitration to which it is a party provided that (1) the arbitration agreement governing the other arbitration permits consolidation, (2) the arbitrations to be consolidated substantially involve common questions of law or fact, and (3) the arbitrations employ materially similar procedural rules and methods for selecting arbitrator(s).

§ 15.4.4.2 Either party, at its sole discretion, may include by joinder persons or entities substantially involved in a common question of law or fact whose presence is required if complete relief is to be accorded in arbitration, provided that the party sought to be joined consents in writing to such joinder. Consent to arbitration involving an additional person or entity shall not constitute consent to arbitration of any claim, dispute or other matter in question not described in the written consent.

§ 15.4.4.3 The Owner and Contractor grant to any person or entity made a party to an arbitration conducted under this Section 15.4, whether by joinder or consolidation, the same rights of joinder and consolidation as the Owner and Contractor under this Agreement.

SECTION 00 73 00.01

UNIVERSITY OF MAINE SYSTEM SUPPLEMENTARY CONDITIONS TO AIA A201-2007

GENERAL

1.01 SUPPLEMENTARY CONDITIONS APPLICABLE TO THIS CONTRACT

A. University of Maine System Supplementary Conditions to AIA A201-2007 ver 1.5 2/1/2013, 2013 Edition, sample attached, is the University of Maine System Supplementary Conditions to AIA A201-2007 between the Owner and Contractor.

END OF SECTION

University of Maine System
Supplementary Conditions
to
AIA A201 2007 General Conditions of the Contract for Construction

§ 1.1.8 Add the following:

The Architect is the Initial Decision Maker for this Agreement.

§1.2.2 Add the following:

Where the Procurement Requirements include provisions that portions of the Work be File Bid in accordance with the requirements of the Maine Bid Depository System, the subcontracts for these portions of the work will cover the same scope of work as defined by the Procurement Requirements and the File Bid and shall have the same contract amount as listed in the successful bid.

§ 1.5.1 Add the following:

The provisions of this section shall not be deemed to modify the contract between the University of Maine System (the Owner) and the Architect under B102 2007 and B201 2007 and the University of Maine Supplementary Requirements to those documents regarding the Instruments of Service.

§ 1.5.2 Add the following:

The provisions of this section shall not be deemed to modify the contract between the University of Maine System (the Owner) and the Architect under B102 2007 and B201 2007 and the University of Maine Supplementary Requirements to those documents regarding the Instruments of Service.

§ 2.1.1.1 Insert the following:

§ 2.1.1.1 For the purpose of this Contract, the Owner is defined as: University of Maine System; 16 Central Street; Bangor, Maine 04401 acting through its duly authorized agent.

§2.2.1 Delete in its entirety

§3.4.2.1 Insert the following:

§ 3.4.2.1 After the Contract has been executed, the Owner and Architect may consider a formal request for substitution of products in place of those specified. The Owner shall deduct from the next payment made from the Contract Sum amounts paid to' the Architect to evaluate the Contractor's proposed substitutions and to make agreed-upon changes in the Drawings and Specifications made necessary by the Owner's acceptance of the substitutions.

By making requests for substitutions, the Contractor:

.1 Represents that the Contractor has personally investigated the proposed substitute product and determined it is equal or superior in all respects to that specified;

.2 Represents that the Contractor will provide the same warranty for the substitution that the Contractor would for that specified;

.3 Certifies that the cost data presented is complete and includes all related costs, and waives all claims for additional costs related to the substitution which subsequently become apparent; and

.4 Will coordinate the installation of the accepted substitute, making such changes as may be required for the Work to be completed in all respects.

§3.4.4 Insert the following:

§ 3.4.4 If a wage scale prepared by the State of Maine Department of Labor, Bureau of Labor Standards, is included in the Contract Documents, such wage scale represents the minimum wages that must be paid in each category of labor employed on the project.

The provisions of Title 26 MRSA Chapter 15 Preference to Maine Workers and Contractors, apply to this project, including but not limited to:

§ **1310. Wage and benefits rates to be kept posted**

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.

§ 1311. Wage and benefit record of contractor

The contractor and each subcontractor in charge of the construction of a public work shall keep an accurate record showing the names and occupation of all laborers, workers and mechanics employed by them and all independent contractors working under contract with them in connection with the construction on the public works. The record must also show for all laborers, workers, mechanics and independent contractors the hours worked, the title of the job, the hourly rate or other method of remuneration and the actual wages or other compensation paid to each of the laborers, workers, mechanics and independent contractors. A copy of such a record must be kept at the job site and must be open at all reasonable hours to the inspection of the Bureau of Labor Standards and the public authority that let the contract and its officers and agents. It is not necessary to preserve those records for a period longer than 3 years after the termination of the contract. A copy of each such record must also be filed monthly with the public authority that let the contract. The filed record is a public record pursuant to Title 1, chapter 13, except that the public authority letting a contract shall adopt rules to protect the privacy of personal information

contained in the records filed with the public authority under this section, such as Social Security numbers and taxpayer identification numbers. The rules may not prevent the disclosure of information regarding the classification of workers or independent contractors and the remuneration they receive. Such rules are routine technical rules as defined by Title 5, chapter 375, subchapter 2-A.

§ 3.4.5 Insert the following:

§ 3.4.5 If a wage scale prepared by the U.S. Department of Labor pursuant to the provision of the Davis-Bacon Act is included in the Contract Documents, such wage scale represents the minimum wages that must be paid in each category of labor on the project. The requirements and responsibilities within the Davis-Bacon Act apply to this project.

§ 3.4.6 Insert the following:

§ 3.4.6 EQUAL EMPLOYMENT OPPORTUNITY
During the performance of this contract, the contractor agrees as follows:

§ 3.4.6.1 The contractor will not discriminate against any employee or applicant for employment because of race, color, religion, sex, sexual orientation, including transgender status or gender expression, national origin or citizenship status, ancestry, age, disability, genetic information, or veterans status. Such action shall include, but not be limited to, the following: employment, upgrading, demotions, transfers, recruitment or recruitment advertising; layoffs or terminations; rates of pay or other forms of compensation; and selection for training, including apprenticeship.

§ 3.4.6.2 The contractor will, in all solicitations or advertisements for employees placed by or on behalf of the contractor, state that all qualified applicants will receive consideration for employment without regard to race, color, religion, sex, sexual orientation, including transgender status or gender expression, national origin or citizenship status, ancestry, age, disability, genetic information, or veterans status.

§ 3.4.6.3 The contractor will send to each labor union or representative of the workers with which there is a collective or bargaining agreement in place, or other contract or understanding, whereby labor is being furnished for the performances of his contract, a notice, as set forth in Attachment A attached hereto, to be provided by the contracting department or agency, advising the said labor union or workers' representative of the contractor's commitment under the provisions of the contract, and shall post copies of the notice in conspicuous places available to employees and to applicants for employment.

§3.4.6.4 The contractor will cause the foregoing provisions to be inserted in all contracts for any work covered by this agreement so that such provisions will be binding upon each subcontractor.

§ 3.4.6.5 Contractors and subcontractors with contracts in excess of $50,000 will also pursue in good faith affirmative action programs.

§ 3.6.1 Insert the following:

§ 3.6.1 The University of Maine System is exempt from payment of taxes under the Maine Sales and Use Tax Law Title 36 Section 1760 for taxes on materials that

are permanently incorporated into the real property belonging to the University of Maine System. The University of Maine System is also exempt from the payment of Federal Excise Taxes on articles not for resale and from the Federal Transportation Tax on all shipments; exemption certificates for these taxes will be furnished when required. All quotations shall be less these taxes. The contractor shall pay all other taxes that have been or are legally enacted.

§ 3.7.4 Replace the existing § 3.7.4 with the following:

§ 3.7.4 Concealed or Unknown Conditions. If the Contractor encounters conditions at the site that are (1) subsurface or otherwise concealed physical conditions that differ materially from those indicated in the Contract Documents or (2) unknown physical conditions of an unusual nature, that differ materially from those ordinarily found to exist and generally recognized as inherent in construction activities of the character provided for in the Contract Documents, the Contractor shall promptly provide notice to the Owner and the Architect before conditions are disturbed. The Architect will promptly investigate such conditions and, if the Architect determines that they differ materially and cause an increase or decrease in the Contractor's cost of, or time required for, performance of any part of the Work, will recommend an equitable adjustment in the Contract Sum or Contract Time, or both. If the Architect determines that the conditions at the site are not materially different from those indicated in the Contract Documents and that no change in the terms of the Contract is justified, the Architect shall promptly notify the Owner and Contractor in writing, stating the reasons. If either party disputes the Architect's determination or recommendation, that party may proceed as provided in Article 15.

§3.10.1.1 Insert the following:

§ 3.10.1.1 The Contractor shall provide an updated Construction Schedule with each Application for Payment reflecting actual construction progress and activities.

§ 3.12.11 Insert the following:

§ 3.12.11 The Architect's review of the Contractor's submittals will be limited to examination of an initial submission and two (2) resubmittals. The Architects review of additional submittals will be made only with the consent of the Owner after notification by the Architect. The Owner shall deduct from the next payment made from the Contract Sum amounts paid to the Architect for evaluation of such additional submittals.

§ 3.15.3 Insert the following:

§ 3.15.3 Waste Management The University is committed to a resource management strategy which reduces to a minimum the production of waste material while reusing, recycling or composting as much as possible of the remaining materials. Contractor should strive to identify opportunities to reduce, reuse, or recycle waste from renovations or new construction, and will submit a construction waste management plan for the project.

§ 4.1.1 Replace the existing § 4.1.1 with the following:

> **§ 4.1.1** The Architect is a person or entity lawfully licensed to practice in the State of Maine. That person or entity is identified in the Agreement and is referred throughout the Contract Documents as if singular in number. Whenever the prime professional designer for the Work is an Engineer, the term Architect, wherever used in these documents shall have the term Engineer substituted for the term Architect. The Engineer shall be lawfully licensed to practice engineering in the State of Maine or an entity lawfully practicing engineering identified as such in the Agreement.

§ 4.2.1 Replace the existing § 4.2.1with the following:

> **§ 4.2.1** The Architect will provide administration of the Contract as described in the Contract Documents, and will be an Owner's representative during construction until the date the final payment is due, and from time to time during the period for correction of Work described in § 12.2, and until the date the Architect issues the final Certificate for Payment. The Architect will have authority to act on behalf of the Owner only to the extent provided in the Contract Documents.

§ 4.2.2 Replace the existing § 4.2.2 with the following:

> **§ 4.2.2** The Architect will visit the site at intervals appropriate to the stage of construction, or as otherwise agreed with the Owner, to become generally familiar with the progress and quality of the portion of the Work completed, endeavor to guard the Owner against defects and deficiencies in the Work, and to determine in general if the Work observed is being performed in a manner indicating that the Work, when fully completed, will be in accordance with the Contract Documents. However, the Architect will not be required to make exhaustive or continuous on-site inspections to check the quality or quantity of the Work. The Architect will not have control over, charge of, or responsibility for, the construction means, methods, techniques, sequences or procedures, or for the safety precautions and programs in connection with the Work, since these are solely the Contractor's rights and responsibilities under the Contract Documents, except as provided in Section 3.3.1.
>
> **§ 4.2.2.1** The Contractor shall reimburse the Owner for compensation paid to the Architect for additional site visits made necessary by the fault, neglect as determined solely by the Owner, or request of the Contractor. The reimbursement shall be deducted from the next payment made from the Contract Sum following the Owner's payment to the Architect.

§ 4.2.3 Delete the word "reasonably" from the first sentence.

§ 4.2.10 Replace the existing § 4.2.10 with the following:

> **§ 4.2.10** If the Owner and Architect agree, the Architect will provide one or more project representatives to assist in carrying out the Architect's responsibilities at the site. The duties, responsibilities and limitations of authority of such project representatives shall be as set forth in the contract between the Architect, AIA B102 and B201-2007and Supplemental Requirements to be incorporated in the Contract Documents and attached hereto as Exhibit A.

§ 5.2.1 Add the following:

§ 5.2.1.1 The Contractor shall provide Owner a list of all subcontractors and independent contractors on the job site and a record of the entity to whom that subcontractor or independent contractor is directly contracted and by whom that subcontractor or independent contractor is insured for workers' compensation purposes. The list shall be presented at the preconstruction meeting and, when changes occur, at each requisition meeting as necessary. Information from this list will be placed on Owner's web site and updated as needed as required by 26 MRSA §1302-A.

§ 5.2.1.2 Where the use of the Maine Bid Depository was required by the Procurement Requirements, Subcontractors included in the Contractor's Proposal shall be the Subcontractors for the defined Work unless a change has been approved by the Owner.

§ 7.1.4 Insert the following:

§ 7.1.4 The combined overhead and profit included in the total cost to the Owner of a change in the Work shall be based on a previously agreed upon unit pricing or on the following schedule allowing for appropriate allowances for contract duration:

.1 For the Contractor, for Work performed by the Contractor's own forces, 20% of the cost.

.2 For the Contractor, for Work performed by the Contractor's Subcontractors, 10% of the amount due the Subcontractors.

.3 For each Subcontractor involved, for Work performed by the Subcontractor's own forces, 20% of the cost.

.4 For each Subcontractor involved, for Work performed by the Subcontractor's Sub-subcontractors, 10% of the amount due the Sub-subcontractor.

.5 Costs to which overhead and profit is to be applied shall be limited to the following:

.1 Costs of labor, including social security, old age and unemployment insurance, fringe benefits required by agreement or custom, and workers' compensation insurance;

.2 Costs of materials, supplies and equipment, including cost of transportation, whether incorporated or consumed;

.3 Rental costs of machinery and equipment, exclusive of hand tools, whether rented from the Contractor or others;

.4 Costs of premiums for all bonds, insurance, permit fees, and sales, use or similar taxes related to the Work; and

§ 7.1.5 When there is only an extension of Contract Time, the contractor delay claim is limited to additional costs related to supervision and field office personnel, which may be included in the overhead and profit calculation.

§ 7.1.6 In order to facilitate checking of quotations, all proposals, except those so minor that their propriety can be seen by inspection, shall be accompanied by complete itemization of costs including labor, materials and Subcontracts. Labor and materials shall be itemized in the manner prescribed above. Where major cost items are Subcontracts, they are to be itemized also. In no case will a change be approved without such itemization.

§ 9.3.1.3 Insert the following:

§ 9.3.1.3 The provisions of Title 5 M.R.S.A § 1746, as amended, pertain to this project. The University shall retain five percent (5%) of each payment due the Contractor as part of the security for the fulfillment of the Contract Agreement by the Contractor, the Contractor shall not withhold a greater percentage from subcontractors. The University may, if deemed expedient by the University, cause the Contractor to be paid temporarily or permanently from time to time during the progress of the work, such portion of the amount retained as the University deems prudent or desirable.

§ 9.5.1 The word "shall" will be substituted for the word "may" in all places in § 9.5.1.

§ 9.5.1.1 Replace with the following:

§ 9.5.1.1 Defective Work, i.e. Work that does not conform to the requirements of the contract, shall include, but not be limited to, non-conforming Work, disputed Work, incomplete Work, and unacceptable Work, which is not remedied.

§ 9.5.1.1.1 The Architect shall deduct and withhold from any certification for payment an amount equal to one hundred and fifty percent (150%) the value of any defective Work.

§ 9.6.8 Insert the following:

§ 9.6.8 All Progress Payments and Final Payment are subject to the requirements of the "Maine Prompt Pay Act" Title 10 M.R.S.A. § 201-A, as amended. Payments shall be made on a timely basis in accord with the requirements of this Statute; however, the Contractor waives interest on any late payment.

§ 9.10.1.1 Insert the following:

§ 9.10.1.1 Except with the consent of the Owner, the Architect will perform no more than three (3) site reviews to determine whether the Work or a designated portion thereof has attained Final Completion in accordance with the Contract Documents. The Owner shall be entitled to deduct from the Contract Sum amounts paid to the Architect for any additional site reviews.

§ 9.11 Insert the following:

§ 9.11 The Contractor and the Contractor's surety, if any, shall be liable for and shall pay the Owner the sums stipulated as liquidated damages in the Contract Documents for each calendar day of delay after the date established for Substantial Completion in the Contract Documents until the Work is substantially complete.

§10.2.1 Add the following:

.4 If this Contract involves renovation, repair, or preparation of surfaces for painting in pre-1978 apartments, houses, or spaces used by child care facilities, Contractor shall use certified workers who follow the lead-safe work practices as required by the US Environmental Protection Agency's Renovation, Repair and Remodeling rule described in 40 CFR § 745.85. Notification of the tenants or users under this rule will be the responsibility of the University.

§ 10.3.2 Replace the existing §10.3.2 with the following:

§ 10.3.2 Upon receipt of the Contractor's written notice, the Owner shall obtain the services of a licensed laboratory to verify the presence or absence of the material or substance reported by the Contractor and, in the event such material or substance is found to be present, to cause it to be rendered harmless. When the material or substance has been rendered harmless, Work in the affected area shall resume upon written agreement of the Owner and Contractor.

§ 11.1.3 Add the following:

Certificates of Insurance filed with the University of Maine System shall indicate the Certificate Holder as University of Maine System, 16 Central Street, Bangor, Maine 04401. The Project name, campus, and general liability insurance required policy form and two required endorsements noted in Paragraph 11.1.5.1 below shall be included on the Certificate. Contractor must provide renewal certificates at least 15 days prior to expiration.

§ 11.1.4 Add the following:

Neither the Contractor nor any Subcontractors or Suppliers shall commence work at the project site under this contract until the Contractor has provided the University with a standard ACORD certificate with an attached AIA Document G715-1991 listing all insurance coverages and limits required under this section. All required insurance shall be maintained throughout the term of this contract (including correction period, defined in 12.2.2.1) and be on a primary basis, noncontributory with any other insurance carried by the University. All required insurance shall be provided by companies that have a current A.M. Best insurance rating of A- or better and that are licensed or approved to do business in the State of Maine.

§ 11.1.5 Insert the following:

§ 11.1.5 COVERAGE LIMITS - The required insurance and coverage limits are as follows:

§ 11.1.5.1 General Liability -Contractor shall provide General Liability insurance with coverage for premises and operations, products and completed operations, explosion, collapse and underground hazards, broad form property damage, contractual, personal and advertising injury liabilities. Insurance shall be provided on a standard Insurance Services Office (ISO) Commercial General Liability Form CG 00 01 12 04 or equivalent and shall include the following three endorsements or their equivalent: 1) Additional Insured—Owners, Lessees or Contractors—Scheduled Person or

Organization (CG20 10 07 04) with the University of Maine System, 16 Central Street, Bangor, ME 04401 listed as additional insured; 2) Additional Insured—Owners, Lessees or Contractors—Completed Operations (CG 20 37 07 04) with the University of Maine System, 16 Central Street, Bangor, ME 04401 listed as additional insured; and 3) Designated Construction Project General Aggregate Limit (CG 25 03 03 97)) as the Aggregate limits shall apply on a per location or job basis. The policy form and endorsements must be included on the certificate of insurance. The below required minimum insurance limits shall not be construed as a limitation of the University's rights under any insurance with higher limits and no insurance shall be endorsed to include such a limitation. General Liability insurance required minimum limits:

.1 General Aggregate	$2,000,000
.2 Products & Completed Operations Aggregate	$2,000,000
.3 Personal Injury Aggregate	$1,000,000
.4 Each Occurrence for Contracts Under $1 million	$1,000,000
.5 Each Occurrence for Contracts $1 million and above	$2,000,000
.6 Personal/Advertising Injury	$1,000,000
.7 Medical Payments (Any One Person)	$5,000

§ 11.1.5.2 Workers' Compensation - Contractor including Independent Contractors shall provide Worker's Compensation insurance with coverage on a statutory basis according to Maine Law and apply to all personnel on the job site. Workers' Compensation insurance required minimum limits:

.1 Coverage A (Workers' Compensation)	Statutory Limits
.2 Coverage B (Employers Liability)	
.1 Bodily injury by accident	$500,000 each accident
.2 Bodily injury by disease	$500,000 each employee
.3 Bodily injury by disease	$500,000 policy limit

§ 11.1.5.3 Vehicle Liability Insurance - Contractor shall provide Vehicle Liability insurance with coverage for all owned, hired/rented and non-owned vehicles. Vehicle Liability insurance required minimum limit:

.1 Combined Single Limit	$1,000,000 each accident
or	
.2 Split Limits	$1,000,000 bodily injury $1,000,000 property damage

§ 11.3.1 Replace all of the existing § 11.3.1 and its subparagraphs with the following:

[NOTE: THE PROJECT MANAGER WILL MANUALLY DELETE FROM THIS SECTION THE ONE NOT SELECTED TO DESCRIBE THE TYPE OF PROJECT.]

[FOR NEW, STAND-ALONE CONSTRUCTION AND MAJOR ADDITIONS USE THIS PARAGRAPH. Use for stand-alone buildings and major additions with fire walls and fire doors separating the addition from the existing building:]

§ 11.3.1 The Contractor shall secure "All Risk" type Builder's Risk Insurance,

appropriate for the Project, with an insurance company lawfully authorized to do business in the State of Maine, and shall maintain said insurance during the contract time. The insurance shall be written on a replacement cost basis and the amount of the insurance shall not be less than the full replacement cost of the Project and Project materials. The insurance shall cover, at a minimum, losses due to fire, smoke, explosion, hail, lightning, theft, vandalism, malicious mischief, wind, collapse, riot, aircraft, and increased cost of construction. Insurance shall also cover portions of the work located away from the site but intended for use at the site, and for portions of the work in transit. In the event of a loss, the insurance deductible and any uncovered loss will be assumed by the Contractor. The insurance shall name as the insured the Contractor, the Subcontractors, the Designer, and the University. The policy must be written as the primary insurance covering the project and include endorsement providing permission to occupy in advance of project completion. A certificate of insurance verifying coverage shall be forwarded simultaneously to the Designer and the University prior to starting any work at the site. If the Contractor fails to maintain the appropriate insurance, then the Contractor shall bear all reasonable costs attributed to that failure.

[FOR RENOVATION, ALTERATION AND/OR ADDITION WORK USE THIS PARAGRAPH:]

§ 11.3.1 For this project, Property Insurance coverage, up to the total amount of the Project, will be provided by the University by adding the Project to the University's existing master property insurance. Coverage shall be included for the Contractor and all Subcontractors, as their interests may appear, while involved in the Project and until the work is completed or the contractor is otherwise advised in writing. This insurance is limited to the "all risk" type coverage provided under the University's master property insurance for direct physical loss or damage to the building or building materials related to the project, subject to standard policy limitations and exclusions. The contractor is responsible for a $10,000 per claim deductible. Any other insurance desired by the Contractor beyond that covered by the University's insurance, or to cover the $10,000 deductible, is the responsibility of the Contractor. This contract stands as verification of the University's property insurance coverage on the project and no further verification will be provided.

§ 11.4.1 Replace the existing §11.4.1 with the following:

§ 11.4.1 The Contractor shall furnish a Performance Bond and a Payment Bond covering the faithful performance of the contract and payment of obligations arising thereof. Bonds may be obtained through the Contractor’s usual source and the cost thereof shall be included in the Contract Sum. The amount of each bond shall be equal to 100% of the Contract Sum. Should the Contract Sum change during the contract and warranty periods, the amount of the Bonds will be changed to reflect the Contract Sum.

§ 11.4.1.1 The Contractor shall deliver the required bonds to the Owner at the same time as the signed Contract Agreement is delivered to the Owner. Prior to the commencement of the Work, the Contractor shall submit satisfactory evidence that such bonds will be furnished.

§ 11.4.1.2 The Contractor shall require the attorney-in-fact who executes the required bonds on behalf of the surety to affix thereto a certified and current copy of the power

of attorney.

§ 11.4.1.3 The Contract Bonds shall continue in effect for one year after final acceptance of each 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.

§ 13.6 Delete §13.6 in its entirety.

§ 14.1.1.4 Delete §14.1.1.4 in its entirety.

§ 14.1.3 Delete the words "and damages"

§ 14.4.3 Replace the existing §14.4.3 with the following:

§ 14.4.3 In case of such termination for the Owner's convenience, the Contractor shall be entitled to receive payment for the work executed and costs incurred by reason of such termination, but not overhead and profit on Work not executed.

§ 15.4.1 Replace the existing §15.4.1 with the following:

§ 15.4.1 The parties have selected arbitration as the method for binding dispute resolution in this Agreement, any claim, dispute or other matter in question arising out of or related to this Agreement subject to, but not resolved by, mediation shall be subject to arbitration, which unless the parties mutually agree otherwise, shall be administered by the American Arbitration Association in accordance with its Construction Industry Arbitration Rules in effect on the date of this Agreement, except that the parties shall select only one Arbitrator, and there shall be no discovery. A demand for arbitration shall be made in writing, delivered to the other party to this Agreement, and filed with the person or entity administering the arbitration. The party filing a notice of demand for arbitration must assert in the demand all Claims then known to that party on which arbitration is permitted to be defended.

THE MAINE HUMAN RIGHTS ACT GUARANTEES…

Equal Employment Rights

EQUAL EMPLOYMENT RIGHTS

1. The RIGHT to freedom from discrimination in employment.
2. The opportunity for an individual to secure employment without discrimination… is declared to be a CIVIL RIGHT.

The Maine Human Rights Act prohibits discrimination because of race, color, sex, sexual orientation, age, physical or mental disability, genetic pre-disposition, religion, ancestry or national origin.

The Maine Human Rights Act also prohibits discrimination because of filing a claim or asserting a right under the Worker's Comp Act or retaliation under the Whistleblower's Act.

UNLAWFUL EMPLOYMENT DISCRIMINATION

1. For any employer to fail or refuse to hire an applicant
2. For any employer to discharge an employee
3. For any employer to discriminate against an employee with respect to recruitment, tenure, promotion, transfer, or compensation
4. For any employment agency to fail or refuse to classify properly or refer for employment an applicant
5. For any labor organization to exclude from apprenticeship or membership an applicant
6. For any employer, employment agency, or labor organization prior to employment or admission to membership of an individual to ask questions, keep as record, use application form, issue any notice, employ a quota system
7. For any employer, employment agency, or labor organization to retaliate against a person who has opposed a violation of the Maine Human Rights Act

Because of race, color, sex, sexual orientation, age, physical or mental disability, genetic pre-disposition, religion, ancestry or national origin or because of asserting a claim under the Worker's Comp Act or Whistleblower's Act.

MAINE=
HUMAN RIGHTS
COMMISSION

IF YOU FEEL YOU HAVE BEEN DISCRIMINATED AGAINST, CONTACT THE COMMISSION OFFICE.
51 STATE HOUSE STATION, AUGUSTA, MAINE 04333-0051
PHONE (207) 624-6050 FAX (207) 624-6063 TTY 1-888-577-6690

(Rev. Dec. 28, 2005) **Printed under appropriation: 01094H1010012**

Attachment A

SECTION 00 73 00.11

SCHEDULE OF LIQUIDATED DAMAGES

Liquidated damages (a fixed amount set forth in the contract) agreed to by the owner and the contractor are intended to compensate the owner for unexcused delay in the performance of the contract. The parties agree that the purpose of the liquidated damages schedule below is to establish, in advance, a reasonable estimate of the damages that would be incurred by the owner if there is an unexcused delay, or a breach of contract, which causes the work to be extended beyond the contractual substantial completion date. This agreement of liquidated damages by the parties is made to establish the reasonableness of them to the actual damages an owner may have incur due to unexcused delays by the contractor, even though the actual damages may be an uncertain amount and unprovable.

The specific per diem rates for Liquidated Damages are **$825 as set forth below.** By executing the Contract, the Contractor acknowledges that such an amount is not a penalty and that the daily amount set forth in the Contract is a reasonable per diem forecast of damages incurred by the Owner due to the Contractor's failure to complete the Work within the Contract Time.

Original Contract Amount		Per Diem Amount of Liquidated Damages
From	To	
More Than	and Including	
0	$100,000	$500
$100,000	$300,000	$675
$300,000	$500,000	$750
$500,000	$1,000,000	$825
$1,000,000	$2,000,000	$1,000
$2,000,000	$4,000,000	$1,250
$4,000,000	and more	$1,500

END OF DOCUMENT

SECTION 00 73 46
WAGE DETERMINATION SCHEDULE

GENERAL

1.01 WAGE DETERMINATION SCHEDULE APPLICABLE TO THIS CONTRACT

A. State of Maine, Department of Labor, Bureau of Labor Standards, Wage and Hour Division, 2015 Edition, schedule attached, is the Wage Determination Schedule between the Owner and Contractor.

END OF SECTION

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

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

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

Title of Project --------Payson Smith Hall Lab 305 Renovation 6100236

Location of Project –Portland, Cumberland County

2015 Fair Minimum Wage Rates
Building 2 Cumberland County
(other than 1 or 2 family homes)

Occupation Title	Minimum Wage	Minimum Benefit	Total	Occupation Title	Minimum Wage	Minimum Benefit	Total
Asbestos/Lead Removal Worker	$12.00	$0.00	$12.00	Ironworker - Reinforcing	$20.00	$1.23	$21.23
Backhoe Loader Operator	$18.00	$2.23	$20.23	Ironworker - Structural	$22.65	$6.06	$28.71
Bricklayer	$22.25	$2.33	$24.58	Laborers (Incl.Helpers & Tenders)	$13.25	$0.60	$13.85
Bulldozer Operator	$18.00	$2.77	$20.77	Laborer - Skilled	$16.29	$1.76	$18.05
Carpenter	$20.00	$2.98	$22.98	Loader Operator - Front-End	$17.00	$2.68	$19.68
Carpenter - Acoustical	$14.88	$2.19	$17.07	Mechanic- Maintenance	$22.50	$3.69	$26.19
Carpenter - Rough	$17.92	$1.36	$19.28	Mechanic- Refrigeration	$22.00	$3.80	$25.80
Cement Mason/Finisher	$17.50	$1.44	$18.94	Millwright	$23.50	$3.54	$27.04
Communication Equip Installer	$24.81	$3.57	$28.38	Oil/Fuel Burner Servicer & Installer (Licensed)	$23.50	$3.35	$26.85
Concrete Pump Operator	$19.00	$3.35	$22.35	Painter	$15.00	$0.00	$15.00
Crane Operator <15 Tons	$20.00	$1.41	$21.41	Paver Operator	$20.00	$2.26	$22.26
Crane Operator =>15 Tons)	$24.50	$4.81	$29.31	Pipe/Steam/Sprinkler Fitter	$23.00	$2.90	$25.90
Crusher Plant Operator	$18.65	$3.62	$22.27	Plumber (Licensed)	$24.45	$3.09	$27.54
Dry-Wall Applicator	$21.50	$1.89	$23.39	Plumber Helper/Trainee (Licensed)	$19.60	$2.59	$22.19
Dry-Wall Taper & Finisher	$22.30	$1.86	$24.16	Propane & Natural Gas Servicer & Inst	$24.00	$3.10	$27.10
Earth Auger Operator	$22.50	$8.14	$30.64	Rigger	$19.00	$5.52	$24.52
Electrician - Licensed	$25.22	$5.49	$30.71	Roller Operator - Pavement	$18.75	$5.25	$24.00
Electrician Helper/Cable Puller (Licensed)	$16.12	$3.61	$19.73	Roofer	$16.30	$1.64	$17.94
Elevator Constructor/Installer	$52.32	$32.82	$85.14	Sheet Metal Worker	$16.00	$5.22	$21.22
Excavator Operator	$18.00	$1.87	$19.87	Sider	$16.00	$1.73	$17.73
Fence Setter	$15.63	$2.39	$18.02	Stone Mason	$14.50	$0.29	$14.79
Flagger	$9.00	$0.00	$9.00	Tile Setter	$21.50	$4.28	$25.78
Floor Layer	$17.00	$0.79	$17.79	Truck Driver - Light	$17.00	$1.46	$18.46
Glazier	$19.82	$1.92	$21.74	Truck Driver - Medium	$13.75	$0.39	$14.14
Grader/Scraper Operator	$20.00	$4.90	$24.90	Truck Driver - Heavy	$14.50	$1.17	$15.67
HVAC	$25.00	$3.07	$28.07	Truck Driver - Tractor Trailer	$15.92	$2.73	$18.65
Insulation Installer	$19.00	$2.23	$21.23				

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

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

Apprentices - The minimum wage rate for registered apprentices are those set forth in the standards and policies of the Maine State Apprenticeship and Training Council for approved apprenticeship programs.

Posting of Schedule - Posting of this schedule is required in accordance with 26 MRSA §1301 et. seq., by any contractor holding a State contract for construction valued at $50,000 or more and any subcontractors to such a contractor.

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

Determination No: **B2-005-2015**

Filing Date: **December 17, 2014**

Expiration Date: **12-31-2015**

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

BLS 424BU (R2015) (Building 2 Cumberland)

SECTION 01 00 00
GENERAL REQUIREMENTS

PART 1 - GENERAL

1.01 DESCRIPTION

A. The General Conditions, Supplementary General Conditions and Special Conditions of this Contract shall apply to each and every contract and contractor or other person or persons supplying labor, material, equipment and/or services entering into this Project and/or on the premises directly or indirectly.

B. Definitions:
   1. The word “Contractor” where used throughout this document to describe the General Contractor, shall also mean the “Construction Manager”, both Contractor and Construction Manager describing the entity holding the prime Contract for Construction.

C. Work Included in This Contract:
   1. Providing all labor, materials, equipment, and services, etc., as required to properly complete all Work identified in, implied by or otherwise required by the Contract Documents.

D. Work Excluded from This Contract:
   1. Providing equipment noted as “Not in Contract” (N.I.C.) or “By Owner,” (B.O.). The Contractor shall, however, provide services and coordination related to items not in the Contract as otherwise required or implied by the Contract Documents.

1.02 GENERAL RESPONSIBILITIES OF THE CONTRACTOR

A. Regulations: The Contractor shall fully comply with all governing Local, State and Federal Laws, Codes, Rules, Regulations and Ordinances, including but not limited to The Americans with Disabilities Act, Equal Employment Opportunity and Affirmative Action provisions, and Occupational Safety and Health Administration provisions.

B. Permits: The Contractor shall obtain and pay for all permits and arrange for necessary inspections and approvals from the authorities having jurisdiction. Should any changes be necessary in the Contract Documents to secure such approvals, the Contractor shall promptly notify the Architect.
   1. For the Owner’s records, submit copies of permits, licenses, inspection reports, certifications, and similar documents, correspondence and records established in conjunction with compliance with standards and regulations bearing on the Work.

C. Coordination: The Contractor shall be fully responsible for coordinating all construction activities to assure efficient and orderly installation of each part of the Work. In general coordination duties shall include, but not be limited to verifying dimensions and existing field conditions, coordinating construction operations, establishing on-site lines of authority and communication, monitoring schedules and progress, monitoring quality, maintaining records and reports and in general assuring the proper administration of the Work.
   1. Where installation of one part of the Work is dependent on installation of other components, either before or after its own installation, schedule construction activities in the sequence required to obtain the best results.
   2. Where installation of a component or system involves installation of component parts by multiple subcontractors, the Contractor shall inventory, store, and distribute parts to appropriate installers.
   3. Where structural, electrical, or mechanical components such as columns, ductwork, sprinkler piping, or raceways are installed in finished spaces, the intent is for room finish to enclose such components unless indicated otherwise. Coordinate between the trades and with the Architect.

4. Where inspections or approval of a substrate or component to be concealed by another is required, coordinate construction activities and notification of Architect or inspecting party. Do not conceal substrate or component until it has been inspected and is satisfactory.
5. Where availability of space is limited, coordinate installation of different components to assure maximum accessibility for maintenance, service, and repair.
6. Make adequate provision to accommodate items scheduled for later installation.
7. Coordinate completion and clean-up of Work in preparation of Substantial Completion.
8. After Owner occupancy, coordinate access to site for correction of defective or incomplete Work to minimize disruptions to Owner's activities.

D. Supervision – Construction Superintendent: The Contractor shall place and maintain a competent, experienced construction Superintendent/Foreman in charge of the Work on the job site at all times while work is in progress, including overtime operations by the Contractor's forces or by subcontractors. No changes in this position shall be made without the Owner's prior approval. The Owner shall have the right to review the qualifications of the proposed Superintendent/Foreman and ask for a replacement if in his/her opinion the person does not meet the qualifications that the project will demand. The same superintendent who was in charge during the general progress of the Work shall oversee the completion of all punch list items.
   1. The Contractor shall be responsible for the strict enforcement of the following requirements:
      a. All persons working on the Project site shall be required to conduct themselves in a courteous and professional manner. The use of profane language shall be strictly prohibited.
      b. Smoking and alcoholic beverages shall be strictly prohibited on the Project site.
      c. The use of radios, etc. shall be strictly regulated if they interfere with the Owner's ongoing building operation.
      d. Contact with building occupants and visitors shall be minimized to the extent necessary for the safe and proper execution of the Work.
      e. All construction personnel shall be issued identification badges by the Contractor, which shall be conspicuously displayed at all times while on the construction site.

E. On-Site Documents: The Contractor shall provide in a visible and accessible location in the on-site office:
   1. Complete, currently updated set of Specifications and Drawings, Change Orders, reviewed Shop Drawings, and other documents and samples.
   2. Permits and notifications required by laws and regulations.
   3. Standards, manuals, installation instructions, or reports required by individual Specification sections.
   4. Product MSDS Sheets.
   5. List of Owner, Owner's Representative, Architect, Architect's Consultants, Contractor's project manager, superintendent, assistant superintendent, subcontractors, building inspector, police, ambulance and fire departments; include telephone numbers and fax numbers.

F. Accommodation and Cooperation with the Owner: The Contractor shall cooperate with the Owner to the greatest extent possible. Disruptions and inconveniences to the activities of existing facilities to remain in operation during construction shall be minimized, and shall be subject to the prior approval of the Owner. The Contractor's cooperative efforts shall include, but shall not necessarily be limited to:
   1. Maintaining fire and all other safety standards acceptable to governing authorities.
   2. Protecting existing building construction, landscaping, site utilities, site improvements and features, and all other improvements within and about the project area. See Division 2 for more information.
   3. Obtaining abutters' written authorization to conduct construction related activities on their properties, if required. [NOTE: The Contractor shall obtain permits and approvals required to temporarily alter or obstruct sidewalks and street(s) if required.]

4. Storing on-site materials at locations acceptable to the Owner and governing authorities.
5. Controlling construction staging, parking, and traffic and limiting it to areas acceptable to the Owner and governing authorities.
6. Providing access for and cooperating with other contractors to be employed by the Owner.
7. Providing access for and cooperating with equipment and furnishing suppliers/installers (including the Owner's own forces) to be employed by the Owner.
8. Accommodating existing occupants and other ongoing activities within and about the Project. Such accommodations shall include, but shall not necessarily be limited to:
   a. Maintaining safe egress acceptable to governing authorities.
   b. Maintaining adequate heating, air conditioning, and ventilation.
   c. Maintaining fire suppression system.
   d. Maintaining electrical power, fire alarm, and detection systems, sound systems, clock systems, intrusion detection systems, television, computer, and telephone services.
   e. Maintaining special systems and services such as emergency electrical power.
   f. Maintaining suitable toilet and janitorial facilities.
   g. Maintaining a watertight roof.
   h. Providing adequate dirt, dust, fume, vapor, and noise control. NOTE: The Contractor shall take special precautions to prevent the introduction of construction related dust, fumes, vapors, etc. from entering into HVAC system ducts, return air grilles, fresh air intakes, etc.)
      1) See Section 01 57 21- Indoor Air Quality Controls, for additional information
   i. Providing temporary fire and smoke partitions acceptable to governing authorities.
   j. Providing adequate building security in areas under the Contractor’s control.
   k. Moving and relocating existing loose furniture, equipment and supplies as required to generally accommodate the Contractor will be the responsibility of the Owner, except as otherwise indicated on the Contract Documents.
   l. Scheduling work within the existing facility at times acceptable to the Owner and least disruptive to ongoing activities. Existing facilities shall remain in operation during the execution of the Work of this Contract. The Contractor shall schedule, phase, and coordinate the Work as required to maintain the safe and functional use of such facilities.

G. Phasing and Work Scheduling
   1. The following shall serve as a general description of the Owner’s scheduling requirements related to the Work of this Contract. It is provided for the Contractor’s use in preparing an acceptable schedule and executing the Work at times and in a manner least disruptive to ongoing activities.
      Prior to completing and distributing the Construction Schedule or proceeding with the Work, the Contractor shall meet with the Owner, accurately assess the Owner’s requirements relative to the use of existing facilities, and schedule the Work accordingly.

      a. All subcontractors shall coordinate with the Contractor to determine all phasing and sequencing requirements and to schedule the Work. Work shall be executed in such a manner that shall cause minimal or no disruptions of the Owner’s activities and the activities of other trades.
      b. Coordinate all shut-downs, service disruptions, demolition, removals, temporary connectors, service change-overs, etc., required to avoid Owner disruption and/or inconvenience.
      c. Coordinate all deliveries, installation, etc, as required to avoid Owner disruption and/or inconvenience.
      d. Temporary ductwork, piping, wiring, controls, and equipment measures for essential systems such as air conditioning, ventilation, hydronic heating, domestic hot and cold water, storm drainage, sanitary sewer, controls, lighting, power, emergency systems, clocks, security, fire protection, etc. shall be provided to:
         1) Keep existing systems functional,

2) Maintain services between existing components that must be redirected around construction areas,
3) Alter, redirect, or make safe,
4) Temporarily relocate equipment to facilitate phasing.

e. See Section 01 78 10 - Warranties for requirements regarding extended warranties for equipment serving phased occupancy.

H. Safety: The Contractor shall assume full responsibility for all means, methods, procedures, sequences and techniques of construction employed and shall take all measures required to ensure the safety of construction workers, as well as the safety of the general public. The Contractor shall take into full consideration and assure himself that all necessary barricades, fencing, and shoring are provided and that they comply with applicable regulations and standards of good practice. The public shall be guarded from all construction hazards and/or attractive nuisances. The construction site is a part of existing occupied buildings and nearby major public thoroughfares. Therefore, site safety is of the utmost importance. The Contractor shall pay all costs necessary for temporary partitioning, barricading, fencing, shoring, walks, ramps, enclosures, flashing lights, warning signs, security and safety devices required for the maintenance of a clean and safe construction site.

1. Owner's Safety Policies: Prior to the commencement of construction, the Contractor shall thoroughly review the Owner's facility and occupant safety policies and procedures and shall inform all construction workers of their related responsibilities. Should the Contractor take exception to any of the Owner's policies and procedures, he shall so notify the Owner and Architect, in writing, prior to proceeding with the Work. The failure to provide such notification shall be construed as full acceptance of the Owner's policies and procedures.
2. MSDS Sheets: The Contractor shall furnish copies of Material Safety Data Sheets to the Owner for all materials classified as hazardous or poisonous. MSDS for all materials shall be maintained with the Contractor in a file on-site.

I. Indoor Air Quality Management:

1. The Contractor and his various subcontractors as he may direct shall implement procedures throughout construction in an effort to improve indoor air quality during the Owner's occupancy. See Section 01 57 21- Indoor Air Quality Controls.
2. The maintenance of a clean, dust-free environment in areas of the facility that remain operational or otherwise accessible to non-construction personnel shall be the shared responsibility of all construction personnel.
3. Control of dust, vapors, odors, and the spread of fire shall be considered of paramount importance. Unless otherwise specifically required by the Owner, the means and methods of achieving such control shall remain the exclusive responsibility of the Contractor, and not the Owner or Architect. However, the following may be considered:
   a. Fire-resistant plastic dust barriers. (Including above suspended ceilings.) Provide ante rooms and gasketed doors where appropriate.)
   b. Construction of non-combustible partitions and enclosures.
   c. Negative pressure containment.
   d. Duct tape and sealant.
   e. Walk-off mats (adhesive treated).
   f. Vacuuming (with HEPA filtered vacuum).
   g. Closure of air intake vents (verify need for service prior to interruption).
4. The Contractor and his various subcontractors as he may direct shall implement the following procedures in an effort to improve indoor air quality during the Owner's occupancy:
   a. All adhesives (for construction, floor and wall coverings, etc.), paints, thinners, solvents, etc. shall, among other technical qualifications, be selected in consideration of minimizing their potential contribution to indoor air pollution. All "wet" products (i.e. paint, sealers, and other liquid products) shall be installed before ceiling tile and carpet to minimize emissions interaction between building products to the greatest extent possible.

b. Provide maximum all-outside-air ventilation during the installation of strong emitting materials. This shall be done for the purpose of reducing the contamination of other materials by absorption of solvents and other volatile components.
c. On projects where the Owner (or other user) occupies all or portions of the building during construction, the Contractor shall make every practical effort to minimize their exposure to fumes and dust from construction. Such efforts shall include items 1 through 3 above, as well as the construction of temporary air-tight barriers, maintaining negative air pressure in work areas, isolation of ventilation systems and all other appropriate means as determined by the Contractor.

J. Environmental Regulations: The Contractor shall comply with all applicable environmental laws and regulations. Particular attention shall be paid to proper dust, fume and vapor control throughout the building and site.

K. Hazardous Substances: The Architect's Scope of Services and responsibilities exclude the investigation, discovery, detection, identification, presence, leakage, release, use, handling, disposal, encapsulation, abatement, treatment, or removal of, or exposure of a person or persons to hazardous materials, pollutants, contaminants, or disease transmitting organisms, pre-existing or otherwise deposited in any form at the project, indoors or outdoors, at any time before, during or after construction, including but not limited to volatile organic compounds, petroleum products, bacteria, molds, fungus, asbestos or asbestos products, lead, radon, electro-magnetic frequency radiation or other radiation. Should any such substances be encountered, the Owner and Architect shall be promptly notified, in writing.

L. Protection of Adjoining Property: The Contractor shall provide all shoring, fencing, and other work necessary to support, protect and keep unharmed all walls, footings, floors, roofs, walks, roadways and all other parts of any existing buildings, facilities, site improvements, land forms, trees and plant materials, etc. The Contractor shall hold the Owner and Architect harmless from any such damage due to any operations under this Contract. Any existing work or property damaged or disrupted as a result of this Contract shall be replaced or repaired to match original existing conditions at no additional cost to the Owner.

M. Utilities: The Contractor shall send proper notices, make all necessary arrangements and perform all other services required for the removal or the care, protection and maintenance of all utilities, including, but not limited to, electric, gas, water, sewer, alarm, television, telephone, computer, and all other items of this character above or below the ground, on. within and around the building site, assuming all responsibility and paying all costs related thereto. Related services to any existing facilities shall not be disrupted without the prior approval of the Owner, and then only to the minimum extent required. The Contractor shall comply with the "Underground Utility Damage Prevention System" by notification to DIG SAFE SYSTEM of intent to excavate near or around any underground utility installations. The Contractor shall call DIG SAFE SYSTEM at least 72 working day hours in advance of starting any such excavation.

N. Traffic Regulations and Parking: The Contractor shall properly regulate traffic at times when the Work interferes with the normal flow of traffic both on and off the site. Parking for workers on the project shall be limited to areas designated by the Owner or governing officials. Roadways and driveways outside the limits of the Contract shall be kept free of debris resulting from construction related traffic.

O. Roads and Access to the Site: Access to the site for workers and the delivery or removal of construction materials and/or equipment shall be made only from locations approved by governing authorities and acceptable to the Owner. Existing roads, lanes and other required fire access shall remain accessible to fire vehicles at all times. Hauling permits and route approvals shall be obtained from governing authorities as applicable.

P. Security: The Contractor shall be responsible for the securing of new and existing structures against the entry of unauthorized persons at all times, including nights, holidays and days when the buildings may be unoccupied.
1. When construction related personnel are the last to leave either the new or existing facilities, they shall verify that the entire building perimeter is properly secured.

2. When non-construction related personnel are the last to leave either the new or existing facilities, the Contractor shall verify that all unoccupied areas are properly secured, and shall record the names and affiliations of those persons remaining in the facilities.

Q. Permanent Fire Protection: At the earliest feasible date in each area of the Project, complete installation of permanent fire protection facilities, including connected services, and place into operation and use. Instruct key personnel on use of facilities.

R. Vandalism: The Contractor shall take all reasonable precautions necessary to prevent loss or damage caused by vandalism, theft, burglary, pilferage, or unexplained disappearance of property of the Owner, whether or not forming part of the Work, located within those areas of the Project to which the Contractor has access.

S. Existing Materials and Equipment: See Section 01 60 00 - Product Requirements.

T. Shipping and Storage of Materials: See Section 01 60 00 - Product Requirements.

U. Owner Furnished Equipment: See Section 01 60 00 - Product Requirements.

V. Watertight Structure: The Contract Documents are not intended to depict each and every condition or detail of construction. As the knowledgeable party in the field, the Contractor is in the best position to verify that all construction is completed in a manner that will provide a watertight structure during construction (i.e. as needed to keep all interior construction dry both during and following its installation) and upon completion of construction. The Contractor shall be solely responsible for ensuring the watertight integrity of the structure.

W. Guarantee: The Contractor shall guarantee the entire Work to be free from defective or improper work or materials, and shall make good any damage due to such work or materials for a term of one year from the date of the satisfactory completion and acceptance of the Work. See Section 01 78 10 - Warranties.

1.03 MEASUREMENT AND PAYMENT

A. Schedule of Values: Submit a preliminary sample of the Schedule of Values for review and comment regarding format and content to the Architect at the earliest feasible date, but in no case later than fourteen (14) days prior to submittal of the first Application for Payment. The Schedule of Values shall clearly identify the cost of the Work by trade, plus all General Conditions, Allowances, and accepted Alternates.
   1. The format and general content of such schedule shall be acceptable to the Owner and Architect.
      a. Round amount off to the nearest whole dollar; the total shall equal the Contract Sum.
      b. No later than seven (7) days prior to submittal of the first Application for Payment, the Contractor shall submit to the Architect and Owner, the fully completed Schedule of Values.
   2. See Section 00 62 73 - Schedule of Values Form.

B. Payment Requisition: The Contractor shall submit to the Architect three original copies of “Application for Payment”, see Section 00 62 76 - Application for Payment Form, an itemized statement showing the original Contract Amount, the value of the Work to date, the amount previously approved, the amount presently requested and the balance remaining. Each copy shall be fully executed and properly signed and sealed.
   1. Application for Payment entries shall match the Schedule of Values. Include amounts of Change Orders issued prior to the last day of the construction period covered by the application.
   2. Each Application for Payment shall be consistent with previous applications and payments as certified by the Architect and paid for by the Owner.
   3. Progress payment dates shall be as established elsewhere in the Agreement. The Contractor shall submit a draft of the Application for Payment to the Architect sufficiently in advance of the due date to the Architect to allow for preliminary review and adjustments.
   4. The Contractor shall clearly differentiate between items stored on-site and items stored off-site. For off-site stored materials, provide invoices, list of materials, insurance

certificate, right of entry, transfer of title, and other documents as may be required by the Architect and Owner. See Section 00 62 79 - Stored Material Form.

5. Provide invoices, vouchers, time sheets, and other documents as may be required by the Architect to verify labor and materials costs.
6. Each Application for Payment shall be accompanied by a transmittal listing all attachments.
7. Initial Application for Payment: The following administrative actions and submittals shall precede or coincide with the submittal of the first Application for Payment:
    a. List of subcontractors, principal suppliers, and fabricators.
    b. Schedule of Values.
    c. Contractor's Construction Schedule (preliminary, if not final).
    d. Contractor's Submittal Schedule (preliminary, if not final).
    e. List of Contractor's staff assignments.
    f. Copies of building permits, authorizations, and licenses from governing authorities.
    g. Certificates of insurance.
    h. Data needed to acquire Owner's insurance.
    i. Initial Progress Report.
    j. Performance and Payment Bonds, if applicable.
8. Application for Payment at Substantial Completion: Submit an Application for Payment following issuance of the Certificate of Substantial Completion. The application shall reflect any Certificates of Partial Substantial Completion issued previously for Owner occupancy of designated portions of the Work. See AIA 201 General Conditions of the Contract. The following administrative actions and submittals shall precede or coincide with the submittal of this Application for Payment:
    a. Occupancy permits, as applicable.
    b. Warranties and maintenance agreements.
    c. Testing / adjusting / balancing reports.
    d. Maintenance instructions.
    e. Meter readings, as applicable.
    f. Start-up performance reports.
    g. Change-over information related to Owner's occupancy, use operation and maintenance.
    h. Final cleaning.
    i. Application for reduction of retainage, and consent of surety.
    j. Advice on shifting insurance coverage.
    k. List of incomplete Work, recognized as exception to the Architect's Certificate of Substantial Completion, if any.
    l. See Section 00 65 16 - Certificate of Substantial Completion Form.
9. Final Application for Payment: This application shall reflect any Certificates of Partial Substantial Completion issued previously for Owner occupancy of designated portions of the Work. See Article regarding Final Payment of the Agreement and AIA 201 General Conditions of the Contract. The following administrative actions and submittals shall precede or coincide with the submittal of the final Application for Payment:
    a. All items required by Article 9 "Payments & Completion" of AIA A201.
    b. Completion of Project close-out requirements.
    c. Completion of items specified for completion after Substantial Completion.
    d. Assurance that unsettled claims will be settled.
    e. Transmittal of required Project construction records, including Record Drawings to the Owner.
    f. Proof that taxes, fees and similar obligations have been paid.
    g. Removal of temporary facilities and services.
    h. Removal of surplus materials, rubbish, and similar elements.
    i. See Section 00 65 19 - Certificate of Completion Form.

C. Waivers of Mechanics Lien: With each Application for Payment, submit waivers of mechanics lien for every entity who is lawfully entitled to file a lien arising out the Contract and related to the Work covered by the Payment. See AIA A201 General Conditions of the Contract.
   1. The Contractor shall promptly execute a partial waiver of mechanics lien for the period of construction covered by each application. Executed waivers shall be submitted to the Architect with the submittal of the next Application for Payment by the Contractor. With each Application for Payment, submit partial waiver of mechanics liens from subcontractors, or sub-subcontractors and suppliers for the construction period covered by the previous application.
   2. When an application shows completion of an item, submit final or full waivers when retainage is released.
   3. The Owner reserves the right to designate which entities involved in the Work must submit waivers.
   4. Submit the 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. The total amount of each entity's final waiver of lien shall equal the Contact Sum for that entity including all additions and reductions thereto.
   5. See Section 00 65 19.13 - Affidavit of Payments of Debts and Claims Form.
   6. See Section 00 65 19.16 - Affidavit of Release of Liens Form.
   7. See Section 00 65 19.17 - Waiver of Lien.

D. Schedule Update: Along with each payment requisition, the Contractor shall submit construction photographs and a report on the status of the next month's construction schedule. Each such monthly report shall update the progress of the Work and shall identify:
   1. Areas of the building and site expected to be worked on during the next month.
   2. Special conditions or circumstances that may affect the safe use of the building or site.

1.04 MODIFICATION PROCEDURES

A. Minor Changes to the Work: 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.

B. Architect / Owner Initiated Change Order Proposal Requests: The Architect shall issue Proposal Requests that describe proposed changes in the Work that may require adjustment to the Contract Sum and/or Contract Time. The Architect will provide supplemental sketches or revised Drawings and Specifications as necessary.
   1. Proposal requests are for information only. Do not consider them an instruction either to stop work in progress, or to execute the proposed change.
   2. Unless otherwise indicated in the proposal request, within ten working days of receipt of the proposal request, the Contractor shall submit to the Architect and Owner for review, an estimate of cost necessary to execute the proposed change. Include an itemization of quantities, unit costs, etc. Include all related charges and a statement indicating the effect the proposed change will have on the Contract Time.

C. Contractor Initiated Change Order Proposal Requests: The Contractor may propose changes when latent or other unforeseen conditions require modifications to the Contract, by submitting a request for a change to the Architect.
   1. Provide a complete description of the proposed change. Indicate the reason for the change and the effect of the change on the Work, the Contract Sum and the Contract Time. Include an itemization of quantities, unit costs, etc. and include all related charges. Comply with requirements for "Substitutions".
   2. See Section 00 63 57 - Change Order Request Form.
   3. See Section 00 63 63 - Change Order Form.

D. Allowances: See Section 01 21 00 - Allowances. For allowance cost adjustment, base Change Order Proposal on the difference between the actual purchase amount and the allowance, multiplied by the measurement for work-in-place. Submit substantiation of all changes in Work

claimed in the Change Orders. The Owner reserves the right to establish the actual quantity of work-in-place by independent quantity survey, measure, or count.

1. 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. A change in the Contractor's indirect expense will only be allowed when it is clearly demonstrated that either the nature or scope of the Work was changed from that which could be foreseen from the description of the allowance and other information in the Contract Documents.

E. Construction Change Directive: Construction Change Directives, containing descriptions of changes in the Work and designating methods to be followed to determine changes in the Contract Sum and/or Contract Time may be issued by the Architect.
   1. Maintain detailed records of time and materials related to the 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.
   2. See Section 00 63 46 - Construction Change Directive Form.

F. Change Order Procedures: Upon the Owner's approval of a Change Order Proposal Request, the Architect will issue a Change Order for signatures of the Owner and Contractor, in triplicate.
   1. See Section 00 63 63 - Change Order Form.

1.05 SUBSTITUTIONS

A. Substitutions are changes, modifications or deviations in those products, materials, equipment, and methods of construction required by the Contract Documents proposed by the Contractor after the receipt of Bids. Substitutions for the convenience of the Contract or subcontractors, or materials suppliers will only be considered if submitted prior to the receipt of Bids, in strict conformance with the Instructions to Bidders. The following shall not be considered substitutions:
   1. Changes, modifications, or deviations requested by Bidders during the bidding period and accepted prior to the receipt of Bids shall be considered as included in the Contact Documents and are not subject to the requirements of this Section.
   2. Revisions to Contract Documents requested by the Owner or Architect.
   3. Specified options of products or materials included in the Contract Documents.
   4. The Contractor's compliance with governing regulations and orders issued by governing authorities, subject to the Architect's prior written notice and approval.

B. Substitution Requests: See Section 01 60 00 - Product Requirements, for substitution request procedures.

1.06 SUBMITTALS

A. See Section 01 30 00 - Administrative Requirements, for requirements regarding submission of:
   1. Outline Construction Schedule.
   2. Comprehensive Construction Schedule.
   3. Schedule of Materials.
   4. Schedule of Submittals.
   5. Shop Drawings, Product Data and Samples.
   6. Mock-ups and Sample Field Installations.
   7. Requests for Substitution

1.07 ELECTRONIC MEDIA

A. Electronic Media: See Section 01 00 30 - Electronic Media, for information regarding obtaining the Contract Documents electronically and their limited use for purposes of project coordination, Contractor's use in the preparation of submittals, and Contractor's use in the preparation of Record Drawings.

1.08 QUALITY CONTROL

A. General: The Owner shall employ an independent testing agency for the purpose of testing and inspecting portions of the Work in progress. The Contractor and his various subcontractors shall be responsible for specific testing and inspections as identified in individual specification sections. See Section 01 40 00 - Quality Requirements and Section 01 21 00 - Allowances.

1.09 TEMPORARY FACILITIES

A. See Section 01 50 00 - Temporary Facilities and Controls, for information regarding:
   1. Field offices and storage sheds.
   2. Project signs.
   3. Temporary utilities.
   4. Temporary enclosures and heat.
   5. Sanitary facilities.
   6. Temporary protective covering of finished work.
   7. Temporary protection of existing facilities.
   8. Temporary fencing.
   9. Temporary fire protection.
   10. Temporary drainage and storm water control.
   11. Clean-up and waste removal.

1.10 PROJECT MEETINGS

A. The Contractor shall schedule the following project meetings including but not limited to:
   1. Pre-Construction Meeting.
   2. Pre-Installation Meetings.
   3. Coordination Meetings.
   4. Job Meetings.
   5. Project Close-out Meeting.
   6. Other meetings as necessary.

B. Pre-Construction Meeting: The Contractor shall conduct an initial organization meeting at the Project site or other convenient location after the Notice to Proceed and prior to commencement of construction activities. The Owner, Architect, Owner's Representative, Contractor, his Superintendent, major subcontractors, and other concerned parties shall each be represented at the meeting by persons familiar with and authorized to conclude matters related to the Work. The Contractor shall record the minutes of this meeting. The minutes shall be distributed promptly to all participants.
   1. Agenda items shall include, but not be limited to:
      a. Notice to Proceed
      b. Designation of personnel representing the parties and their responsibilities.
      c. Contract Documents: on-site documents, discrepancies or omissions, interpretations and clarifications.
      d. Subcontractors
      e. Schedule of Values
      f. Insurance requirements.
      g. Application for Payment: progress payments, Substantial Completion, off-site stored materials.
      h. Project meetings.
      i. Layout.
      j. Scheduling: Construction schedule, working hours, overtime, holidays.
      k. Permits and regulations
      l. Testing and inspections.
      m. Submittals: schedule, process, shop drawings, samples, record documents.
      n. Substitutions.
      o. Changes.
      p. Job responsibilities: Superintendent, Owner's Representative.

q. Temporary facilities: parking, staging areas, site security, water, power, clean-up
r. Job safety.

C. Pre-Installation Meetings: The Contractor shall conduct pre-installation meetings before each major construction activity that requires coordination is begun. Attendees may include the Contractor, Superintendent, Owner's Representative, Architect, Installers, Manufacturer's representatives, and fabricators. Refer to individual Specification Sections for required pre-installation meetings. Review progress of other construction activities and preparation for the particular activity under consideration.

D. Coordination Meetings: The Contractor shall conduct coordination meetings at regularly scheduled times convenient to all parties. All major subcontractors shall be represented and other trades or subcontractors as required for coordination, planning and scheduling construction activities. The Contractor shall bring any significant issues to the next Job Meeting.

E. Job Meetings: The Contractor shall conduct regular job meetings once every two weeks, or more frequently if required, during the construction period, at such time as is mutually acceptable to the Owner, Architect and Contractor. All major subcontractors shall be represented at each meeting as needed. Other trades or subcontractors may be called to particular job meetings as the progress of the Work requires. The Contractor shall record the minutes of each meeting. The minutes shall be distributed promptly to all participants.
1. Agenda items shall include, but not be limited to:
a. Review construction progress since the last meeting.
b. Review work progress in relation to the Construction Schedule.
c. Review "Old Business" and new items significant to the Work.
d. Review issues regarding construction activities and Owner's on-going occupancy.
e. Review work sequence, deliveries, hazards, quality standards, housekeeping, security, etc.
f. Review Change Orders, Proposal Requests, Requests for Information, Supplemental Instructions.
g. The Contractor will distribute updated Construction Schedule once per month.

F. Project Close-out Meeting: See Section 01 78 00 - Project Close-out.

1.11 WARRANTIES

A. See Section 01 78 10 - Warranties, for requirements regarding submission of a bound set of warranties and certificates as required by the Contract Documents.

1.12 PROJECT CLOSE-OUT

A. See Section 01 78 00 - Project Close-out, for requirements regarding:
1. Substantial Completion procedures, including Project Close-out Meeting and Occupancy Permit.
2. Architect's evaluation of the Work.
3. Final Acceptance procedures.
4. Project record documents submittal, including O&M manuals, warranties binder, record photographs, and record drawings.
5. Spare parts and extra materials procedures.
6. Indoor Air Quality Management, building commissioning and systems testing.
7. Operating and maintenance instructional sessions.
8. Final cleaning.
9. Contractor's Certificate of No Hazardous Materials.
a. Testing agency final report.

B. Occupation by the Owner: The Owner shall have the right to take possession of and use any completed or partially completed portions of the Work, notwithstanding the fact that the time for completing the entire Work or such portions thereof may not have expired; but such possession and use shall not be an acceptance of the Work.

1.13 TIME FOR COMPLETION AND LIQUIDATED DAMAGES

A. Time is of the essence of the Contract, and the Work to be performed under the Contract shall be commenced on or around (Date – TBD), 2015, and shall be Substantially Complete and in receipt of an Occupancy Permit on or before (Date – TBD).

B. It is expressly understood and agreed, by and between the Contractor and the Owner, that the time for completion of the Work described herein is reasonable for the completion of same, taking into consideration the climatic and industrial conditions prevailing in this locality.

C. See Section 00 73 00.11 - Schedule of Liquidated Damages.

END OF SECTION

SECTION 01 00 30

ELECTRONIC MEDIA

PART 1 - GENERAL

1.01 DESCRIPTION

A. The provisions of this Section apply to each and every contract and contractor or other person or persons supplying labor, material, equipment and/or services entering into this Project and/or on the premises directly or indirectly.

B. Following the receipt of a written request by the Contractor, signed Electronic Data Transfer and Non-Disclosure Agreement, and if applicable, payment in full from the Contractor, the Architect will make available an electronic data version of the Project, for the limited purposes described in this Agreement. It shall be the Contractor's responsibility to make electronic files available to subcontractors in accordance with the Electronic Data Transfer and Non-Disclosure Agreement.

ELECTRONIC DATA TRANSFER AND NON-DISCLOSURE AGREEMENT

The Agreement is entered into and agreed by, between and among Lavallee Brensinger Professional Association (LBA) Owner, and _____ (Recipient) and is made in reference to the University of Southern Maine/Science Building C300 Chemistry Lab Project. It is understood and agreed that it may become desirable for LBA to make certain Instruments of Service in electronic machine readable format, hereinafter referred to as "Electronic Data" available to other parties related to the Project. It is also understood that such information is proprietary to LBA and that LBA intends to limit its distribution and use. It is the intent of the Agreement to govern all circumstances under which Electronic Data is made available by LBA.

In consideration of the request of _____ (Recipient) to LBA and Owner to deliver to Recipient or otherwise enable the Recipient to access certain Electronic Data for use on the Project, the parties mutually agree as follows:

1. Electronic Data includes but is not limited to, computer-aided design files including native file formats (DWG), Building Information Models (BIM), files produced by word processing, spread sheet, scheduling, data base and other software programs. Computer-Aided-Design files shall be provided as Autocad.dwg files. Building Information Models shall be provided as Revit.rvt files.

2. The means by which the Electronic Data is transferred may include, but are not limited to, electronic mail, File Transfer Protocol sites and CD-Rom, transmitted between the parties in this Agreement. Recipient acknowledges that Electronic Data transferred in any manner or translated from the system and format used by LBA to an alternate system or format is subject to errors that may affect the accuracy and reliability of the data and that the data may be altered, whether inadvertently or otherwise. Accordingly, LBA makes no warranty, express or implied, as to the correctness, accuracy, and/or completeness of the information transferred. Although LBA may issue information throughout the development of the Project, LBA does not represent that the information provided includes all revisions to-date, nor shall LBA assume any responsibility for providing updated information as the Project proceeds.

3. LBA reserves the right to retain hard copy originals in addition to electronic copies of the Electronic Data transferred, which originals shall be referred to and shall govern in the event of any inconsistency with the transferred data. Should the recipient discover errors or conflicts in any transferred files, he shall promptly notify LBA.

4. As consideration to LBA for the transfer of the Electronic Data, Recipient agrees that the use of Electronic Data shall be entirely at his/her own risk, and that LBA shall not be liable for, and Recipient hereby waives all claims and agrees to indemnify and hold LBA harmless from all liabilities, claims, losses, damages or expenses (including attorneys' fees) arising out of, or connected with: (1) the transfer of Electronic Data by any means; or (2) the use, modification or misuse of the Electronic Data by parties other than LBA; or (3) the limited life expectancy and decline of accuracy or readability of the Electronic Data due to storage; or (4) translation and data errors; or (5) any use of the Electronic Data by any third parties receiving the data from other parties to this Agreement; or (6) the incompatibility of software or hardware used by LBA and the other parties to this Agreement.

5. **The Electronic Data provided by LBA under the terms of this Agreement is the proprietary information of LBA, containing designs, details, model elements and other information developed by LBA. LBA is willing to supply such information only if the Recipient enters into this Non-Disclosure Agreement and agrees to strictly enforce its terms and conditions. All Electronic Data is to be treated as confidential and is not to be disclosed to or shared with any third parties, not expressly allowed herein, without LBA's express, written consent.**

6. Recipient agrees to maintain and protect any and all proprietary information of LBA and to exercise great care in the preservation of its confidentiality. The Recipient will disclose the proprietary information only to its own employees, and then only to the extent required for the design and construction of this Project. The Recipient shall be responsible for any unauthorized use or disclosure of LBA's proprietary information by anyone to whom it may disclose such information.

7. The Recipient agrees that any and all Electronic Data shall remain the property of LBA. Neither the execution of this Agreement, nor the transfer of Electronic Data shall constitute a conveyance or transfer to the Recipient of any right, interest, or license in the proprietary materials. The Recipient shall not reproduce any proprietary information without the express written authorization of LBA.

8. Electronic Data 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 Data do not replace or supplement the paper copies of the Drawings and Specifications which are and remain, the Contract Documents for the Project.

9. **Electronic Data shall only be used for purposes allowable by this Agreement. It is understood and agreed that, without the separate express written permission of LBA to do so, the Electronic Data are not to be used for any purpose whatsoever, by anyone (any contractor or any of its subcontractors of any tier or any materials supplier or vendor) other than the Recipient. It shall be the responsibility of the Recipient to notify LBA of any and all third parties with whom the Recipient wishes to share LBA's Electronic Data, to identify the intended uses of the information, and to obtain LBA's prior written authorization to share LBA's information.**

10. All transmittal of Electronic Data whether by CD-Rom, e-mail, Internet or any other methods shall require that the file name, size, date and time be recorded along with the date and time of transmission (if by electronic means) and the identity of the sender and recipient.

11. The Recipient further agrees to indemnify and save harmless LBA and its sub-consultant and each of their partners, officers, shareholders, directors and employees from any and all claims, judgments, suits, liabilities, damages, costs or expenses (including reasonable defense and attorneys' fees) arising as the result of either: 1) Recipient's failure to comply with any of the requirements of the Electronic Data Transfer Agreement; or 2) a defect, error or omission in the Electronic Data or the information contained therein, which defect error or omission was not contained in the Contact Documents as defined in paragraph 3 or where the use of such Contact Documents would have prevented the claim, judgment, suit, liability, damage, cost or expense.

12. This agreement shall be interpreted under the laws of the State of New Hampshire. The Recipient hereby agrees that the breach of this Agreement by the Recipient will cause LBA considerable harm, and LBA shall be entitled to recover damages, as well as all expenses and costs incurred by LBA arising out of or related to such breach, including, without limitation, reasonable attorney's fees and costs.

13. In general, the protocols for the distribution of Electronic Data shall be as follows:

a. LBA may make certain Electronic Data available to _____ (Recipient - MUST be Owner, Construction Manager or General Contractor) free of charge, providing that:
   1) Such files can be issued in the format currently used by LBA, without modification.
   2) The Recipient delivers to LBA a fully executed copy of this Agreement and, among other requirements, agrees not to share LBA's Electronic Data with any third parties without LBA's prior written authorization.

b. In the event the Recipient wishes to share LBA's Electronic Data with a third party:
   1) The Recipient shall first forward a complete list of all such third parties to LBA for LBA's prior written authorization. The list shall include all third party names, addresses, telephone numbers, and email addresses.
   2) Each individual third party shall then deliver, through the Recipient, a fully executed copy of this Agreement.

c. In the event that it is necessary for LBA to convert files from its currently used format to an alternative format, LBA shall be compensated for such conversion at the rate of $75.00 per file, payable in advance.

The parties have executed this Agreement as of the dates stated below:

RECIPIENT
Company: _____
By: _____
Title: _____
Date: _____

LBA
Title: _____
Date: _____

END OF SECTION

SECTION 01 10 00
SUMMARY

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

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

1.02 SUMMARY

A. This Section includes the following:
1. Roles and Responsibilities.
2. Work covered by the Contract Documents.
3. Type of the Contract.
4. Work schedule.
5. Work under other contracts.
6. Use of premises.
7. Owner's occupancy requirements.
8. Work restrictions.
9. Specification formats and conventions.

B. Related Sections include the following:
1. Section 01 00 00 "General Requirements".
2. Section 01 50 00 "Temporary Facilities and Controls" for limitations and procedures governing temporary use of Owner's facilities.

1.03 ROLES AND RESPONSIBILITIES

A. Owner: University of Maine System for the University of Southern Maine.

B. Architect: Lavallee Brensinger Architects.

1.04 WORK COVERED BY CONTRACT DOCUMENTS

A. Project Identification: **Science Building C300 Chemistry Lab, #2014-023**
1. Project Location: **University of Southern Maine, 25 Bedford Street, Portland, Maine 04104**
2. Description: Complete interior demolition, renovations and system upgrades of an existing chemistry laboratory and adjacent support spaces located within the third floor portion of Science Building C300 Chemistry Lab located on the University of Southern Maine Portland Campus. Completion of scope of work will require partial demolition and renovations to the abutting second floor areas for floor utility access, replacement and installation of new roof top equipment including minor roof renovations/repairs and necessary selective demolition and repair as required for additional utility connections, replacement or installations as required throughout the building. The construction start date will by (Date – TBD)

1.05 TYPE OF CONTRACT

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

1.06 WORK SCHEDULE

A. Substantial completion date for the work:
1. The building and site shall be substantially complete as indicated in the contract documents.

B. Final completion, including completion of interior punch list items shall be done as indicated in the contract documents.

C. College Break Schedule: not used:

1.07 WORK UNDER OTHER CONTRACTS

A. General: Cooperate fully with separate contractors so work on those contracts may be carried out smoothly, without interfering with or delaying work under this Contract. Coordinate the Work of this Contract with work performed under separate contracts.

B. Concurrent Work: Owner will award separate contract(s) for the following construction operations at Project site. Those operations will be conducted simultaneously with work under this Contract.
1. TAB.
2. Security.

1.08 OWNER-FURNISHED PRODUCTS

A. Owner will furnish products indicated and /or as specified. The Work includes providing support systems to receive Owner's equipment.
1. Owner will arrange for and deliver Shop Drawings, Product Data, and Samples to Contractor.
2. Owner will arrange and pay for delivery of Owner-furnished items according to Contractor's Construction Schedule.
3. After delivery, Owner will inspect delivered items for damage. Contractor shall be present for and assist in Owner's inspection.
4. If Owner-furnished items are damaged, defective, or missing, Owner will arrange for replacement.
5. Owner will arrange for manufacturer's field services and for delivery of manufacturer's warranties to Contractor.
6. Owner will furnish Contractor the earliest possible delivery date for Owner-furnished products. Using Owner-furnished earliest possible delivery dates, Contractor shall designate delivery dates of Owner-furnished items in Contractor's Construction Schedule.
7. Contractor shall review Shop Drawings, Product Data, and Samples and return them to Architect noting discrepancies or anticipated problems in use of product.
8. Contractor is responsible for receiving, unloading, and handling Owner-furnished items at Project site.
9. Contractor is responsible for protecting Owner-furnished items from damage during storage and handling, including damage from exposure to the elements.
10. If Owner-furnished items are damaged as a result of Contractor's operations, Contractor shall repair or replace them.
11. Contractor shall install and otherwise incorporate Owner-furnished items into the Work.

1.09 USE OF PREMISES

A. General: Contractor shall have limited use of premises for construction operations as indicated on Drawings by the Contract limits.

B. Use of Site: Limit use of premises to areas within the Contract limits indicated. Do not disturb portions of Project site beyond areas in which the Work is indicated.
   1. Owner Occupancy: Allow for Owner occupancy of rooms and facilities adjacent to the work and use by the public.
   2. Driveways and Entrances: Keep driveways parking and entrances serving premises clear and available to Owner, Owner's employees, and emergency vehicles at all times. Do not use these areas for parking or storage of materials.
      a. Schedule deliveries to minimize use of driveways and entrances.
      b. Schedule deliveries to minimize space and time requirements for storage of materials and equipment on-site.

C. Use of Existing Building: Maintain existing building in a weather tight condition throughout construction period. Repair damage caused by construction operations. Protect building and its occupants during construction period.

D. Campus Tobacco Use Policy: A tobacco-free campus has been established at The University of Southern Maine to provide a healthy working and learning environment for the entire campus community.
   1. The University of Southern Maine is a tobacco-free campus. This policy applies to faculty, staff, students, contractors, vendors and visitors. The use of tobacco and all smoking products is not permitted on any university-owned property, which includes but is not limited to, buildings, university grounds, parking areas, campus walkways, recreational and sporting facilities, and university or personally-owned, rented or leased vehicles.
   2. Tobacco use by definition includes the possession of any lighted tobacco products, or the use of any type of smokeless tobacco, including but not limited to chew, snuff, snus, electronic cigarettes, and all other nicotine delivery devices that are non-FDA approved as cessation products.
   3. It is the shared responsibility of all members of the campus community to respect and abide by this policy. The successful implementation of this policy depends on the courtesy and cooperation of the entire campus community.

1.10 OWNER'S OCCUPANCY REQUIREMENTS

A. Full Owner Occupancy: Owner will occupy adjacent site and existing building during entire construction period. Cooperate with Owner during construction operations to minimize conflicts and facilitate Owner usage. Perform the Work so as not to interfere with Owner's day-to-day operations. Maintain existing exits, unless otherwise indicated.
   1. Maintain access to existing walkways, corridors, and other adjacent occupied or used facilities. Do not close or obstruct walkways, corridors, or other occupied or used facilities without written permission from Owner and authorities having jurisdiction.
   2. Provide not less than 72 hours' notice to Owner of activities that will affect Owner's operations.

B. Owner Occupancy of Completed Areas of Construction: Owner reserves the right to occupy and to place and install equipment in completed areas of building, before Substantial Completion, provided such occupancy does not interfere with completion of the Work. Such placement of equipment and partial occupancy shall not constitute acceptance of the total Work.
   1. Architect will prepare a Certificate of Substantial Completion for each specific portion of the Work to be occupied before Owner occupancy.
   2. Contractor shall obtain a Certificate of Occupancy from authorities having jurisdiction before Owner occupancy.
   3. Before partial Owner occupancy, mechanical and electrical systems shall be fully operational, and required tests and inspections shall be successfully completed. On occupancy, Owner will operate and maintain mechanical and electrical systems serving occupied portions of building.

4. On occupancy, Owner will assume responsibility for maintenance and custodial service for occupied portions of building.

1.11 WORK RESTRICTIONS

A. Existing Utility Interruptions: Do not interrupt utilities serving facilities occupied by Owner or others unless permitted under the following conditions and then only after arranging to provide temporary utility services according to requirements indicated:
   1. Notify Architect and Owner not less than three days in advance of proposed utility interruptions.
   2. Do not proceed with utility interruptions without Owner's written permission.
   3. Shutdowns shall be scheduled during after hours, or during semester breaks, when the facility is not occupied.

1.12 SPECIFICATION FORMATS AND CONVENTIONS

A. Specification Format: The Specifications are organized into Divisions and Sections using the 50-division format and CSI/CSC's "2004 MasterFormat" numbering system.
   1. Section Identification: The Specifications use Section numbers and titles to help cross-referencing in the Contract Documents. Sections in the Project Manual are in numeric sequence; however, the sequence is incomplete because all available Section numbers are not used. Consult the table of contents at the beginning of the Project Manual to determine numbers and names of Sections in the Contract Documents.
   2. Division 1: Sections in Division 1 govern the execution of the Work of all Sections in the Specifications.

B. Specification Content: The Specifications use certain conventions for the style of language and the intended meaning of certain terms, words, and phrases when used in particular situations. These conventions are as follows:
   1. Abbreviated Language: Language used in the Specifications and other Contract Documents is abbreviated. Words and meanings shall be interpreted as appropriate. Words implied, but not stated, shall be inferred as the sense requires. Singular words shall be interpreted as plural, and plural words shall be interpreted as singular where applicable as the context of the Contract Documents indicates.
   2. Imperative mood and streamlined language are generally used in the Specifications. Requirements expressed in the imperative mood are to be performed by Contractor. Occasionally, the indicative or subjunctive mood may be used in the Section Text for clarity to describe responsibilities that must be fulfilled indirectly by Contractor or by others when so noted.
      a. The words "shall," "shall be," or "shall comply with," depending on the context, are implied where a colon (:) is used within a sentence or phrase.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION

SECTION 01 21 00
ALLOWANCES

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Cash Lump Sum and Unit Cost allowances.

B. Inspecting and testing allowances.

1.02 RELATED REQUIREMENTS

A. Section 01 00 00 - General Requirements: Additional payment and modification procedures.

1.03 CASH ALLOWANCES

A. Types of allowances required include Lump Sum allowances and Unit Cost allowances.

B. All Allowances under this Section shall be included in the Base Bid and shall be carried by the Contractor, unless specifically indicated to be carried by a subcontractor.

C. The Contract shall cause the work covered by these Allowances to be performed for such amounts and by such persons as the Owner may direct, but he will not be required to employ persons against whom he makes a reasonable objection.

D. Costs Included in Cash Allowances: Cost of product to the Contractor or subcontractor, less applicable trade discounts, and other costs, if any, specifically included in the description of the Allowance.

E. Costs Not Included in Cash Allowances: Product delivery to site and handling at the site, including unloading, uncrating, and storage; protection of products from elements and from damage; and labor for installation and finishing, unless specifically included in the description of the Allowance.

F. Refer to related Drawings and Specifications for additional information regarding Work to be included as a part of Allowances.

G. Architect Responsibilities:
   1. Consult with Contractor for consideration and selection of products, suppliers, and installers.
   2. Select products in consultation with Owner and transmit decision to Contractor.
   3. Prepare Change Order.

H. Contractor Responsibilities:
   1. At the earliest practical date after award of the Contract, advise the Architect of the date when selection and purchase of each product or system described by an Allowance must be completed to avoid delaying the Work.
   2. Assist Architect in selection of products. Where services, products and/or systems are selected by the Owner, purchase such items from the designated supplier.
   3. Obtain proposals from suppliers and installers for use in making final selections and offer recommendations.
   4. On notification of which products have been selected, execute purchase agreement with designated supplier and installer.
   5. Arrange for and process shop drawings, product data, and samples. Arrange for delivery.
   6. Promptly inspect products upon delivery for completeness, damage, and defects. Submit claims for transportation damage.
   7. Submit invoices or delivery slips to show quantities of materials delivered to the site for use in fulfilling each allowance.
   8. Cost monitoring:
      a. Monitor progress of Allowance costs and expenditures and regularly report to the Architect and Owner.

b. Provide written advance notice to Architect and Owner if Allowance is likely to be exceeded.
c. Obtain Owner's written authorization prior to incurring costs in excess of the stated Allowance.
d. The Contractor shall assume responsibility for all costs in excess of the stated Allowance with failure to perform the above cost monitoring procedures.

I. If the cost, when determined, is more than or less than the Allowance, the Contract Sum shall be adjusted accordingly by Change Order, which will include additional or reduced handling costs on the site, labor, installation costs, overhead, profit and other expenses resulting to the Contractor for any increase over or decrease from the original Allowance.

PART 2 - ALLOWANCES

2.01 INSPECTING AND TESTING ALLOWANCE

A. Allow the sum of $ TBD for inspection services provided by the Owner, to establish compliance with the Contract Documents. The Owner will solicit proposals and select the Testing Agency. All reports and invoices shall be submitted to the Architect and Owner prior to payment. See Section 01 40 00 - Quality Requirements.

B. Costs Not Included in the Inspecting and Testing Allowance:
1. Costs of incidental labor and facilities required to assist Testing Agency.
2. Costs of testing services required to be provided by the Contractor or any subcontractor. Document requirements.
3. Costs of retesting upon failure of previous tests as determined by Architect.

C. Payment Procedures:
1. Submit two copies of the Testing Agency's invoice with next Application For Payment to Architect.
2. Pay invoice on approval by Architect.

D. Differences in cost will be adjusted by Change Order.

2.02 FURNISHINGS AND EQUIPMENT

A. Allow the sum of $ TBD for the purchase and installation of the following:
1. Laptop computer with service contract. (University of Southern Maine to issue specification requirements and preferred service source.)

B. The Owner will solicit proposals for equipment. The Contractor shall be required to engage as subcontractors, equipment suppliers/ subcontractors selected by the Owner. The equipment subcontractors will furnish Performance Bonds and also Payment Bonds, each of a surety company qualified to do business under the laws of the State and satisfactory to the Owner. Such bonds will be in the name of the Contractor and each will be in the sum of one hundred percent of the contract price, the premiums for which are to be paid by the equipment subcontractors.

C. NOTE: Drawings and Specifications related to the Furnishings and Equipment of this Allowance have been made available to Bidders for their information. Bidders are encouraged to review such documents in order to accurately assess the scope of Work required.

2.03 BUILDING CONTROLS AND AUTOMATION SYSTEMS

A. Allow the sum of $ TBD for Building Automation System (BAS) controls as specified in Section 230900 “INSTRUMENTATION AND CONTROL FOR HVAC” and Section 230995 “LABORATORY AIRFLOW CONTROL SYSTEM". This work will be provided by IB Controls and is assigned to the general contractor as part of their contractual obligations.
1. Contactor is responsible for scheduling and coordinating this work.

PART 3 EXECUTION - NOT USED

END OF SECTION

SECTION 01 23 00
ALTERNATES

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Description of alternates.

B. The Contractor shall provide all labor, materials, equipment, and services, etc., necessary for the proper and complete execution of accepted Alternates. Amount of Alternate prices to be added to or deducted from the Base Bid shall be stated on the Proposal Form and shall include cost of any and all modifications made necessary by Owner's acceptance of Alternates.

C. Related Work Described Elsewhere:
   1. Materials and methods to be used in the Base Bid and in the Alternatives are generally described in the Contract Documents.
   2. Method for stating the proposed Contract Sum is described in the Proposal Form.

D. This Section includes administrative and procedural requirements for alternates.

E. NOTE: Alternates will be carefully considered in the Owner's selection of a Contractor.

1.02 RELATED REQUIREMENTS

A. Document 00 21 13 - Instructions to Sub-bidders: Instructions for preparation of pricing for alternatives.

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

1.03 DEFINITIONS

A. Alternate: An amount proposed by bidders and stated on the Bid Form for certain work defined in the Bidding Requirements that may be added to or deducted from the Base Bid amount if Owner decides to accept a corresponding change either in the amount of construction to be completed or in the products, materials, equipment, systems, or installation methods described in the Contract Documents.

   1. The cost or credit for each alternate is the net addition to or deduction from the Contract Sum to incorporate alternate into the Work. No other adjustments are made to the Contract Sum.

   2. Hold pricing for 90 days from date of bid opening to allow Owner time for project accounting. Alternates not accepted before contract signing may be added by Change Order later.

1.04 ACCEPTANCE OF ALTERNATES

A. If the Owner elects to proceed on the basis of one or more of the described Alternates, make all modifications to the Work required in order to furnish and install the selected Alternate or Alternates to the approval of the Architect and at no additional cost to the Owner, other than as proposed on the Proposal Form.

B. Notification: Immediately following award of the Contract, notify each party involved, in writing, of the status of each alternate. Indicate if alternates have been accepted, rejected, or deferred for later consideration. Include a complete description of negotiated modifications to alternates.

C. It shall be the responsibility of the Contractor to properly coordinate work related to Alternates with all other Work of this Contract in order to ensure that a complete and proper job is provided.
   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.

D. Submit a Schedule of Values including adjustments to all Sections affected by accepted Alternates.

E. Alternates quoted on Bid Forms will be reviewed and accepted or rejected at Owner's option. Accepted alternates will be identified in the Owner-Contractor Agreement.

F. Coordinate related work and modify surrounding work to integrate the Work of each alternate.

G. Execute accepted alternates under the same conditions as other work of the Contract.

H. Schedule: A Schedule of Alternates is included at the end of this Section. Specification Sections referenced in schedule contain requirements for materials necessary to achieve the work described under each alternate.

1.05 SCHEDULE OF ALTERNATES

A. Alternate No.1 (Concrete Slab Moisture Barrier System for Resilient Flooring)
   1. No.1A: State the amount to be ADDED to the Base Bid to furnish and install the slab moisture barrier system and primer, if Owner's field testing indicates an issue with slab moisture vapor and alkalinity levels for flooring installations. See Section 09 65 00 - Resilient Flooring.
   2. No. 1B: State the amount to be ADDED to the Base Bid to provide blast-trac slab surface preparation to remove surface slab contaminants and produce a bondable surface as required by the slab moisture barrier system.

PART 2 PRODUCTS - NOT USED

PART 3 EXECUTION - NOT USED

END OF SECTION

SECTION 01 26 00
CONTRACT MODIFICATION PROCEDURES

PART 1 GENERAL

1.01 SECTION INCLUDES

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

1.02 RELATED REQUIREMENTS

A. Section 00 21 13 - Instructions to Sub-bidders: Instructions for preparation of pricing for alternatives.

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

C. Section 01 60 00 – Product Requirements: Administrative procedures for handling requests for substitutions made after Contract award.

1.03 MINOR CHANGES IN THE WORK

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

1.04 PROPOSAL REQUESTS

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

1. Proposal Requests issued by Architect are for information only. Do not consider them instructions either to stop work in progress or to execute the proposed change.
2. Within 20 days after receipt of Proposal Request or earlier as specified in Proposal Request issued, submit a quotation estimating cost adjustments to the Contract Sum and the Contract Time necessary to execute the change.
    a. Include a list of quantities of products required or eliminated and unit costs, with total amount of purchases and credits to be made. If requested, furnish survey data to substantiate quantities.
    b. Indicate applicable taxes, delivery charges, equipment rental, and amounts of trade discounts.
    c. Include costs of labor and supervision directly attributable to the change.
    d. Include quotes on supplier’s and subcontractor’s letterhead for the requested change.
    e. Include an updated Contractor's Construction Schedule that indicates the effect of the change, including, but not limited to, changes in activity duration, start and finish times, and activity relationship. Use available total float time before requesting an extension of the Contract Time.

B. Contractor-Initiated Proposals: If latent or unforeseen conditions require modifications to the Contract, Contractor may propose changes by submitting a request for a change to Architect.

1. Include a statement outlining reasons for the change and the effect of the change on the Work. Provide a complete description of the proposed change. Indicate the effect of the proposed change on the Contract Sum and the Contract Time.
2. Include a list of quantities of products required or eliminated and unit costs, with total amount of purchases and credits to be made. If requested, furnish survey data to substantiate quantities.

3. Indicate applicable taxes, delivery charges, equipment rental, and amounts of trade discounts.
4. Include costs of labor and supervision directly attributable to the change.
5. Include an updated Contractor's Construction Schedule that indicates the effect of the change, including, but not limited to, changes in activity duration, start and finish times, and activity relationship. Use available total float time before requesting an extension of the Contract Time.
6. Comply with requirements in Division 1 Section "Product Requirements" if the proposed change requires substitution of one product or system for product or system specified.

C. Proposal Request Form: Use AIA Document G709 for Proposal Requests, or format as approved by the Owner.

1.05 ALLOWANCES

A. Allowance Adjustment: To adjust allowance amounts, base each Change Order proposal on the difference between purchase amount and the allowance, multiplied by final measurement of work-in-place. If applicable, include reasonable allowances for cutting losses, tolerances, mixing wastes, normal product imperfections, and similar margins.

1. Include installation costs in purchase amount only where indicated as part of the allowance.
2. If requested, prepare explanation and documentation to substantiate distribution of overhead costs and other margins claimed.
3. Submit substantiation of a change in scope of work, if any, claimed in Change Orders related to unit-cost allowances.
4. Owner reserves the right to establish the quantity of work-in-place by independent quantity survey, measure, or count.

B. Submit claims for increased costs because of a change in scope or nature of the allowance described in the Contract Documents, whether for the Purchase Order amount or Contractor's handling, labor, installation, overhead, and profit. Submit claims within 21 days of receipt of the Change Order or Construction Change Directive authorizing work to proceed. Owner will reject claims submitted later than 21 days after such authorization.

1. Do not include Contractor's or subcontractor's indirect expense in the Change Order cost amount unless it is clearly shown that the nature or extent of work has changed from what could have been foreseen from information in the Contract Documents.
2. No change to 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.

1.06 CHANGE ORDER PROCEDURES

A. On Owner's approval of a Proposal Request, Architect will issue a University of Maine Change Order form for signatures of Owner and Contractor.

1.07 CONSTRUCTION CHANGE DIRECTIVE

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

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

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

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

PART 2 PRODUCTS - NOT USED

PART 3 EXECUTION - NOT USED

END OF SECTION

SECTION 012900
PAYMENT PROCEDURES

PART 1 GENERAL

1.01 RELATED DOCUMENTS

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

1.02 SUMMARY

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

B. Related Sections include the following:

1. Section 01 00 00 – General Requirements:
    a. Administrative requirements governing preparation and submittal of Contractor's Construction Schedule and Submittals Schedule.
2. Section 01 26 00 - Contract Modification Procedures: Administrative procedures for handling changes to the Contract.
4. Section 01 78 00 – Project Closeout: Concurrent submittal of Preliminary Operation and Maintenance Summary with schedule of values submittal.

1.03 DEFINITIONS

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

1.04 SCHEDULE OF VALUES

A. Coordination: Coordinate preparation of the Schedule of Values with preparation of Contractor's Construction Schedule.

1. Correlate line items in the Schedule of Values with other required administrative forms and schedules, including the following:
    a. Application for Payment forms with Continuation Sheets.
    b. Submittals Schedule.
    c. Contractor's Construction Schedule.
2. Submit the Schedule of Values to Architect at earliest possible date but no later than seven days before the date scheduled for submittal of initial Applications for Payment.
    a. Submit Schedule of Values to the Architect in electronic format for review, comment and approval by the Owner.
3. Subschedules: Where the Work is separated into phases requiring separately phased payments, provide subschedules showing values correlated with each phase of payment.

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

1. Cover Sheet Identification: Include the following Project identification on the Schedule of Values:
    a. Project name and location.
    b. Name of Architect.
    c. Architect's project number.

d. Contractor's name and address.

e. Date of submittal.

f. Certification that Record Drawings have been updated and verified.

g. Certification that IDAT (Integrated Deliverables and Testing) procedures have been coordinated and completed for applicable items included in the Payment Application.

2. Submit draft of Continuation Sheets.

3. Arrange the Schedule of Values in tabular form with separate columns to indicate the following for each item listed:

   a. Related Specification Section or Division.

   b. Description of the Work.

   c. Name of subcontractor.

   d. Name of manufacturer or fabricator.

   e. Name of supplier.

   f. Change Orders (numbers) that affect value.

   g. Dollar value.

      1) Percentage of the Contract Sum to nearest one-hundredth percent, adjusted to total 100 percent.

4. Provide a breakdown of the Contract Sum in enough detail to facilitate continued evaluation of Applications for Payment and progress reports. Coordinate with the Project Manual table of contents, providing at least one line item for each Specification Section. Provide several line items for principal subcontract amounts, where appropriate.

   a. For each line item, provide a sublist breakdown as follows:

      1) Material.

      2) Labor.

      3) IDAT (Integrated Deliverables and Testing).

5. For Division 15 work, provide the following additional line item breakdown of the mechanical subcontractor’s work for each Application for Payment.

   a. Ductwork Systems.

   b. HVAC Piping Systems.

   c. HVAC Equipment.

   d. HVAC Controls.

   e. Plumbing, including fixtures and piping.

6. Documentation: Submit proper documentation for the amounts being requisitioned from subcontractors and material suppliers with each Application for Payment.

7. Round amounts to nearest whole dollar; total shall equal the Contract Sum.

8. Provide a separate line item in the Schedule of Values for each part of the Work where Applications for Payment may include materials or equipment purchased or fabricated and stored, but not yet installed.

   a. Differentiate between items stored on-site and items stored off-site. If specified, include evidence of insurance or bonded warehousing.

   b. Only major long lead delivery items may be considered for off-site storage (Example: Long lead custom mechanical unit). Standard order and production materials and products shall be delivered to the site before including in Application of Payment on such items.

9. Provide separate line items in the Schedule of Values for initial cost of materials, for each subsequent stage of completion, and for total installed value of that part of the Work.
10. Allowances: Provide a separate line item in the Schedule of Values for each allowance. Show line-item value of unit-cost allowances, as a product of the unit cost, multiplied by measured quantity. Use information indicated in the Contract Documents to determine quantities.
11. Each item in the Schedule of Values and Applications for Payment shall be complete.
    a. Temporary facilities and other major cost items that are not direct cost of actual work-in-place may be shown either as separate line items in the Schedule of Values or distributed as general overhead expense, at Contractor's option.
12. Schedule Updating: Update and resubmit the Schedule of Values before the next Applications for Payment when Change Orders or Construction Change Directives result in a change in the Contract Sum.

C. The Contractor shall furnish to the Architect at the beginning of the project an expected monthly requisition estimate for the Owner's use in planning funding.

1.05 APPLICATIONS FOR PAYMENT

A. Each Application for Payment shall be consistent with previous applications and payments as certified by Architect and paid for by Owner.
   1. Initial Application for Payment, Application for Payment at time of Substantial Completion, and final Application for Payment involve additional requirements.

B. Payment Application Times: Progress Payment Applications shall be submitted to Architect not less than 7 days before monthly progress meeting. The period covered by each Application for Payment is one month, ending on the last day of the month.
   1. Submit electronic copy to Architect and to Owner for review and comment at least 7 days before monthly progress meeting. Upon receipt of review comments, prepare notarized paper copies and transmit for signing at the progress meeting.

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

D. Application Preparation: Complete every entry on form. Notarize and execute by a person authorized to sign legal documents on behalf of Contractor. Architect will return incomplete applications without action.
   1. Entries shall match data on the Schedule of Values and Contractor's Construction Schedule. Use updated schedules if revisions were made.
   2. Include amounts of Change Orders and Construction Change Directives issued before last day of construction period covered by application.

E. Transmittal: Submit 3 signed and notarized original copies of each Application for Payment to Architect by a method ensuring receipt within 24 hours. One copy shall include waivers of lien and similar attachments if required.
   1. Transmit each copy with a transmittal form listing attachments and recording appropriate information about application.
   2. Submit one electronic copy of Application for Payment.

F. Waivers of Mechanic's Lien: With each Application for Payment, submit waivers of mechanic's liens from subcontractors, sub-subcontractors, and suppliers for construction period covered by the previous application.
   1. Submit partial waivers on each item for amount requested in previous application, after deduction for retainage, on each item.

2. When an application shows completion of an item, submit final or full waivers.
3. Owner reserves the right to designate which entities involved in the Work must submit waivers.
4. Submit final Application for Payment with or proceeded by final waivers from every entity involved with performance of the Work covered by the application who is lawfully entitled to a lien.
5. Waiver Forms: Submit waivers of lien on University of Maine System Wavier of Lien form, executed in a manner acceptable to Owner.

G. Record Drawing Updates: With each Application of Payment, record documents shall be maintained and current for all trades, available for viewing at a central location.

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

1. List of subcontractors.
2. Schedule of Values.
3. Contractor's Construction Schedule (preliminary if not final).
4. Products list.
5. Schedule of unit prices.
6. Submittals Schedule (preliminary if not final).
7. List of Contractor's staff assignments.
8. List of Contractor's principal consultants.
9. Copies of building permits and other required permits.
10. Copies of authorizations and licenses from authorities having jurisdiction for performance of the Work.
11. Initial progress report.
12. Report of preconstruction conference.
13. Certificates of insurance and insurance policies.
14. Performance and payment bonds.

I. Progress Applications for Payment: Administrative actions and submittals that must precede or coincide with submittal of progress Applications for Payment include the following:

1. Contractor's Construction Schedule update.
2. Submittals for Work being requisitioned for are complete and approved.
3. Submit list of completed tests, checklists, commissioning, reports, IDAT and similar requirements for the work are submitted and in compliance with the Contract Documents.
4. Minutes of previous month’s progress meeting have been distributed.
5. Record drawings are current.

J. Application for Payment at Substantial Completion: After issuing the Certificate of Substantial Completion, submit an Application for Payment showing 100 percent completion less retainage, for portion of the Work claimed as substantially complete.

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

K. Final Payment Application: Submit final Application for Payment with releases and supporting documentation not previously submitted and accepted, including, but not limited, to the following:

1. Evidence of completion of Project closeout requirements, record documents, operation and maintenance data, and demonstration and training.
2. Evidence of completion of IDAT (Integrated Deliverables and Testing).
3. Mechanical commissioning completed and all systems in full compliance.
4. Insurance certificates for products and completed operations where required and proof that taxes, fees, and similar obligations were paid.
5. Updated final statement, accounting for final changes to the Contract Sum.
6. University of Maine System - Certificate of Completion.
7. University of Maine System - Waiver of Lien.
8. Separate Releases of Waivers of Liens from Subcontractors and material and equipment suppliers.
9. AIA Document G707, "Consent of Surety to Final Payment."
10. Evidence that claims have been settled.
11. Submission of Waste Reporting Sheets and Waste Handling Certificates.
12. Final meter readings for utilities, a measured record of stored fuel, and similar data as of date of Substantial Completion or when Owner took possession of and assumed responsibility for corresponding elements of the Work.
13. Final, liquidated damages settlement statement.

PART 2 PRODUCTS - Not Used

PART 3 EXECUTION - Not Used

END OF SECTION

SECTION 01 30 00
ADMINISTRATIVE REQUIREMENTS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Preconstruction meeting.
B. Site mobilization meeting.
C. Job meetings.
D. Construction reports.
E. Construction Progress Schedule.
F. Materials Schedule.
G. Submittal Schedule.
H. Progress photographs.
I. Coordination Drawings.
J. Shop Drawings.
K. Approval Drawings.
L. Product Data, Certifications, Delegated-Design Submittals
M. Submittals for review, information, and project closeout.
N. Submittal procedures.
O. Architect's Review

1.02 RELATED REQUIREMENTS

A. Section 01 00 00 - General Requirements.
B. Section 01 78 10 - Warranties.
C. Section 01 78 00 - Project Close-out: Project record documents.

1.03 PROJECT COORDINATION

A. Project Coordinator: Contractor.
B. Cooperate with the Project Coordinator in allocation of mobilization areas of site; for field offices and sheds, for delivery access, traffic, and parking facilities.
C. During construction, coordinate use of site and facilities through the Project Coordinator.
D. Comply with Project Coordinator's procedures for intra-project communications; submittals, reports and records, schedules, coordination drawings, and recommendations; and resolution of ambiguities and conflicts.
E. Comply with instructions of the Project Coordinator for use of temporary utilities and construction facilities.
F. Coordinate field engineering and layout work under instructions of the Project Coordinator.
G. Make the following types of submittals to Architect through the Project Coordinator:
    1. Requests for interpretation.
    2. Requests for substitution.
    3. Shop drawings, product data, and samples.
    4. Test and inspection reports.
    5. Manufacturer's instructions and field reports.
    6. Applications for payment and change order requests.
    7. Progress schedules.
    8. Coordination drawings.

9. Closeout submittals.

PART 2 PRODUCTS - NOT USED

PART 3 EXECUTION

3.01 PRECONSTRUCTION MEETING

A. Owner will schedule a meeting after Notice of Award.

B. Attendance Required:
   1. Owner.
   2. Architect.
   3. Contractor.

C. Agenda:
   1. Introductions of attendees and their Project duties.
   2. Execution of Owner- Contractor Agreement.
   3. Submission of executed bonds and insurance certificates.
   4. Distribution of Contract Documents.
   5. Submission of list of Subcontractors, list of Products, schedule of values, and progress schedule.
   6. Designation of personnel representing the parties to Contract, Owner and Architect.
   7. Procedures and processing of field decisions, submittals, substitutions, applications for payments, proposal request, Change Orders, and Contract closeout procedures.
   8. Scheduling.

D. Contractor shall record minutes and distribute copies within two days after meeting to participants, with copies to Architect, Owner, participants, and those affected by decisions made.

3.02 SITE MOBILIZATION MEETING

A. The Contractor shall schedule a meeting at the Project site prior to his occupancy.

B. Attendance Required:
   1. Contractor.
   2. Owner.
   3. Architect.
   4. Contractor's Superintendent.
   5. Major Subcontractors.

C. Agenda:
   1. Use of premises by Owner and Contractor.
   2. Owner's requirements and occupancy prior to completion.
   3. Construction facilities and controls provided by Owner.
   4. Temporary utilities provided by Owner.
   5. Security and housekeeping procedures.
   6. Schedules.
   7. Application for payment procedures.
   8. Scope and procedures for testing and inspections. Review of Testing Agency duties.
   9. Procedures for maintaining record documents.
   10. Requirements for start-up of equipment.
   11. Inspection and acceptance of equipment put into service during construction period.

D. Contractor shall record minutes and distribute copies within two days after meeting to participants, with copies to Architect, Owner, participants, and those affected by decisions made.

3.03 JOB MEETINGS

A. Schedule and administer meetings throughout progress of the Work at maximum bi-monthly intervals.

B. Make arrangements for meetings, prepare agenda with copies for participants, preside at meetings.

C. Attendance Required: Job superintendent, major Subcontractors and suppliers, Owner, Architect, as appropriate to agenda topics for each meeting.

D. Agenda:
   1. Review minutes of previous meetings.
   2. Review of Work progress.
   3. Field observations, problems, and decisions.
   4. Identification of problems that impede, or will impede, planned progress.
   5. Review of submittals schedule and status of submittals.
   6. Maintenance of progress schedule.
   7. Corrective measures to regain projected schedules.
   8. Planned progress during succeeding work period.
   9. Maintenance of quality and work standards.
   10. Review of testing and inspection reports.
   11. Effect of proposed changes on progress schedule and coordination.
   12. Other business relating to Work.

E. Contractor shall record minutes and distribute copies within two days after meeting to participants, with copies to Architect, Owner, participants, and those affected by decisions made.

3.04 CONSTRUCTION REPORTS

A. The Contractor's superintendent shall maintain an on-site daily construction log, recording the following information concerning events at the site and allow access to the Owner and Architect for review.
   1. List of subcontractors at the site.
   2. Approximate count of personnel at the site.
   3. Visitors at the site.
   4. High and low temperatures, general weather conditions.
   5. Accidents and unusual events.
   6. Meetings held at the site.
   7. Communications received or conveyed by the superintendent.
   8. Stoppages, delays, shortage, losses.
   9. Meter readings and similar recordings.
   10. Emergency procedures.
   11. Orders and requests of governing authorities.
   12. Testing agency observations and tests.
   13. Change orders received and implemented.
   14. Services connected, disconnected.
   15. Significant deliveries.
   16. Equipment or system tests and start-ups.
   17. Partial completions, occupancies.
   18. Substantial Completions authorized.

3.05 CONSTRUCTION PROGRESS SCHEDULE

A. Within 10 days after date of the Agreement, submit preliminary schedule defining planned operations for the first 60 days of Work, with a general outline for remainder of Work.

B. If preliminary schedule requires revision after review, submit revised schedule within 10 days.

C. Within 10 days after joint review, submit complete schedule.

D. Submit updated schedule with each Application for Payment.

3.06 CONTRACTOR'S SCHEDULE OF MATERIALS

A. Within twenty-one (21) days after date established for the Notice of Award, prepare and submit to the Architect a projected schedule for materials delivery, clearly identifying all products with long lead times or which are likely to cause delay due to unavailability, extended delivery dates or any other reason. Once approved, long lead times shall be pre-ordered in a timely manner as not to delay the progress of the Work. The Contractor shall assume full responsibility for delays attributed to unavailability, insufficient time for delivery and/or installation of materials or performance of the Work, unless he has conformed with these instructions.

3.07 CONTRACTOR'S SUBMITTAL SCHEDULE

A. Within ten (10) days after development and acceptance of the Contractor's Construction Schedule, prepare and submit to the Architect a complete schedule of submittals. Coordinate schedule with subcontractors and provide adequate time for review, processing and the possibility of non-acceptance and resubmission. No extension of Contract Time will be authorized because of failure to transmit submittals to the Architect sufficiently in advance of ordering materials or performance of the Work to permit processing. Update schedule as necessary.

3.08 PROGRESS PHOTOGRAPHS

A. Submit a minimum of 20 digital photographs with each application for payment, taken not more than 7 days prior to submission of Application For Payment.
   1. Provide an electronic file.
   2. Identify project name, date, description of view and key plan of location if needed.

B. Maintain one set of all photographs at Project site for reference; same copies as submitted, identified as such.

C. Select locations to provide diversified overall views of the Work, from positions that are expected to remain accessible throughout the progress of the Work. When so directed by the Architect, change locations to new locations inside or outside the building.

D. Provide auxiliary lighting as required to produce clear, well lit photographs without obscuring shadows. Provide correct exposure and focus, high resolution and sharpness, maximum depth of field, and minimum distortion

E. Photography Type: Digital; electronic files.

F. Provide photographs of construction throughout progress of Work produced by an experienced photographer, acceptable to Architect.

G. Digital Photographs: 24 bit color, minimum resolution of 1024 by 768, in JPG format; provide files unaltered by photo editing software.
   1. Delivery Medium: On photo CD, flash drive, e-mail or link to on-line file share site either hosted by the Contractor or other, such as DropBox.
   2. File Naming: Include project identification, date and time of view, and view identification.
   3. Photo CD(s): Provide 1 copy including all photos cumulative to date and PDF file(s), with files organized in separate folders by submittal date.

3.09 SHOP DRAWINGS

A. Shop Drawings: Shop drawings include fabrication and installation drawings, coordination drawings, setting diagrams, schedules, patterns, templates, and similar drawings specially prepared for the Work by the Contractor, subcontractors, manufacturers, fabricators, suppliers or distributors to illustrate some portion of the Work.
   1. Shop drawings shall show the design, dimensions, connections, and other details necessary to ensure the accurate interpretation of the Contract Documents and shall show adjoining Work in such detail as required to provide for proper connection to same. Where adjoining Work requires shop drawings, they shall be submitted concurrently for a coordinated review.

2. Submit information specifically prepared for this Project, drawn to accurate scale. Do not reproduce Construction Documents or copy standard information as the basis for shop drawings. Standard information prepared without specific reference to the Project is not considered a shop drawing. Clearly and specifically indicate deviations from the Contract Documents.
3. In addition to the above, include the following information:
    a. Dimensions and notation of dimensions established by field measurements.
    b. Identification of products and materials included.
    c. Compliance with specified standards.
    d. Notation of coordination requirements and specific procedures.
    e. Utility connections for equipment.
    f. Identification of any change, variance or non-conformance with requirements of Contract Documents. Indicate with a "cloud" and provide detailed notation including reason for each change. Include completed "Contractor's Substitution Request" (See Section 01 60 00).
    g. Indication by the Contractor that he has reviewed, coordinated (checked for dimension, quantity, relationship with work of all trades involved and is in accordance with the Contract requirements), and approved the Shop Drawing for submittal to the Architect.
4. Electronic Media: See Section 01 00 30 - Electronic Media, for information regarding obtaining electronic documents and their limited use for purposes of project coordination and the Contractor's use in the preparation of submittals.
    a. Unless express written permission of the Architect is granted, electronic documents provided by the Architect and his consultants, shall not be used by the Contractor, or any of his subcontractors of any tier or any materials supplier or vendor as a shop drawing or any other type of submittal or as the basis for preparing such shop drawing or submittal, with the sole exception to this prohibition being that electronic documents may be used as backgrounds upon which to prepare shop drawings or other submittals.

3.10 COORDINATION DRAWINGS

A. Coordination Drawings are a special type of shop drawing prepared by various trades to show the relationship and integration of different construction elements that require careful coordination during fabrication or installation to fit in the space provided or to function as intended.
    1. The Contractor shall arrange coordination meetings and require attendance of each (major) subcontractor in order to establish priorities for systems installation, to establish systems installation sequences, to determine and resolve potential conflicts, and to ensure that each trade has coordinated its work with the others and will honor commitments to other disciplines.
    2. Each subcontractor's representative shall sign the final coordination drawings, prior to submission for Architect's review, certifying they have coordinated each building system, resolved all potential conflicts between each trade's work, and have satisfied the intent of each disciplines design.
    3. Where potential conflicts cannot be resolved without input from, or review by, the Architect, the Contractor shall request said input/review, in writing, and provide all sketches, details, part plans, etc. necessary to convey fully the essence of the situation and/or potential conflict. The Contractor and all appropriate subcontractors shall make themselves available to meet with the Architect as required to resolve the issue(s) in question.
    4. Coordination Drawings shall be required for all building structure, ductwork, and piping systems.

3.11 APPROVAL DRAWINGS

A. Whenever the Contractor or subcontractor is required to submit Shop Drawings and/or Product Data to the Authority Having Jurisdiction over the Project for review and approval of a particular

component or system, prior to starting on-site work, the Contractor shall submit to the Architect two (2) copies of the approved documents including the authority stamp and approving signature. Submit as "For Information Only".

3.12 RECORD DRAWINGS

A. Record Drawings: See Section 01 78 00 - Project Close-out.

3.13 PRODUCT DATA

A. Compile Product Data into a single submittal for each element of construction or complete system. Product Data includes printed information such as manufacturer's installation instructions, catalog cuts, materials test reports, color charts, roughing-in diagrams, templates, and wiring diagrams. Mark each copy to show applicable choices and options.
   1. Identify any change, variance, or non-conformance with requirements of Contract Documents with a "cloud" and provide detailed notation including reason for each change. Provide a completed "Contractor's Substitution Request" (see Section 01 60 00).

3.14 CERTIFICATIONS

A. Certifications from manufacturers and/or installers required in individual Specification Sections shall be submitted with Product Data.
   1. In accordance with Supplementary General Conditions, Article 3, prior to Substantial Completion, the Contractor shall submit a written certificate that no asbestos and/or other hazardous substances have been incorporated into the Work of this Project.
   2. Contractor's Asbestos/Hazardous Material Certification with the following language:
      a. I, _____ the undersigned representing (company), do hereby certify that the products furnished and/or fabricated and/or installed by my firm under contract with (G.C. or C.M.) at the (Project) located in (project location) do not contain asbestos and /or other hazardous materials.
      b. Provide signature, title and date.
      c. The form of certificate shall be submitted to the Architect for review prior to use.

3.15 DELEGATED-DESIGN SUBMITTALS

A. Where professional engineering services or certifications by a professional engineer are specifically required to be provided by the Contractor, provide products and systems complying with specific performance and design criteria indicated.
   1. If criteria indicated are not sufficient to perform services or certifications required, submit a written request for additional information to the Architect.
   2. In addition to Shop Drawings, Product Data, and other required submittals, submit a certification, signed and sealed by the responsible professional engineer, licensed in the State of the Project, for each product and system specifically assigned to the Contractor to be engineered or certified by a professional engineer, indicating that the products and systems are in compliance with performance and design criteria indicated. Include a list of codes, loads, and other factors used in performing these services.

3.16 SUBMITTALS FOR REVIEW

A. When the following are specified in individual sections, submit for review:
   1. Product data.
   2. Shop drawings.
   3. Samples for selection.
   4. Samples for verification.

B. Submit to Architect for review for the limited purpose of checking for conformance with information given and the design concept expressed in the contract documents.

C. Samples will be reviewed only for aesthetic, color, or finish selection.

D. After review, provide copies and distribute in accordance with SUBMITTAL PROCEDURES article below.

3.17 SUBMITTALS FOR INFORMATION

A. When the following are specified in individual sections, submit for information:
   1. Design data.
   2. Certificates.
   3. Test reports.
   4. Inspection reports.
   5. Manufacturer's instructions.
   6. Manufacturer's field reports.
   7. Other types indicated.

B. Submit for Architect's knowledge as contract administrator. No action will be taken.

3.18 SUBMITTALS FOR PROJECT CLOSEOUT

A. When the following are specified in individual Sections, submit them at project closeout:
   1. Project record documents.
   2. Operation and maintenance data.
   3. Warranties.
   4. Bonds.
   5. Other types as indicated.

B. Submit for Owner's benefit during and after project completion.

3.19 NUMBER OF COPIES OF SUBMITTALS

A. Documents for Review: Submittals to the Architect shall be electronic files in PDF format, unlocked, markable and reproducible. In addition to electronic files, the following types of submittals shall also be submitted in hard copy, quantity indicated:
   1. Structural steel and deck (2).
   2. Doors and Frames (1).
   3. Door hardware (1).
   4. Millwork and casework (1).
   5. Sprinkler shop drawings (2).
   6. Fire alarm shop drawings (2).
   7. Small Size Sheets, Not Larger Than 11 x 17 inches.
   8. Large Size Sheets, Not Larger Than 30 x 42 inches.

B. Documents for Information: Submit three copies.

C. Samples: Confirm with the Architect the number of samples required for each submittal; one of which will be retained by Architect.
   1. After review, produce duplicates.
   2. Retained samples will not be returned to Contractor unless specifically so stated.

3.20 SUBMITTAL PROCEDURES

A. Transmit each submittal with a copy of approved submittal form.

B. Transmit each submittal with an approved form.

C. Sequentially number the transmittal form. Revise submittals with original number and a sequential alphabetic suffix.

D. Submittal form shall include identification information: Project name, Contractor, Subcontractor or supplier; product name, pertinent drawing and detail number, and specification section number, submittal category, date, and total number of pages in the submittal.

E. Contractor's Action and Certification: The Contractor shall review each submittal, check for compliance with the Contract Documents, note corrections, note field dimension, and complete a review stamp with the following information:
   1. Contractor stamp, signed or initialed certifying that the submittal conforms to requirements of the Contract Documents in accordance with AIA A201, Paragraph 3.12.; or, Submittal deviates from requirements of the Contract Documents, with deviations clearly noted and marked with Contractor's initials; or, Contractor's substitution requested.

F. Deliver submittals to Architect at business address. Submittals may only be sent directly to the Architect's consultants by special arrangement with the Architect. Subcontractors shall not directly send submittals to the Architect.

G. Submittals of poor legibility may be returned without action.

H. Submittals not including a completed Contractor's Certification will be returned without action.

I. Submittals certified as in conformance by the Contractor and found to deviate from requirements of the Contract Documents will be returned without action.

J. The Contractor may require sub-contractors to submit similar certification, however this shall not in any way relieve the Contractor of responsibility for review and certification of all submittals.

K. All notations made on submittals by the Contractor, sub-contractors, suppliers, or fabricators shall be made in bold line type and initialed by person making the notations. Clearly indicate specified items with a "cloud" or arrows. Cross out all extraneous information not intended as part of the submission. Do NOT use highlighter or colored markings, only arrows, circles, text and the like that can be copied in black and white shall be allowed.

L. Provide a detailed notation of all deviations from the Contract Document requirements including minor variations and limitations, and the reason for each deviation. Include a Contractor's Substitution Request.

M. Schedule submittals to expedite the Project, and coordinate submission of related items.

N. For each submittal for review, allow 15 days excluding delivery time to and from the Contractor.

O. Identify variations from Contract Documents and Product or system limitations that may be detrimental to successful performance of the completed Work.

P. Provide space for Contractor and Architect review stamps.

Q. When revised for resubmission, identify all changes made since previous submission.

R. Distribute reviewed submittals as appropriate. Instruct parties to promptly report any inability to comply with requirements.

S. Submittals not requested will not be recognized or processed.

T. Do not order materials or proceed with the Work requiring submission and review of Product Data, Shop Drawings, Samples or similar submittals prior to receiving acceptance of the submittal from the Architect.

U. The Contractor shall not use or take submittals on-site without the Architect's or the Architect's consultant's Submittal Stamp indicating acceptance. Submittals without this stamp or with a stamp indicating non-acceptance shall not be used in connection with construction.

3.21 ARCHITECT'S REVIEW

A. Except for submittals for record, information or similar purposes, where action and return is required or requested, the Architect will review each submittal and mark to indicate action taken.
   1. In general, the Architect will strive to complete his review of submittals and return them to the Contractor in approximately two (2) weeks. Additional time may be required if large volumes of submittals are simultaneously delivered to the Architect for review. Where concurrent review of submittals by Architect's consultants, Owner, or other parties is required, allow three (3) weeks for initial review of each submittal.
   2. The Architect will not review submittals of colors and finishes until submittals for all such related materials are complete and delivered for collective review. This same requirement may be extended to other components and systems as deemed appropriate by the Architect.
   3. The Architect's review shall, among other limitations, not include the calculation, coordination, or verification of dimensions or quantities, which shall be the sole responsibility of the Contractor.

4. Action Stamp: The Architect will stamp each submittal with a uniform, self-explanatory action stamp. The stamp will be appropriately marked, as follows to indicate the action taken:
   a. Final Unrestricted Release: Where submittals are marked "No Exceptions Taken", that part of the Work covered by the submittal may proceed provided it complies with requirements of the Contract Documents.
   b. Final-but-Restricted Release: Where submittals are marked "Note Markings" or "Comments Attached" or "Revise and Resubmit Record Copy", that part of the Work covered by the submittal may proceed provided it complies with markings / comments and requirements of the Contract Documents.
   c. Returned for Resubmittal: Where submittals are marked "Revise and Resubmit for Further Review", do not proceed with that part of the Work covered by the submittal including purchasing, fabrication, delivery, or other activity. Revise or prepare a new submittal in accordance with the notations; resubmit without delay. Repeat as necessary to obtain a different action mark.
   d. Rejected: When the submittal is marked "Rejected", do not proceed with that part of the Work covered by the submittal, including purchasing, fabrication, delivery, or other activity. Do not resubmit that product.

B. Other Action: Where a submittal is primarily for record purposes, the submittal will be returned marked "Received and Distributed for Record Only". Where a submittal cannot be reviewed due to lack of Contractor review or illegibility, for example, the submittal will be returned marked "Returned No Action".

END OF SECTION

SECTION 01 31 00
PROJECT MANAGEMENT AND COORDINATION

PART 1 GENERAL

1.01 RELATED DOCUMENTS

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

1.02 SUMMARY

A. This Section includes administrative provisions for coordinating construction operations on Project including, but not limited to, the following:

1. Coordination Drawings.
2. Administrative and supervisory personnel.
3. Project meetings.

B. Related Sections include the following:

1. Division 01 Section "Construction Progress Documentation" for preparing and submitting Contractor's Construction Schedule.
2. Division 01 Section "Execution Requirements" for procedures for coordinating general installation and field-engineering services, including establishment of benchmarks and control points.
3. Division 01 Section "Closeout Procedures" for coordinating Contract closeout.
4. Section 01 30 00 Administrative Requirements.

1.03 COORDINATION

A. Coordination: Coordinate construction operations included in different Sections of the Specifications to ensure efficient and orderly installation of each part of the Work. Coordinate construction operations, included in different Sections that depend on each other for proper installation, connection, and operation.

1. Schedule construction operations in sequence required to obtain the best results where installation of one part of the Work depends on installation of other components, before or after its own installation.
2. Coordinate installation of different components with other contractors to ensure maximum accessibility for required maintenance, service, and repair.
3. Make adequate provisions to accommodate items scheduled for later installation.
4. Where availability of space is limited, coordinate installation of different components to ensure maximum performance and accessibility for required maintenance, service, and repair of all components, including mechanical and electrical. Coordinate location of pipes, conduits, ducts and similar items in confined areas to assure proper fit and access. Contractor is responsible for handling interferences created by the work of subcontractors (example, sprinkler pipe interfering with installation of duct work; duct work interfering with installation of tight fixtures).

B. Coordinate with contractors doing work for the Owner under separate contracts.

C. Prepare memoranda for distribution to each party involved, outlining special procedures required for coordination. Include such items as required notices, reports, and list of attendees at meetings.

1. Prepare similar memoranda for Owner and separate contractors if coordination of their Work is required.

D. Administrative Procedures: Coordinate scheduling and timing of required administrative procedures with other construction activities and activities of other contractors to avoid conflicts and to ensure orderly progress of the Work. Such administrative activities include, but are not limited to, the following:

1. Preparation of Contractor's Construction Schedule.
2. Preparation of the Schedule of Values.
3. Installation and removal of temporary facilities and controls.
4. Delivery and processing of submittals.
5. Progress meetings.
6. Preinstallation conferences.
7. Project closeout activities.
8. Startup and adjustment of systems.
9. Project closeout activities.

E. Conservation: Coordinate construction activities to ensure that operations are carried out with consideration given to conservation of energy, water, and materials.

1.04 SUBMITTALS

A. Coordination Drawings: Prepare Coordination Drawings as determined by the Contractor and subcontractors, if limited space availability necessitates maximum utilization of space for efficient installation of different components or if coordination is required for installation of products and materials fabricated by separate entities.

1. Content: Project-specific information, drawn accurately to scale. Do not base Coordination Drawings on reproductions of the Contract Documents or standard printed data. Include the following information, as applicable:
   a. Indicate functional and spatial relationships of components of architectural, structural, civil, mechanical, and electrical systems.
   b. Indicate required installation sequences.
   c. Indicate dimensions shown on the Contract Drawings and make specific note of dimensions that appear to be in conflict with submitted equipment and minimum clearance requirements. Provide alternate sketches to Architect for resolution of such conflicts. Minor dimension changes and difficult installations will not be considered changes to the Contract.

B. Key Personnel Names: Within 15 days of starting construction operations, submit a list of key personnel assignments, including superintendent and other personnel in attendance at Project site. Identify individuals and their duties and responsibilities; list addresses and telephone numbers, including home and office telephone numbers. Provide names, addresses, and telephone numbers of individuals assigned as standbys in the absence of individuals assigned to Project.

1. Post copies of list in Project meeting room, in temporary field office, and by each temporary telephone. Keep list current at all times.

1.05 ADMINISTRATIVE AND SUPERVISORY PERSONNEL

A. General: In addition to Project superintendent, provide other administrative and supervisory personnel as required for proper performance of the Work.

1. Include special personnel required for coordination of operations with other contractors.

1.06 PROJECT MEETINGS

A. General: Schedule and conduct meetings and conferences at Project site, unless otherwise indicated.

1. Attendees: Inform participants and others involved, and individuals whose presence is required, of date and time of each meeting. Notify Owner and Architect of scheduled meeting dates and times.
2. Agenda: Prepare the meeting agenda. Distribute the agenda to all invited attendees.
3. Minutes: Record significant discussions and agreements achieved. Distribute the meeting minutes to everyone concerned, including Owner and Architect, within three days of the meeting.

B. Preconstruction Conference: Schedule a preconstruction conference before starting construction, at a time convenient to Owner and Architect, but no later than 15 days after execution of the Agreement. Hold the conference at Project site or another convenient location. Conduct the meeting to review responsibilities and personnel assignments.

1. Attendees: Authorized representatives of Owner, Architect, and their consultants; Contractor and its superintendent; major subcontractors; suppliers; and other concerned parties shall attend the conference. All participants at the conference shall be familiar with Project and authorized to conclude matters relating to the Work.
2. Agenda: Discuss items of significance that could affect progress, including the following:
    a. Tentative construction schedule.
    b. Phasing.
    c. Critical work sequencing and long-lead items.
    d. Designation of key personnel and their duties.
    e. Procedures for processing field decisions and Change Orders.
    f. Procedures for requests for interpretations (RFIs).
    g. Procedures for testing and inspecting.
    h. Procedures for processing Applications for Payment.
    i. Distribution of the Contract Documents.
    j. Submittal procedures.
    k. Integrated Deliverables and Testing (IDAT).
    l. Preparation of Record Documents.
    m. Use of the premises.
    n. Work restrictions.
    o. Owner's occupancy requirements.
    p. Responsibility for temporary facilities and controls.
    q. Construction waste management and recycling.
    r. Parking availability.
    s. Office, work, and storage areas.
    t. Equipment deliveries and priorities.
    u. First aid.
    v. Security.

w. Progress cleaning.

x. Working hours.

y. USM campus operational protocols and procedures.

3. Minutes: Record and distribute meeting minutes.

a. Include action items and responsible party.

C. Preinstallation Conferences: Conduct a preinstallation conference at Project site before each construction activity that requires coordination with other construction.

1. Attendees: 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 Architect of scheduled meeting dates.

2. Agenda: Review progress of other construction activities and preparations for the particular activity under consideration, including requirements for the following:

a. The Contract Documents.

b. Options.

c. Related requests for interpretations (RFIs).

d. Related Change Orders.

e. Purchases.

f. Deliveries.

g. Submittals.

h. Review of mockups.

i. Possible conflicts.

j. Compatibility problems.

k. Time schedules.

l. Weather limitations.

m. Manufacturer's written recommendations.

n. Warranty requirements.

o. Compatibility of materials.

p. Acceptability of substrates.

q. Temporary facilities and controls.

r. Space and access limitations.

s. Regulations of authorities having jurisdiction.

t. Testing and inspecting requirements.

u. Installation procedures.

v. Coordination with other work.

w. Required performance results.

x. Protection of adjacent work.

y. Protection of construction and personnel.

z. Record drawing process.

3. Record significant conference discussions, agreements, and disagreements, including required corrective measures and actions.

a. Include action items and responsible party.

4. Reporting: Distribute minutes of the meeting to each party present and to parties who should have been present.
5. Do not proceed with installation if the conference cannot be successfully concluded. Initiate whatever actions are necessary to resolve impediments to performance of the Work and reconvene the conference at earliest feasible date.

D. Monthly Progress Meetings: Conduct progress meetings at monthly intervals. Coordinate dates of meetings with preparation of payment requests.

1. Attendees: In addition to representatives of Owner and Architect, each contractor, subcontractor, supplier, and other entity concerned with current progress or involved in planning, coordination, or performance of future activities shall be represented at these meetings. All participants at the conference shall be familiar with Project and authorized to conclude matters relating to the Work.
2. Agenda: Review and correct or approve minutes of previous progress meeting. Review other items of significance that could affect progress. Include topics for discussion as appropriate to status of Project.
    a. Contractor's Construction Schedule: Review progress since the last meeting. Determine whether each activity is on time, ahead of schedule, or behind schedule, in relation to Contractor's Construction Schedule. Determine how construction behind schedule will be expedited; secure commitments from parties involved to do so. Discuss whether schedule revisions are required to ensure that current and subsequent activities will be completed within the Contract Time.
        1) Review schedule for next period.
    b. Application for Payment: Contractor shall bring copy of Application for Payment to meeting. Review Application for Payment and required attachments, including LEED Progress Report, record drawing and documents status, waivers of mechanic's liens, list of completed tests, checklists, commissioning, reports, IDAT and similar requirements for the work are submitted and in compliance with the Contract Documents.
    c. Review present and future needs of each entity present, including the following:
        1) Interface requirements.
        2) Sequence of operations.
        3) Status of submittals.
        4) Deliveries.
        5) Off-site fabrication.
        6) Access.
        7) Site utilization.
        8) Temporary facilities and controls.
        9) Work hours.
        10) Hazards and risks.
        11) Progress cleaning.
        12) Quality and work standards.
        13) Status of correction of deficient items.
        14) Field observations.
        15) Requests for interpretations (RFIs).

16) Status of proposal requests.
17) Pending changes.
18) Status of Change Orders.
19) Pending claims and disputes.
20) Documentation of information for payment requests.

3. Minutes: Record and distribute the meeting minutes.
   a. Include action items and responsible party.
4. Reporting: Distribute minutes of the meeting to each party present and to parties who should have been present.
   a. Schedule Updating: Revise Contractor's Construction Schedule after each progress meeting where revisions to the schedule have been made or recognized. Issue revised schedule concurrently with the report of each meeting.

E. Coordination/Progress Meetings: Conduct Project coordination/progress meetings at weekly intervals. Project coordination meetings are in addition to specific meetings held for other purposes, such as progress meetings and preinstallation conferences.

1. Attendees: In addition to representatives of Owner, each contractor, subcontractor, supplier, and other entity concerned with current progress or involved in planning, coordination, or performance of future activities shall be represented at these meetings. All participants at the conference shall be familiar with Project and authorized to conclude matters relating to the Work.
2. Agenda: Review and correct or approve minutes of the previous coordination meeting. Review other items of significance that could affect progress. Include topics for discussion as appropriate to status of Project.
   a. Combined Contractor's Construction Schedule: Review progress since the last coordination meeting. Determine whether each contract is on time, ahead of schedule, or behind schedule, in relation to Combined Contractor's Construction Schedule. Determine how construction behind schedule will be expedited; secure commitments from parties involved to do so. Discuss whether schedule revisions are required to ensure that current and subsequent activities will be completed within the Contract Time.
   b. Schedule Updating: Revise Combined Contractor's Construction Schedule after each coordination meeting where revisions to the schedule have been made or recognized. Issue revised schedule concurrently with report of each meeting.
   c. Review present and future needs of each contractor present, including the following:
      1) Interface requirements.
      2) Sequence of operations.
      3) Status of submittals.
      4) Deliveries.
      5) Off-site fabrication.
      6) Access.
      7) Site utilization.
      8) Temporary facilities and controls.
   9) Work hours.

10) Hazards and risks.
11) Progress cleaning.
12) Quality and work standards.
13) Change Orders.

3. Conduct coordination meetings with the mechanical, plumbing, sprinkler and electrical trades. Before the trades start work in an area of the building, review structural clearances and locations of ducts, pipes, conduits, light fixtures, equipment and other items that affect location and proper fit. Prepare coordination drawings where limited space availability necessitates maximum utilization of space for efficient installation of different components. Verify depths and clearances before fabrication of ductwork.
4. Reporting: Record meeting results and distribute copies to everyone in attendance and to others affected by decisions or actions resulting from each meeting.
    a. Include action items and responsible party.

PART 2 PRODUCTS – NOT USED

PART 3 EXECUTION – NOT USED

END OF SECTION

SECTION 01 32 00
CONSTRUCTION PROGRESS DOCUMENTATION

PART 1 GENERAL

1.01 RELATED DOCUMENTS

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

1.02 SUMMARY

A. This Section includes administrative and procedural requirements for documenting the progress of construction during performance of the Work, including the following:

1. Preliminary Construction Schedule.
2. Contractor's Construction Schedule.
3. Submittals Schedule.
4. Field condition reports.
5. Special reports.

B. Related Sections include the following:

1. Division 1 Section "Payment Procedures" for submitting the Schedule of Values.
2. Division 1 Section "Project Management and Coordination" for submitting and distributing meeting and conference minutes.
3. Division 1 Section "Submittal Procedures" for submitting schedules and reports.
4. Division 1 Section "Quality Requirements" for submitting a schedule of tests and inspections.
5. Division 1 Section "Integrated Deliverables and Testing (IDAT)" for submitting checklists, schedules and reports.
6. Division 1 Section “Administrative Requirements”.

DEFINITIONS

A. Activity: A discrete part of a project that can be identified for planning, scheduling, monitoring, and controlling the construction project. Activities included in a construction schedule consume time and resources.

1. Critical activities are activities on the critical path. They must start and finish on the planned early start and finish times.
2. Predecessor Activity: An activity that precedes another activity in the network.
3. Successor Activity: An activity that follows another activity in the network.

B. Cost Loading: The allocation of the Schedule of Values for the completion of an activity as scheduled. The sum of costs for all activities must equal the total Contract Sum, unless otherwise approved by Architect.

C. CPM: Critical path method, which is a method of planning and scheduling a construction project where activities are arranged based on activity relationships. Network calculations determine when activities can be performed and the critical path of Project.

D. Critical Path: The longest connected chain of interdependent activities through the network schedule that establishes the minimum overall Project duration and contains no float.

E. Event: The starting or ending point of an activity.

F. Float: The measure of leeway in starting and completing an activity.

1. Float time is not for the exclusive use or benefit of either Owner or Contractor, but is a jointly owned, expiring Project resource available to both parties as needed to meet schedule milestones and Contract completion date.
2. Free float is the amount of time an activity can be delayed without adversely affecting the early start of the successor activity.
3. Total float is the measure of leeway in starting or completing an activity without adversely affecting the planned Project completion date.

G. Fragnet: A partial or fragmentary network that breaks down activities into smaller activities for greater detail.

H. Major Area: A story of construction, a separate building, or a similar significant construction element.

I. Milestone: A key or critical point in time for reference or measurement.

J. Network Diagram: A graphic diagram of a network schedule, showing activities and activity relationships.

K. Resource Loading: The allocation of manpower and equipment necessary for the completion of an activity as scheduled.

SUBMITTALS

A. Submittals Schedule: Submit three copies of schedule. Arrange the following information in a tabular format:
1. Scheduled date for first submittal.
2. Specification Section number and title.
3. Submittal category (action or informational).
4. Name of subcontractor.
5. Description of the Work covered.
6. Scheduled date for Architect's final release or approval.

B. Preliminary Construction Schedule: Submit two copies.
1. Approval of cost-loaded preliminary construction schedule will not constitute approval of Schedule of Values for cost-loaded activities.

C. Contractor's Construction Schedule: Submit two copies of initial schedule, large enough to show entire schedule for entire construction period.

D. Field Condition Reports: Submit two copies at time of discovery of differing conditions.

E. Special Reports: Submit two copies at time of unusual event.

COORDINATION

A. Coordinate preparation and processing of schedules and reports with performance of construction activities and with scheduling and reporting of separate contractors.

B. Coordinate Contractor's Construction Schedule with the Schedule of Values, list of subcontracts, Submittals Schedule, progress reports, payment requests, and other required schedules and reports.
1. Secure time commitments for performing critical elements of the Work from parties involved.
2. Coordinate each construction activity in the network with other activities and schedule them in proper sequence.

PART 2 PRODUCTS

2.01 SUBMITTALS SCHEDULE

A. Preparation: Submit a schedule of submittals, arranged in chronological order by dates required by construction schedule. Include time required for review, resubmittal, ordering, manufacturing, fabrication, and delivery when establishing dates.

1. Coordinate Submittals Schedule with list of subcontracts, the Schedule of Values, and Contractor's Construction Schedule.
2. Initial Submittal: Submit concurrently with preliminary network diagram. Include submittals required during the first 60 days of construction. List those required to maintain orderly progress of the Work and those required early because of long lead time for manufacture or fabrication.
3. Final Submittal: Submit concurrently with the first complete submittal of Contractor's Construction Schedule.
4. The Owner will review the schedule of submittals and identify the submittals that they want to receive a copy of at the same time that the Architect’s copies are sent out.

2.02 CONTRACTOR'S CONSTRUCTION SCHEDULE, GENERAL

A. Time Frame: Extend schedule from date established for the Notice to Proceed to date of Final Completion.

1. Contract completion date shall not be changed by submission of a schedule that shows an early completion date, unless specifically authorized by Change Order.

B. Activities: Treat each story or separate area as a separate numbered activity for each principal element of the Work. Comply with the following:

1. Procurement Activities: Include procurement process activities for long lead items and major items, requiring a cycle of more than 60 days, as separate activities in schedule. Procurement cycle activities include, but are not limited to, submittals, approvals, purchasing, fabrication, and delivery.
2. Submittal Review Time: Include review and resubmittal times indicated in Division 1 Section "Submittal Procedures" in schedule. Coordinate submittal review times in Contractor's Construction Schedule with Submittals Schedule.
3. Startup and Testing Time: Include times for startup and testing.
4. Integrated Deliverables and Testing (IDAT): Include adequate time and activities for IDAT requirements.
5. Mechanical Commissioning: Include adequate time and activities for mechanical commissioning activities. Coordinate milestones, events and duration of activities with Owner’s Commissioning Agent.
6. Substantial Completion: Indicate completion in advance of date established for Substantial Completion, and allow time for Architect's administrative procedures necessary for certification of Substantial Completion.

C. Constraints: Include constraints and work restrictions indicated in the Contract Documents and as follows in schedule, and show how the sequence of the Work is affected.

1. Phasing: Arrange list of activities on schedule by phase.
2. Work by Owner: Include a separate activity for each portion of the Work performed by Owner.
3. Owner-Furnished Products: Include a separate activity for each product. Include delivery date indicated in Division 1 Section "Summary." Delivery dates indicated stipulate the earliest possible delivery date.

D. Milestones: Include milestones indicated in the Contract Documents in schedule, including, but not limited to, the Notice to Proceed, Mechanical Commissioning, Substantial Completion, and Final Completion.

2.03 BROAD SCOPE MILESTONE SCHEDULE

A. Submit a separate general broad scope schedule to provide a basic progress report for the Owner's use with at least ten (10) appropriate items. Examples of broad scope line items to include are: Site Work, Cast-In-Place Concrete, Framing, Rough MEP, Building Envelope, Interior Finishes, Exterior Finishes, Final MEP, Commissioning, 2 Week IAQ Flush Out, Certificate of Occupancy. Update schedule on a monthly basis for submission at project meetings.

2.04 REPORTS

A. Field Condition Reports: Immediately on discovery of a difference between field conditions and the Contract Documents, prepare and submit a detailed report. Submit with a request for interpretation. Include a detailed description of the differing conditions, together with recommendations for changing the Contract Documents.

2.05 SPECIAL REPORTS

A. General: Submit special reports to Architect within one day(s) of an occurrence. Distribute copies of report to parties affected by the occurrence.

B. Reporting Unusual Events: When an event of an unusual and significant nature occurs at Project site, whether or not related directly to the Work, prepare and submit a special report. List chain of events, persons participating, response by Contractor's personnel, evaluation of results or effects, and similar pertinent information. Advise Owner in advance when these events are known or predictable.

PART 3 EXECUTION

3.01 CONTRACTOR'S CONSTRUCTION SCHEDULE

A. Contractor's Construction Schedule Updating: At monthly intervals, update schedule to reflect actual construction progress and activities. Issue schedule one week before each regularly scheduled progress meeting.

1. Revise schedule immediately after each meeting or other activity where revisions have been recognized or made. Issue updated schedule concurrently with the report of each such meeting.
2. Include a report with updated schedule that indicates every change, including, but not limited to, changes in logic, durations, actual starts and finishes, and activity durations.
3. As the Work progresses, indicate Actual Completion percentage for each activity.

B. Distribution: Distribute copies of approved schedule to Architect, Owner, separate contractors, testing and inspecting agencies, and other parties identified by Contractor with a need-to-know schedule responsibility.

1. Post copies in Project meeting rooms and temporary field offices.
2. When revisions are made, distribute updated schedules 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 performance of construction activities.

END OF SECTION

SECTION 01 33 00
SUBMITTAL PROCEDURES

PART 1 GENERAL

1.01 RELATED DOCUMENTS

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

1.02 SUMMARY

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

B. Related Requirements:

1. Section 01 29 00 "Payment Procedures" for submitting Applications for Payment and the schedule of values.
2. Section 01 30 00 “Administrative Requirements”.
2. Section 01 32 00 "Construction Progress Documentation" for submitting schedules and reports, including Contractor's construction schedule.
3. Section 01 78 23 "Operation and Maintenance Data" for submitting operation and maintenance manuals.
4. Section 01 78 39 "Project Record Documents" for submitting record Drawings, record Specifications, and record Product Data.

1.03 DEFINITIONS

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

B. Informational Submittals: Written and graphic information and physical samples that do not require Architect's responsive action. Submittals may be rejected for not complying with requirements. Informational submittals are those submittals indicated in individual Specification Sections as "informational submittals."

1.04 ACTION SUBMITTALS

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

1. Coordinate submittal schedule with list of subcontracts, the schedule of values, and Contractor's construction schedule.
2. Initial Submittal: Submit concurrently with startup construction schedule. Include submittals required during the first 60 days of construction. List those submittals required to maintain orderly progress of the Work and those required early because of long lead time for manufacture or fabrication.
3. Final Submittal: Submit concurrently with the first complete submittal of Contractor's construction schedule.
    a. Submit revised submittal schedule to reflect changes in current status and timing for submittals.
4. Format: Arrange the following information in a tabular format:
    a. Scheduled date for first submittal.

b. Specification Section number and title.

c. Submittal category: Action; informational.

d. Name of subcontractor.

e. Description of the Work covered.

f. Scheduled date for Architect's final release or approval.

g. Scheduled date of fabrication.

h. Scheduled dates for purchasing.

i. Scheduled dates for installation.

j. Activity or event number.

1.05 SUBMITTAL ADMINISTRATIVE REQUIREMENTS

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

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

a. Architect makes no representations as to the accuracy or completeness of digital data drawing files as they relate to the Contract Drawings.

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

1. Coordinate each submittal with fabrication, purchasing, testing, delivery, other submittals, and related activities that require sequential activity.

2. Submit all submittal items required for each Specification Section concurrently unless partial submittals for portions of the Work are indicated on approved submittal schedule.

3. Submit action submittals and informational submittals required by the same Specification Section as separate packages under separate transmittals.

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

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

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

1. Initial Review: Allow 15 days for initial review of each submittal. Allow additional time if coordination with subsequent submittals is required. Architect will advise Contractor when a submittal being processed must be delayed for coordination.

2. Intermediate Review: If intermediate submittal is necessary, process it in same manner as initial submittal.

3. Resubmittal Review: Allow 15 days for review of each resubmittal.

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

1. Assemble complete submittal package into a single indexed file incorporating submittal requirements of a single Specification Section and transmittal form with links enabling navigation to each item.

2. Name file with submittal number or other unique identifier, including revision identifier.

a. File name shall use project identifier and Specification Section number followed by a decimal point and then a sequential number (e.g., LNHS-061000.01). Resubmittals shall include an alphabetic suffix after another decimal point (e.g., LNHS-061000.01.A).

3. Provide means for insertion to permanently record Contractor's review and approval markings and action taken by Architect.

4. Transmittal Form for Electronic Submittals: Use software-generated form from electronic project management software acceptable to Owner, containing the following information:

a. Project name.

b. Date.

c. Name and address of Architect.

d. Name of Construction Manager.

e. Name of Contractor.

f. Name of firm or entity that prepared submittal.

g. Names of subcontractor, manufacturer, and supplier.

h. Category and type of submittal.

i. Submittal purpose and description.

j. Specification Section number and title.

k. Specification paragraph number or drawing designation and generic name for each of multiple items.

l. Drawing number and detail references, as appropriate.

m. Location(s) where product is to be installed, as appropriate.

n. Related physical samples submitted directly.

o. Indication of full or partial submittal.

p. Transmittal number, numbered consecutively.

q. Submittal and transmittal distribution record.

r. Other necessary identification.

s. Remarks.

E. Options: Identify options requiring selection by Architect.

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

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

1. Note date and content of previous submittal.

2. Note date and content of revision in label or title block and clearly indicate extent of revision.

3. Resubmit submittals until they are marked with approval notation from Architect's action stamp.

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

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

PART 2 PRODUCTS

2.01 SUBMITTAL PROCEDURES

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

1. Submit electronic submittals via email as PDF electronic files.
    a. Architect will return annotated file. Annotate and retain one copy of file as an electronic Project record document file.
2. Certificates and Certifications Submittals: Provide a statement that includes signature of entity responsible for preparing certification. Certificates and certifications shall be signed by an officer or other individual authorized to sign documents on behalf of that entity.
    a. Provide a digital signature with digital certificate on electronically submitted certificates and certifications where indicated.
    b. Provide a notarized statement on original paper copy certificates and certifications where indicated.

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

1. If information must be specially prepared for submittal because standard published data are not suitable for use, submit as Shop Drawings, not as Product Data.
2. Mark each copy of each submittal to show which products and options are applicable.
3. Include the following information, as applicable:
    a. Manufacturer's catalog cuts.
    b. Manufacturer's product specifications.
    c. Standard color charts.
    d. Statement of compliance with specified referenced standards.
    e. Testing by recognized testing agency.
    f. Application of testing agency labels and seals.
    g. Notation of coordination requirements.
    h. Availability and delivery time information.
4. For equipment, include the following in addition to the above, as applicable:
    a. Wiring diagrams showing factory-installed wiring.
    b. Printed performance curves.
    c. Operational range diagrams.
    d. Clearances required to other construction, if not indicated on accompanying Shop Drawings.
5. Submit Product Data before or concurrent with Samples.
6. Submit Product Data in the following format:
    a. PDF electronic file.

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

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

b. Schedules.

c. Compliance with specified standards.

d. Notation of coordination requirements.

e. Notation of dimensions established by field measurement.

f. Relationship and attachment to adjoining construction clearly indicated.

g. Seal and signature of professional engineer if specified.

2. Submit Shop Drawings in the following format:

a. PDF electronic file.

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

1. Transmit Samples that contain multiple, related components such as accessories together in one submittal package.

2. Identification: Attach label on unexposed side of Samples that includes the following:

a. Generic description of Sample.

b. Product name and name of manufacturer.

c. Sample source.

d. Number and title of applicable Specification Section.

e. Specification paragraph number and generic name of each item.

3. For projects where electronic submittals are required, provide corresponding electronic submittal of Sample transmittal, digital image file illustrating Sample characteristics, and identification information for record.

4. Disposition: Maintain sets of approved Samples at Project site, available for quality-control comparisons throughout the course of construction activity. Sample sets may be used to determine final acceptance of construction associated with each set.

a. Samples that may be incorporated into the Work are indicated in individual Specification Sections. Such Samples must be in an undamaged condition at time of use.

b. Samples not incorporated into the Work, or otherwise designated as Owner's property, are the property of Contractor.

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

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

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

a. Number of Samples: Submit three sets of Samples. Architect will retain two Sample sets; remainder will be returned. Mark up and retain one returned Sample set as a project record sample.

1) Submit a single Sample where assembly details, workmanship, fabrication techniques, connections, operation, and other similar characteristics are to be demonstrated.

2) If variation in color, pattern, texture, or other characteristic is inherent in material or product represented by a Sample, submit at least three sets of paired units that show approximate limits of variations.

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

1. Type of product. Include unique identifier for each product indicated in the Contract Documents or assigned by Contractor if none is indicated.
2. Manufacturer and product name, and model number if applicable.
3. Number and name of room or space.
4. Location within room or space.
5. Submit product schedule in the following format:
   a. PDF electronic file.

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

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

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

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

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

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

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

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

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

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

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

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

R. Product Test Reports: Submit written reports indicating that current product produced by manufacturer complies with requirements in the Contract Documents. Base reports on

evaluation of tests performed by manufacturer and witnessed by a qualified testing agency, or on comprehensive tests performed by a qualified testing agency.

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

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

T. Preconstruction Test Reports: Submit reports written by a qualified testing agency, on testing agency's standard form, indicating and interpreting results of tests performed before installation of product, for compliance with performance requirements in the Contract Documents.

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

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

W. IDAT

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

2.02 DELEGATED-DESIGN SERVICES

A. Performance and Design Criteria: Where professional design services or certifications by a design professional are specifically required of Contractor by the Contract Documents, provide products and systems complying with specific performance and design criteria indicated.

1. If criteria indicated are not sufficient to perform services or certification required, submit a written request for additional information to Architect.

B. Delegated-Design Services Certification: In addition to Shop Drawings, Product Data, and other required submittals, submit digitally signed PDF electronic file, signed and sealed by the responsible design professional, for each product and system specifically assigned to Contractor to be designed or certified by a design professional.

1. Indicate that products and systems comply with performance and design criteria in the Contract Documents. Include list of codes, loads, and other factors used in performing these services.

PART 3 EXECUTION

3.01 CONTRACTOR'S REVIEW

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

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

C. Approval Stamp: Stamp each submittal with a uniform, approval stamp. Include Project name and location, submittal number, Specification Section title and number, name of reviewer, date of Contractor's approval, and statement certifying that submittal has been reviewed, checked, and approved for compliance with the Contract Documents.

3.02 ARCHITECT'S ACTION

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

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

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

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

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

END OF SECTION

SECTION 01 40 00
QUALITY REQUIREMENTS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. References and standards.

B. Quality assurance submittals.

C. Samples, Mock-ups and Sample Field Installations.

D. Control of installation.

E. Tolerances.

F. Testing and inspection services.

G. Manufacturers' field services.

1.02 RELATED REQUIREMENTS

A. Section 01 00 00 - General Requirements.

B. Section 01 30 00 - Administrative Requirements: Submittal procedures.

1.03 REFERENCE STANDARDS

A. ASTM C1021 - Standard Practice for Laboratories Engaged in Testing of Building Sealants; 2008 (Reapproved 2014).

B. ASTM C1077 - Standard Practice for Laboratories Testing Concrete and Concrete Aggregates for Use in Construction and Criteria for Laboratory Evaluation; 2014.

C. ASTM C1093 - Standard Practice for Accreditation of Testing Agencies for Masonry; 2013.

D. ASTM E329 - Standard Specification for Agencies Engaged in Construction Inspection, Testing, or Special Inspection; 2014a.

E. ASTM E543 - Standard Specification for Agencies Performing Nondestructive Testing; 2013.

1.04 SUBMITTALS

A. Contractor's Testing Agency Qualifications:
   1. Prior to start of Work, submit agency name, address, and telephone number, and names of full time registered Engineer and responsible officer.

B. Contractor's Test Reports: After each test/inspection, promptly submit one copy of reports to Architect, Engineer, Building Official and to Owner. Information required on Test Reports shall be as identified herein for the Owner's Testing Agency.
   1. Include:
      a. Date issued.
      b. Project title and number.
      c. Name of inspector.
      d. Date and time of sampling or inspection.
      e. Identification of product and specifications section.
      f. Location in the Project.
      g. Type of test/inspection.
      h. Date of test/inspection.
      i. Results of test/inspection.
      j. Conformance with Contract Documents.
      k. When requested by Architect, provide interpretation of results.

C. Certificates: When specified in individual specification sections, submit certification by the manufacturer and Contractor or installation/application subcontractor to Architect, in quantities specified for Product Data.

1. Indicate material or product conforms to or exceeds specified requirements. Submit supporting reference data, affidavits, and certifications as appropriate.
2. Certificates may be recent or previous test results on material or product, but must be acceptable to Architect.

D. Manufacturer's Instructions: When specified in individual specification sections, submit printed instructions for delivery, storage, assembly, installation, start-up, adjusting, and finishing, for the Owner's information. Indicate special procedures, perimeter conditions requiring special attention, and special environmental criteria required for application or installation.

E. Manufacturer's Field Reports: Submit reports within 10 days of observation to Architect and Owner for their information.

F. Erection Drawings: Submit drawings to the Architect and Owner for their information.
1. Submit for information for the sole and limited purpose of generally assessing conformance with the design intent expressed in the Contract Documents.
2. Data indicating inappropriate or unacceptable Work may be subject to action by Architect or Owner.

1.05 REFERENCES AND STANDARDS

A. For products and workmanship specified by reference to a document or documents not included in the Project Manual, also referred to as reference standards, comply with requirements of the standard, except when more rigid requirements are specified or are required by applicable codes.

B. Conform to reference standard of date of issue current on date of Contract Documents, except where a specific date is established by applicable code.

C. Should specified reference standards conflict with Contract Documents, request clarification from Architect before proceeding.

1.06 TESTING AND INSPECTION AGENCIES

A. Quality control services include inspections, tests, and related actions including reports performed by independent agencies, governing authorities, and the Contractor. They do not include Contract enforcement activities performed by the Architect.

B. Inspection and testing services are required to verify compliance with requirements specified or indicated. These services do not relieve the Contractor of responsibility for compliance with Contract Document requirements.

C. 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.

D. Inspections, tests and related actions specified are not intended to limit the Contractor's quality control procedures that facilitate compliance with Contract Document requirements.

E. Requirements for the Contractor to provide quality control services as directed by the Architect, Owner, or authorities having jurisdiction are not limited by the provisions of this Section.

F. Owner will employ services of an independent testing agency to perform certain specified testing; payment for cost of services will be derived from allowance specified in Section 01 21 00; see Section 01 21 00 and applicable sections for description of services included in allowance.

G. Contractor shall employ and pay for services of an independent testing agency to perform other specified testing.

H. Employment of agency in no way relieves Contractor of obligation to perform Work in accordance with requirements of Contract Documents.

I. Testing and Inspection Agencies Quality Assurance:
1. Testing agency: Comply with requirements of ASTM E 329, ASTM E 543, ASTM C 1021, ASTM C 1077, ASTM C 1093, and ASTM D 3740.

2. Inspection agency: Comply with requirements of ASTM D3740 and ASTM E329.
3. Laboratory: Authorized to operate in the State in which the Project is located.
4. Laboratory Staff: Maintain a full time registered Engineer on staff to review services.
5. Testing Equipment: Calibrated at reasonable intervals either by NIST or using an NIST established Measurement Assurance Program, under a laboratory measurement quality assurance program.

1.07 SPECIAL TESTS AND INSPECTIONS

A. Special Tests and Inspections: Conducted by a qualified testing agency or special inspector as required by Authorities Having Jurisdiction, as indicated in individual Specification Sections, in the Statement of Special Inspections, the Building Code of Maine, and as follows:
   1. Verifying that manufacturer maintains detailed fabrication and quality-control procedures and reviewing the completeness and adequacy of those procedures to perform the Work.
   2. Notifying Architect, Contractor and Owner promptly of irregularities and deficiencies observed in the Work during performance of its service.
   3. Submitting a certified written report of each test, inspection, and similar quality-control service to Architect, Owner, Contractor and to Authorities Having Jurisdiction.
   4. Submitting a final report of special tests and inspections at Substantial Completion which includes a list of unresolved deficiencies to Architect, Owner, Contractor and Authorities Having Jurisdiction.
   5. Interpreting tests and inspections and stating in each report whether tested and inspected work complies with or deviates from the Contract Documents.
   6. Retesting and re-inspecting corrected work.

PART 2 PRODUCTS - NOT USED

PART 3 EXECUTION

3.01 CONTROL OF INSTALLATION

A. Monitor quality control over suppliers, manufacturers, products, services, site conditions, and workmanship, to produce Work of specified quality.

B. Comply with manufacturers' instructions, including each step in sequence.

C. Should manufacturers' instructions conflict with Contract Documents, request clarification from Architect before proceeding.

D. Comply with specified standards as minimum quality for the Work except where more stringent tolerances, codes, or specified requirements indicate higher standards or more precise workmanship.

E. Have Work performed by persons qualified to produce required and specified quality.

F. Verify that field measurements are as indicated on Shop Drawings or as instructed by the manufacturer.

G. Secure products in place with positive anchorage devices designed and sized to withstand stresses, vibration, physical distortion, and disfigurement.

3.02 SAMPLES, MOCK-UPS AND SAMPLE FIELD INSTALLATIONS

A. Tests shall be performed under provisions identified in this Section and identified in the respective product Specification Sections.

B. Assemble and erect specified items at full scale, with specified attachment and anchorage devices, flashings, seals, and finishes.

C. The purpose of mock-ups and sample field installations shall be to clearly establish standards of quality for the Work prior to proceeding with the Work itself. They shall be constructed in sizes, locations and quantities as directed by the Architect.

D. To the extent possible, all samples, mock-ups and sample field installations accepted by Architect shall be preserved until the Work itself has been completed and accepted by the Architect. The alteration, destruction or removal of mock-ups and sample installations shall not commence without the Architect's prior authorization.

E. The Contractor and/or his subcontractors shall construct or prepare all samples, mock-ups and sample field installations as required in individual Specification Sections or as directed by the Architect.

F. Sample field installations are full sized, fully fabricated, cured, and finished built in-place assemblies that maybe permanent if acceptable to the Architect.

G. Samples shall be clearly marked with the manufacturer's name, generic description of the sample and compliance with required standards. 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.

H. All costs related to providing, maintaining and removing required samples, mock-ups and sample field installations shall be paid by the Contractor.

3.03 TOLERANCES

A. Monitor fabrication and installation tolerance control of products to produce acceptable Work. Do not permit tolerances to accumulate.

B. Comply with manufacturers' tolerances. Should manufacturers' tolerances conflict with Contract Documents, request clarification from Architect before proceeding.

C. Adjust products to appropriate dimensions; position before securing products in place.

3.04 TESTING AND INSPECTION

A. See individual Specification Sections for testing and inspection required.

B. Testing Agency Duties:
   1. Provide qualified personnel at site. Cooperate with Architect and Contractor in performance of services.
   2. Perform specified sampling and testing of products in accordance with specified standards.
   3. Ascertain compliance of materials and mixes with requirements of Contract Documents.
   4. Promptly notify (within 24 hours) Owner, Architect and Contractor of observed irregularities or non-conformance of Work or products during performance of its services.
   5. Perform additional tests and inspections required by Architect.
   6. Submit written reports of all tests, inspections or other services to the Architect, Owner, Contractor and local Building Authority. Reports indicating compliant inspections shall be submitted within three (3) days. Reports shall include:
      a. Date of issue.
      b. Project name and number.
      c. Name, address, and telephone number of testing agency.
      d. Dates and locations of samples and tests or inspections.
      e. Names of individuals making tests or inspections.
      f. Designation of the Work and test method.
      g. Identification of product and Specification Section.
      h. Complete inspection or test data.
      i. Test results and interpretations of test results.
      j. Ambient conditions at time of sample taking, testing, or inspection.
      k. Comments or professional opinion regarding whether inspected or tested Work complies with the Contract Documents.
      l. Recommendations for re-testing.
      m. Name and signature of laboratory inspector.
   7. The Testing Agency shall maintain a complete deficiency list of all items not corrected and shall re-test and/or re-inspect as required after each deficiency has been corrected. All

such re-testing and re-inspection shall be at the Contractor's expense. The Testing Agency shall submit a final signed report, stating whether or not all corrections have been made and the Work tested and inspected conforms to the Contract Documents.

8. Limits on Testing/Inspection Agency Authority:
   a. Agency may not release, revoke, alter, or enlarge on requirements of Contract Documents.
   b. Agency may not approve or accept any portion of the Work.
   c. Agency may not assume any duties of Contractor.
   d. Agency has no authority to stop the Work.

C. Owner Responsibilities:
   1. The Owner will provide observations, inspections, tests and similar quality control services specified to be performed by independent agencies, except where they are specifically indicated as the Contractor's responsibility or are provided by another identified entity. The costs for Owner provided testing and inspection services shall be paid for by the Owner through an allowance under the Contract.
   2. The Owner will employ directly an independent agency, testing laboratory, or other qualified firm to perform services that are the Owner's responsibility. Such inspections and tests may include, but shall not be limited to:
      a. Fireproofing.
      b. Firestopping.
      c. Substrate moisture testing for finishes.
      d. Other testing specified to be by Owner required under individual Specification Sections.

D. Contractor Responsibilities:
   1. The Contractor shall provide inspections, tests and similar quality control services, specified in individual Specification Sections, except where they are specifically indicated to be the Owner's responsibility, or are provided by another identified entity. Costs for these services shall be included in the Contract Sum.
   2. The Contractor shall employ and pay an independent testing agency to perform quality control services, including but not limited to inspections, sampling and tests required for determining the suitability of materials prior to delivery to the site and other services as specified in the Specification Sections. Such inspections and tests shall include, but may not be limited to the following:
      a. Sealant testing.
      b. Electrical systems.
      c. HVAC systems.
      d. Piping systems.
      e. Indoor air quality.
      f. Where the Owner has engaged a testing agency or other entity for testing and inspection of a part of the Work and the Contractor is also required to engage an entity for the same or related element, the Contractor shall not employ the entity engaged by the Owner, unless otherwise agreed in writing with the Owner.
   3. Deliver to agency at designated location, adequate samples of materials proposed to be used that require testing, along with proposed mix designs.
   4. Cooperate with laboratory personnel, and provide access to the Work and to manufacturers' facilities.
   5. Provide incidental labor and facilities:
      a. To provide access to Work to be tested/inspected.
      b. To obtain and handle samples at the site or at source of Products to be tested/inspected.
      c. To facilitate tests/inspections.
      d. To provide storage and curing of test samples.

6. Notify Owner's Representative, Architect and laboratory sufficiently in advance of operations to allow for the proper assignment of personnel and scheduling of tests and inspections.
7. Employ services of an independent qualified testing laboratory and pay for additional samples, tests, and inspections required by Contractor beyond specified requirements.
8. Arrange with Owner's agency and pay for additional samples, tests, and inspections required by Contractor beyond specified requirements.

E. Re-testing:
1. Re-testing required because of non-conformance to specified requirements shall be performed by the same agency on instructions by Architect.
2. Re-testing required because of non-conformance to specified requirements shall be paid for by Contractor.
3. The Contractor is responsible for re-testing where results of required inspections, tests or similar services prove unsatisfactory and do not indicate compliance with the Contract Document requirements, regardless of whether or not the original test was the Contractor's responsibility. Cost of re-testing construction revised or replaced by the Contractor is the Contractor's responsibility.

F. Electrical and Mechanical Systems Final Testing:
1. The Contractor shall engage the services of a Maine registered professional mechanical and electrical engineers who shall witness testing of all HVAC, lighting and power distribution systems in accordance with applicable code.

G. Indoor Air Quality Testing:
1. The Contractor shall engage the services of a Certified Industrial Hygienist, using an AIHA accredited laboratory to comply with RSA 10-B, Chapter 1800 Occupational Health Rules
   a. The Contractor shall provide a clean air certification to the Owner immediately following Substantial Completion. Receipt of the certification shall be a condition of Final Payment.

3.05 MANUFACTURERS' FIELD SERVICES

A. When specified in individual specification sections, require material or product suppliers or manufacturers to provide qualified staff personnel to observe site conditions, conditions of surfaces and installation, quality of workmanship, start-up of equipment, test, adjust and balance of equipment as applicable, and to initiate instructions when necessary.

B. Report in writing, observations and site decisions or instructions given to applicators or installers that are supplemental or contrary to manufacturers' written instructions.

3.06 DEFECT ASSESSMENT

A. Replace Work or portions of the Work not conforming to specified requirements.

B. If, in the opinion of Architect, it is not practical to remove and replace the Work, Architect will direct an appropriate remedy or adjust payment.

END OF SECTION

SECTION 01 42 00
REFERENCES

PART 1 GENERAL

1.01 RELATED DOCUMENTS

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

1.02 DEFINITIONS

A. General: Basic Contract definitions are included in the Conditions of the Contract.

B. "Approved": When used to convey Architect's action on Contractor's submittals, applications, and requests, "approved" is limited to Architect's duties and responsibilities as stated in the Conditions of the Contract.

C. "Directed": A command or instruction by Architect. Other terms including "requested," "authorized," "selected," "required," and "permitted" have the same meaning as "directed."

D. "Indicated": Requirements expressed by graphic representations or in written form on Drawings, in Specifications, and in other Contract Documents. Other terms including "shown," "noted," "scheduled," and "specified" have the same meaning as "indicated."

E. "Regulations": Laws, ordinances, statutes, and lawful orders issued by authorities having jurisdiction, and rules, conventions, and agreements within the construction industry that control performance of the Work.

F. "Furnish": Supply and deliver to Project site, ready for unloading, unpacking, assembly, installation, and similar operations.

G. "Install": Operations at Project site including unloading, temporarily storing, unpacking, assembling, erecting, placing, anchoring, applying, working to dimension, finishing, curing, protecting, cleaning, and similar operations.

H. "Provide": Furnish and install, complete and ready for the intended use.

I. "Project Site": Space available for performing construction activities. The extent of Project site is shown on Drawings and may or may not be identical with the description of the land on which Project is to be built.

1.03 INDUSTRY STANDARDS

A. Applicability of Standards: Unless 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.

B. Publication Dates: Comply with standards in effect as of date of the Contract Documents unless otherwise indicated.

1.04 ABBREVIATIONS AND ACRONYMS

A. Industry Organizations: Where abbreviations and acronyms are used in Specifications or other Contract Documents, they shall mean the recognized name of the entities indicated in Thomson Gale's "Encyclopedia of Associations" or in Columbia Books' "National Trade & Professional Associations of the U.S."

B. Industry Organizations: Where abbreviations and acronyms are used in Specifications or other Contract Documents, they shall mean the recognized name of the entities in the following list. Names, telephone numbers, and Web sites are subject to change and are believed to be accurate and up-to-date as of the date of the Contract Documents.

AA	Aluminum Association (The) www.aluminum.org	(703) 358-2960
AABC	Associated Air Balance Council www.aabchq.com	(202) 737-0202
AAMA	American Architectural Manufacturers Association www.aamanet.org	(847) 303-5664
AASHTO	American Association of State Highway and Transportation Officials www.transportation.org	(202) 624-5800
AATCC	American Association of Textile Chemists and Colorists www.aatcc.org	(919) 549-8141
ABAA	Air Barrier Association of America www.airbarrier.org	(866) 956-5888
ABMA	American Bearing Manufacturers Association www.abma-dc.org	(202) 367-1155
ACI	American Concrete Institute www.concrete.org	(248) 848-3700
ACPA	American Concrete Pipe Association www.concrete-pipe.org	(972) 506-7216
AEIC	Association of Edison Illuminating Companies, Inc. (The) www.aeic.org	(205) 257-2530
AF&PA	American Forest & Paper Association www.afandpa.org	(800) 878-8878 (202) 463-2700
AGA	American Gas Association www.aga.org	(202) 824-7000
AHAM	Association of Home Appliance Manufacturers www.aham.org	(202) 872-5955
AHRI	Air-Conditioning, Heating, and Refrigeration Institute, The	(703) 524-8800

	www.ahrinet.org	
AI	Asphalt Institute www.asphaltinstitute.org	(859) 288-4960
AIA	American Institute of Architects (The) www.aia.org	(800) 242-3837 (202) 626-7300
AISC	American Institute of Steel Construction www.aisc.org	(800) 644-2400 (312) 670-2400
AISI	American Iron and Steel Institute www.steel.org	(202) 452-7100
AITC	American Institute of Timber Construction www.aitc-glulam.org	(303) 792-9559
ALSC	American Lumber Standard Committee, Incorporated www.alsc.org	(301) 972-1700
AMCA	Air Movement and Control Association International, Inc. www.amca.org	(847) 394-0150
ANSI	American National Standards Institute www.ansi.org	(202) 293-8020
AOSA	Association of Official Seed Analysts, Inc. www.aosaseed.com	(405) 780-7372
APA	APA - The Engineered Wood Association www.apawood.org	(253) 565-6600
APA	Architectural Precast Association www.archprecast.org	(239) 454-6989
API	American Petroleum Institute www.api.org	(202) 682-8000
ARI	Air-Conditioning & Refrigeration Institute www.ari.org	(703) 524-8800

ARMA	Asphalt Roofing Manufacturers Association www.asphaltroofing.org	(202) 207-0917
ASCE	American Society of Civil Engineers www.asce.org	(800) 548-2723 (703) 295-6300
ASCE/SEI	American Society of Civil Engineers/Structural Engineering Institute (See ASCE)	
ASHRAE	American Society of Heating, Refrigerating and Air-Conditioning Engineers www.ashrae.org	(800) 527-4723 (404) 636-8400
ASME	ASME International (American Society of Mechanical Engineers International) www.asme.org	(800) 843-2763 (973) 882-1170
ASSE	American Society of Sanitary Engineering www.asse-plumbing.org	(440) 835-3040
ASTM	ASTM International (American Society for Testing and Materials International) www.astm.org	(610) 832-9500
ATIS	Alliance for Telecommunications Industry Solutions www.atis.org	(202) 628-6380
AWCMA	American Window Covering Manufacturers Association (Now WCMA)	
AWCI	Association of the Wall and Ceiling Industry www.awci.org	(703) 534-8300
AWI	Architectural Woodwork Institute www.awinet.org	(571) 323-3636
AWPA	American Wood Protection Association (Formerly: American Wood Preservers' Association) www.awpa.com	(205) 733-4077

AWS	American Welding Society www.aws.org	(800) 443-9353 (305) 443-9353
AWWA	American Water Works Association www.awwa.org	(800) 926-7337 (303) 794-7711
BHMA	Builders Hardware Manufacturers Association www.buildershardware.com	(212) 297-2122
BIA	Brick Industry Association (The) www.bia.org	(703) 620-0010
BICSI	BICSI, Inc. www.bicsi.org	(800) 242-7405 (813) 979-1991
BIFMA	BIFMA International (Business and Institutional Furniture Manufacturer's Association International) www.bifma.com	(616) 285-3963
BISSC	Baking Industry Sanitation Standards Committee www.bissc.org	(866) 342-4772
CCC	Carpet Cushion Council www.carpetcushion.org	(610) 527-3880
CDA	Copper Development Association www.copper.org	(800) 232-3282 (212) 251-7200
CEA	Canadian Electricity Association www.canelect.ca	(613) 230-9263
CEA	Consumer Electronics Association www.ce.org	(866) 858-1555 (703) 907-7600
CFFA	Chemical Fabrics & Film Association, Inc. www.chemicalfabricsandfilm.com	(216) 241-7333
CGA	Compressed Gas Association www.cganet.com	(703) 788-2700

CIMA	Cellulose Insulation Manufacturers Association www.cellulose.org	(888) 881-2462 (937) 222-2462
CISCA	Ceilings & Interior Systems Construction Association www.cisca.org	(630) 584-1919
CISPI	Cast Iron Soil Pipe Institute www.cispi.org	(423) 892-0137
CLFMI	Chain Link Fence Manufacturers Institute www.chainlinkinfo.org	(301) 596-2583
CPA	Composite Panel Association www.pbmdf.com	 (703) 724-1128
CRI	Carpet and Rug Institute (The) www.carpet-rug.com	(800) 882-8846 (706) 278-3176
CRRC	Cool Roof Rating Council www.coolroofs.org	(866) 465-2523 (510) 485-7175
CRSI	Concrete Reinforcing Steel Institute www.crsi.org	(847) 517-1200 (800) 328-6306
CRRC	Cool Roof Rating Council www.coolroofs.org	(866) 465-2523 (510) 485-7175
CSA	Canadian Standards Association www.csa.ca	(800) 463-6727 (416) 747-4000
CSA	CSA International (Formerly: IAS - International Approval Services) www.csa-international.org	(866) 797-4272 (416) 747-4000
CSI	Construction Specifications Institute (The) www.csinet.org	(800) 689-2900 (703) 684-0300
CSSB	Cedar Shake & Shingle Bureau www.cedarbureau.org	(604) 820-7700
CTI	Cooling Technology Institute	(281) 583-4087

	(Formerly: Cooling Tower Institute) www.cti.org	
DHI	Door and Hardware Institute www.dhi.org	(703) 222-2010
ECA	Electrical Components Association www.ec-central.org	(703)907-8024
EIA	Electronic Industries Alliance www.eia.org	(703) 907-7500
EIMA	EIFS Industry Members Association www.eima.com	(800) 294-3462 (770) 968-7945
EJCDC	Engineers Joint Contract Documents Committee http://content.asce.org/ejcdc/	(703) 295-6000
EJMA	Expansion Joint Manufacturers Association, Inc. www.ejma.org	(914) 332-0040
ESD	ESD Association (Electrostatic Discharge Association) www.esda.org	(315) 339-6937
ETL SEMCO	Intertek ETL SEMCO (Formerly: ITS - Intertek Testing Service NA) www.intertek-etlsemko.com	(800) 967-5352
FIBA	Federation Internationale de Basketball (The International Basketball Federation) www.fiba.com	41 22 545 00 00
FIVB	Federation Internationale de Volleyball (The International Volleyball Federation) www.fivb.ch	41 21 345 35 35
FM Approvals	FM Approvals LLC www.fmglobal.com	(781) 762-4300
FM Global	FM Global	(401) 275-3000

	(Formerly: FMG - FM Global) www.fmglobal.com	
FRSA	Florida Roofing, Sheet Metal & Air Conditioning Contractors Association, Inc. www.floridaroof.com	(407) 671-3772
FSA	Fluid Sealing Association www.fluidsealing.com	(610) 971-4850
FSC	Forest Stewardship Council www.fsc.org	49 228 367 66 0
GA	Gypsum Association www.gypsum.org	(301) 277-8686
GANA	Glass Association of North America www.glasswebsite.com	(785) 271-0208
GRI	(Part of GSI)	
GS	Green Seal www.greenseal.org	(202) 872-6400
GSI	Geosynthetic Institute www.geosynthetic-institute.org	(610) 522-8440
HI	Hydronics Institute www.gamanet.org	(908) 464-8200
HI/GAMA	Hydronics Institute/Gas Appliance Manufacturers Association Division of Air-Conditioning, Heating, and Refrigeration Institute (AHRI) www.ahrinet.org	(908) 464-8200
HMMA	Hollow Metal Manufacturers Association (Part of NAAMM)	
HPVA	Hardwood Plywood & Veneer Association www.hpva.org	(703) 435-2900

HPW	H. P. White Laboratory, Inc. www.hpwhite.com	(410) 838-6550
IAPSC	International Association of Professional Security Consultants www.iapsc.org	(515) 282-8192
ICBO	International Conference of Building Officials www.iccsafe.org	(888) 422-7233
ICEA	Insulated Cable Engineers Association, Inc. www.icea.net	(770) 830-0369
ICRI	International Concrete Repair Institute, Inc. www.icri.org	(847) 827-0830
ICPA	International Cast Polymer Association www.icpa-hq.org	(703) 525-0320
IEC	International Electrotechnical Commission www.iec.ch	41 22 919 02 11
IEEE	Institute of Electrical and Electronics Engineers, Inc. (The) www.ieee.org	(212) 419-7900
IES	Illuminating Engineering Society of North America www.iesna.org	(703) 525-0320
IEST	Institute of Environmental Sciences and Technology www.iest.org	(847) 255-1561
IGMA	Insulating Glass Manufacturers Alliance www.igmaonline.org	(613) 233-1510
ILI	Indiana Limestone Institute of America, Inc. www.iliai.com	(812) 275-4426
ISA	Instrumentation, Systems, and Automation Society, The www.isa.org	(919) 549-8411
ISO	International Organization for Standardization www.iso.ch	41 22 749 01 11

ISSFA	International Solid Surface Fabricators Association www.issfa.net	(877) 464-7732 (801) 341-7360
ITS	Intertek Testing Service NA (Now ETL SEMCO)	
ITU	International Telecommunication Union www.itu.int/home	41 22 730 51 11
KCMA	Kitchen Cabinet Manufacturers Association www.kcma.org	(703) 264-1690
LGSEA	Light Gauge Steel Engineers Association www.arcat.com	(202) 263-4488
LMA	Laminating Materials Association (Now part of CPA)	
LPI	Lightning Protection Institute www.lightning.org	(800) 488-6864
MBMA	Metal Building Manufacturers Association www.mbma.com	(216) 241-7333
MCA	Metal Construction Association www.metalconstruction.org	(847) 375-4718
MFMA	Maple Flooring Manufacturers Association, Inc. www.maplefloor.org	(888) 480-9138
MFMA	Metal Framing Manufacturers Association, Inc. www.metalframingmfg.org	(312) 644-6610
MH	Material Handling (Now MHIA)	
MHIA	Material Handling Industry of America www.mhia.org	(800) 345-1815 (704) 676-1190
MIA	Marble Institute of America	(440) 250-9222

	www.marble-institute.com	
MPI	Master Painters Institute www.paintinfo.com	(888) 674-8937 (604) 298-7578
MSS	Manufacturers Standardization Society of The Valve and Fittings Industry Inc. www.mss-hq.com	(703) 281-6613
NAAMM	National Association of Architectural Metal Manufacturers www.naamm.org	(630) 942-6591
NACE	NACE International (National Association of Corrosion Engineers International) www.nace.org	(800) 797-6223 (281) 228-6200
NADCA	National Air Duct Cleaners Association www.nadca.com	(202) 737-2926
NAGWS	National Association for Girls and Women in Sport www.aahperd.org/nagws/	(800) 213-7193, ext. 453
NAIMA	North American Insulation Manufacturers Association www.naima.org	(703) 684-0084
NBGQA	National Building Granite Quarries Association, Inc. www.nbgqa.com	(800) 557-2848
NCAA	National Collegiate Athletic Association (The) www.ncaa.org	(317) 917-6222
NCMA	National Concrete Masonry Association www.ncma.org	(703) 713-1900
NCTA	National Cable & Telecommunications Association www.ncta.com	(202) 222-2300
NEBB	National Environmental Balancing Bureau www.nebb.org	(301) 977-3698

NECA	National Electrical Contractors Association www.necanet.org	(301) 657-3110
NeLMA	Northeastern Lumber Manufacturers' Association www.nelma.org	(207) 829-6901
NEMA	National Electrical Manufacturers Association www.nema.org	(703) 841-3200
NETA	InterNational Electrical Testing Association www.netaworld.org	(888) 300-6382 (269) 488-6382
NFHS	National Federation of State High School Associations www.nfhs.org	(317) 972-6900
NFPA	NFPA (National Fire Protection Association) www.nfpa.org	(800) 344-3555 (617) 770-3000
NFRC	National Fenestration Rating Council www.nfrc.org	(301) 589-1776
NGA	National Glass Association www.glass.org	(866) 342-5642 (703) 442-4890
NHLA	National Hardwood Lumber Association www.natlhardwood.org	(800) 933-0318 (901) 377-1818
NLGA	National Lumber Grades Authority www.nlga.org	(604) 524-2393
NOFMA	NOFMA: The Wood Flooring Manufacturers Association (Formerly: National Oak Flooring Manufacturers Association) www.nofma.org	(901) 526-5016
NOMMA	National Ornamental & Miscellaneous Metals Association www.nomma.org	(888) 516-8585
NRCA	National Roofing Contractors Association www.nrca.net	(800) 323-9545 (847) 299-9070

NRMCA	National Ready Mixed Concrete Association www.nrmca.org	(888) 846-7622 (301) 587-1400
NSF	NSF International (National Sanitation Foundation International) www.nsf.org	(800) 673-6275 (734) 769-8010
NSSGA	National Stone, Sand & Gravel Association www.nssga.org	(800) 342-1415 (703) 525-8788
NTMA	National Terrazzo & Mosaic Association, Inc. (The) www.ntma.com	(800) 323-9736 (540) 751-0930
NWFA	National Wood Flooring Association www.nwfa.org	(800) 422-4556 (636) 519-9663
PCI	Precast/Prestressed Concrete Institute www.pci.org	(312) 786-0300
PDI	Plumbing & Drainage Institute www.pdionline.org	(800) 589-8956 (978) 557-0720
PGI	PVC Geomembrane Institute http://pgi-tp.cee.uiuc.edu	(217) 333-3929
PTI	Post-Tensioning Institute www.post-tensioning.org	(248) 848-3180
RCSC	Research Council on Structural Connections www.boltcouncil.org	
RFCI	Resilient Floor Covering Institute www.rfci.com	 (706) 882-3833
RIS	Redwood Inspection Service www.redwoodinspection.com	 (925) 935-1499
SAE	SAE International www.sae.org	(877) 606-7323 (724) 776-4841
SCAQMD	South Coast Air Quality Management District	(909) 396-2000

	www.aqmd.com	
SCTE	Society of Cable Telecommunications Engineers www.scte.org	(800) 542-5040 (610) 363-6888
SDI	Steel Deck Institute www.sdi.org	(847) 458-4647
SDI	Steel Door Institute www.steeldoor.org	(440) 899-0010
SEFA	Scientific Equipment and Furniture Association www.sefalabs.com	(877) 294-5424 (516) 294-5424
SEI/ASCE	Structural Engineering Institute/American Society of Civil Engineers (See ASCE)	
SIA	Security Industry Association www.siaonline.org	(866) 817-8888 (703) 683-2075
SJI	Steel Joist Institute www.steeljoist.org	(843) 626-1995
SMA	Screen Manufacturers Association www.smacentral.org	(561) 533-0991
SMACNA	Sheet Metal and Air Conditioning Contractors' National Association www.smacna.org	(703) 803-2980
SMPTE	Society of Motion Picture and Television Engineers www.smpte.org	(914) 761-1100
SPFA	Spray Polyurethane Foam Alliance (Formerly: SPI/SPFD - The Society of the Plastics Industry, Inc.; Spray Polyurethane Foam Division) www.sprayfoam.org	(800) 523-6154
SPIB	Southern Pine Inspection Bureau (The) www.spib.org	(850) 434-2611

SPRI	Single Ply Roofing Industry www.spri.org	(781) 647-7026
SSINA	Specialty Steel Industry of North America www.ssina.com	(800) 982-0355 (202) 342-8630
SSPC	SSPC: The Society for Protective Coatings www.sspc.org	(877) 281-7772 (412) 281-2331
STI	Steel Tank Institute www.steeltank.com	(847) 438-8265
SWI	Steel Window Institute www.steelwindows.com	(216) 241-7333
SWPA	Submersible Wastewater Pump Association www.swpa.org	(847) 681-1868
TCA	Tilt-Up Concrete Association www.tilt-up.org	(319) 895-6911
TCNA	Tile Council of North America, Inc. www.tileusa.com	(864) 646-8453
TEMA	Tubular Exchanger Manufacturers Association www.tema.org	(914) 332-0040
TIA/EIA	Telecommunications Industry Association/Electronic Industries Alliance www.tiaonline.org	(703) 907-7700
TMS	The Masonry Society www.masonrysociety.org	(303) 939-9700
TPI	Truss Plate Institute, Inc. www.tpinst.org	(703) 683-1010
TPI	Turfgrass Producers International www.turfgrasssod.org	(800) 405-8873 (847) 649-5555

TRI	Tile Roofing Institute www.tileroofing.org	(312) 670-4177
UL	Underwriters Laboratories Inc. www.ul.com	(877) 854-3577 (847) 272-8800
UNI	Uni-Bell PVC Pipe Association www.uni-bell.org	(972) 243-3902
USAV	USA Volleyball www.usavolleyball.org	(888) 786-5539 (719) 228-6800
USGBC	U.S. Green Building Council www.usgbc.org	(800) 795-1747
USITT	United States Institute for Theatre Technology, Inc. www.usitt.org	(800) 938-7488 (315) 463-6463
WASTEC	Waste Equipment Technology Association www.wastec.org	(800) 424-2869 (202) 244-4700
WCLIB	West Coast Lumber Inspection Bureau www.wclib.org	(800) 283-1486 (503) 639-0651
WCMA	Window Covering Manufacturers Association www.wcmanet.org	(212) 297-2122
WDMA	Window & Door Manufacturers Association (Formerly: NWWDA - National Wood Window and Door Association) www.wdma.com	(800) 223-2301 (312) 321-6802
WI	Woodwork Institute (Formerly: WIC - Woodwork Institute of California) www.wicnet.org	(916) 372-9943
WMMPA	Wood Moulding & Millwork Producers Association www.wmmpa.com	(800) 550-7889 (530) 661-9591
WSRCA	Western States Roofing Contractors Association www.wsrca.com	(800) 725-0333 (650) 570-5441

WWPA	Western Wood Products Association www.wwpa.org	(503) 224-3930

C. Code Agencies: Where abbreviations and acronyms are used in Specifications or other Contract Documents, they shall mean the recognized name of the entities in the following list. Names, telephone numbers, and Web sites are subject to change and are believed to be accurate and up-to-date as of the date of the Contract Documents.

DIN	Deutsches Institut fur Normung e.V. www.din.de	49 30 2601-0
IAPMO	International Association of Plumbing and Mechanical Officials www.iapmo.org	(909) 472-4100
ICC	International Code Council www.iccsafe.org	(888) 422-7233
ICC-ES	ICC Evaluation Service, Inc. www.icc-es.org	(800) 423-6587 (562) 699-0543

D. Federal Government Agencies: Where abbreviations and acronyms are used in Specifications or other Contract Documents, they shall mean the recognized name of the entities in the following list. Names, telephone numbers, and Web sites are subject to change and are believed to be accurate and up-to-date as of the date of the Contract Documents.

COE	Army Corps of Engineers www.usace.army.mil	(202) 761-0011
CPSC	Consumer Product Safety Commission www.cpsc.gov	(800) 638-2772 (301) 504-7923
DOC	Department of Commerce www.commerce.gov	(202) 482-2000
DOD	Department of Defense http://dodssp.daps.dla.mil	(215) 697-6257
DOE	Department of Energy www.energy.gov	(202) 586-9220
EPA	Environmental Protection Agency	(202) 272-0167

	www.epa.gov	
FAA	Federal Aviation Administration www.faa.gov	(866) 835-5322
FCC	Federal Communications Commission www.fcc.gov	(888) 225-5322
FDA	Food and Drug Administration www.fda.gov	(888) 463-6332
GSA	General Services Administration www.gsa.gov	(800) 488-3111
HUD	Department of Housing and Urban Development www.hud.gov	(202) 708-1112
LBL	Lawrence Berkeley National Laboratory www.lbl.gov	(510) 486-4000
NCHRP	National Cooperative Highway Research Program (See TRB)	
NIST	National Institute of Standards and Technology www.nist.gov	(301) 975-6478
OSHA	Occupational Safety & Health Administration www.osha.gov	(800) 321-6742 (202) 693-1999
PBS	Public Buildings Service (See GSA)	
PHS	Office of Public Health and Science http://www.hhs.gov/ophs/	(202) 690-7694
RUS	Rural Utilities Service (See USDA)	(202) 720-9540
SD	State Department www.state.gov	(202) 647-4000

TRB	Transportation Research Board http://gulliver.trb.org	(202) 334-2934
USDA	Department of Agriculture www.usda.gov	(202) 720-2791
USP	U.S. Pharmacopeia www.usp.org	(800) 227-8772
USPS	Postal Service www.usps.com	(202) 268-2000

E. Standards and Regulations: Where abbreviations and acronyms are used in Specifications or other Contract Documents, they shall mean the recognized name of the standards and regulations in the following list. Names, telephone numbers, and Web sites are subject to change and are believed to be accurate and up-to-date as of the date of the Contract Documents.

ADAAG	Americans with Disabilities Act (ADA) Architectural Barriers Act (ABA) Accessibility Guidelines for Buildings and Facilities Available from U.S. Access Board www.access-board.gov	(800) 872-2253 (202) 272-0080
CFR	Code of Federal Regulations Available from Government Printing Office www.gpoaccess.gov/cfr/index.html	(866) 512-1800 (202) 512-1800
DOD	Department of Defense Military Specifications and Standards Available from Department of Defense Single Stock Point http://dodssp.daps.dla.mil	(215) 697-2664
DSCC	Defense Supply Center Columbus (See FS)	
FED-STD	Federal Standard (See FS)	
FS	Federal Specification Available from Department of Defense Single Stock Point http://dodssp.daps.dla.mil/ Available from Defense Standardization Program	(215) 697-2664

www.dsp.dla.mil

Available from General Services Administration (202) 619-8925
www.gsa.gov

Available from National Institute of Building Sciences (202) 289-7800
www.wbdg.org/ccb

FTMS Federal Test Method Standard
(See FS)

MIL (See MILSPEC)

MIL-STD (See MILSPEC)

MILSPEC Military Specification and Standards (215) 697-2664
Available from Department of Defense Single Stock Point
http://dodssp.daps.dla.mil

UFAS Uniform Federal Accessibility Standards (800) 872-2253
Available from Access Board (202) 272-0080
www.access-board.gov

F. State Government Agencies: Where abbreviations and acronyms are used in Specifications or other Contract Documents, they shall mean the recognized name of the entities in the following list. Names, telephone numbers, and Web sites are subject to change and are believed to be accurate and up-to-date as of the date of the Contract Documents.

CBHF State of California, Department of Consumer Affairs Bureau of Home Furnishings and Thermal Insulation (800) 952-5210
www.dca.ca.gov/bhfti (916) 574-2041

CCR California Code of Regulations (916) 323-6815
www.calregs.com

CDHS California Department of Health Services (916) 445-4171
www.dhcs.ca.gov

CDPH California Department of Public Health, Indoor Air Quality Section
www.cal-iaq.org

CPUC California Public Utilities Commission (415) 703-2782
www.cpuc.ca.gov

TFS	Texas Forest Service	
	Forest Resource Development	(979) 458-6606
	http://txforestservice.tamu.edu	

PART 2 PRODUCTS – NOT USED

PART 3 EXECUTION – NOT USED

END OF SECTION

SECTION 01 45 33
CODE-REQUIRED SPECIAL INSPECTIONS

PART 1 GENERAL - NOT USED

1.01 SECTION INCLUDES

A. Code-required special inspections.

B. Testing services incidental to special inspections.

C. Submittals.

1.02 RELATED REQUIREMENTS

A. Section 01 30 00 - Administrative Requirements: Submittal procedures.

B. Section 01 40 00 - Quality Requirements.

1.03 DEFINITIONS

A. Code or Building Code: 2009 Edition of the International Building Code and, more specifically, Chapter 17 - Structural Tests and Inspections, of same.

B. Authority Having Jurisdiction (AHJ): Agency or individual officially empowered to enforce the building, fire and life safety code requirements of the permitting jurisdiction in which the Project is located.

C. Special Inspection:
   1. Special inspections are inspections and testing of materials, installation, fabrication, erection or placement of components and connections mandated by the AHJ that also require special expertise to ensure compliance with the approved contract documents and the referenced standards.
   2. Special inspections are separate from and independent of tests and inspections conducted by Owner or Contractor for the purposes of quality assurance and contract administration.

1.04 REFERENCE STANDARDS

A. ACI 318 - Building Code Requirements for Structural Concrete and Commentary; 2011.

B. ASTM E329 - Standard Specification for Agencies Engaged in Construction Inspection, Testing, or Special Inspection; 2014a.

C. ASTM E543 - Standard Specification for Agencies Performing Nondestructive Testing; 2013.

D. AWS D1.1/D1.1M - Structural Welding Code - Steel; 2010 w/Errata.

E. AWS D1.3/D1.3M - Structural Welding Code - Sheet Steel; 2008.

F. AWS D1.4/D1.4M - Structural Welding Code - Reinforcing Steel; 2011.

G. IAS AC89 - Accreditation Criteria for Testing Laboratories; 2010.

H. IAS AC291 - Accreditation Criteria for Special Inspection Agencies; 2012.

1.05 SUBMITTALS

A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.

B. Special Inspection Agency Qualifications: Prior to the start of work, the Special Inspection Agency shall:
   1. Submit agency name, address, and telephone number, names of full time registered Engineer and responsible officer.
   2. Submit copy of report of laboratory facilities inspection made by NIST Construction Materials Reference Laboratory during most recent inspection, with memorandum of remedies of any deficiencies reported by the inspection.
   3. Submit certification that Special Inspection Agency is acceptable to AHJ.

4. Submit documentation that Special Inspection Agency is accredited by IAS according to IAS AC291.

C. Testing Agency Qualifications: Prior to the start of work, the Testing Agency shall:
   1. Submit agency name, address, and telephone number, and names of full time registered Engineer and responsible officer.
   2. Submit copy of report of laboratory facilities inspection made by NIST Construction Materials Reference Laboratory during most recent inspection, with memorandum of remedies of any deficiencies reported by the inspection.
   3. Submit certification that Testing Agency is acceptable to AHJ.
   4. Submit documentation that Testing Agency is accredited by IAS according to IAS AC89.

D. Special Inspection Reports: After each special inspection, Special Inspector shall promptly submit two copies of report; one to Architect and one to the AHJ.
   1. Include:
      a. Date issued.
      b. Project title and number.
      c. Name of Special Inspector.
      d. Date and time of special inspection.
      e. Identification of product and specifications section.
      f. Location in the Project.
      g. Type of special inspection.
      h. Date of special inspection.
      i. Results of special inspection.
      j. Conformance with Contract Documents.
   2. Final Special Inspection Report: Document special inspections and correction of discrepancies prior to the start of the work.

E. Fabricator Special Inspection Reports: After each special inspection of fabricated items at the Fabricator's facility, Special Inspector shall promptly submit two copies of report; one to Architect and one to AHJ.
   1. Include:
      a. Date issued.
      b. Project title and number.
      c. Name of Special Inspector.
      d. Date and time of special inspection.
      e. Identification of fabricated item and specification section.
      f. Location in the Project.
      g. Results of special inspection.
      h. Verification of fabrication and quality control procedures.
      i. Conformance with Contract Documents.
      j. Conformance to referenced standard(s).

F. Test Reports: After each test or inspection, promptly submit two copies of report; one to Architect and one to AHJ.
   1. Include:
      a. Date issued.
      b. Project title and number.
      c. Name of inspector.
      d. Date and time of sampling or inspection.
      e. Identification of product and specifications section.
      f. Location in the Project.
      g. Type of test or inspection.
      h. Date of test or inspection.
      i. Results of test or inspection.
      j. Conformance with Contract Documents.

G. Certificates: When specified in individual special inspection requirements, Special Inspector shall submit certification by the manufacturer, fabricator, and installation subcontractor to Architect and AHJ, in quantities specified for Product Data.
   1. Indicate material or product conforms to or exceeds specified requirements. Submit supporting reference data, affidavits, and certifications as appropriate.

1.06 SPECIAL INSPECTION AGENCY

A. Owner will employ services of a Special Inspection Agency to perform inspections and associated testing and sampling in accordance with ASTM E329 and required by the building code.

B. The Special Inspection Agency may employ and pay for services of an independent testing agency to perform testing and sampling associated with special inspections and required by the building code.

C. Employment of agency in no way relieves Contractor of obligation to perform work in accordance with requirements of Contract Documents.

1.07 TESTING AND INSPECTION AGENCIES

A. Owner may employ services of an independent testing agency to perform additional testing and sampling associated with special inspections but not required by the building code.

B. Employment of agency in no way relieves Contractor of obligation to perform work in accordance with requirements of Contract Documents.

1.08 QUALITY ASSURANCE

A. Special Inspection Agency Qualifications:
   1. Independent firm specializing in performing testing and inspections of the type specified in this section.
   2. Accredited by IAS according to IAS AC291.

B. Testing Agency Qualifications:
   1. Independent firm specializing in performing testing and inspections of the type specified in this section.
   2. Accredited by IAS according to IAS AC89.

PART 2 PRODUCTS - NOT USED

PART 3 EXECUTION

END OF SECTION

Statement of Special Inspections

July 21, 2015

University of Southern Maine/Science Building C300 Chemistry Lab
Portland, Maine

Owner:

University of Southern Maine System
Portland, Maine

Registered Design Professional in Responsible Charge:

Chris Drobat, AIA
Lavallee Brensinger Architects
155 Dow Street, Suite #400
Manchester, NH 03101
603-622-5450

Architect of Record (AR):

Chris Drobat, AIA
Lavallee Brensinger Architects
155 Dow Street, Suite #400
Manchester, NH 03101
603-622-5450

Structural Engineer of Record (SER): NOT APPLICABLE

Approved Agency(s) (AA): TO BE DETERMINED

Geotechnical Engineer (GE): NOT APPLICABLE

This Statement of Special Inspections is submitted as a condition for permit issuance in accordance with the Special Inspection and Structural Testing requirements of the International Building Code, 2009 edition. It includes a schedule of Special Inspection services applicable to this Project, names of Special Inspectors, and names of other approved agencies conducting these inspections and tests. This Statement of Special Inspections includes the following disciplines: Fire Protection, Mechanical and Electrical.

Record Keeping and Reports:

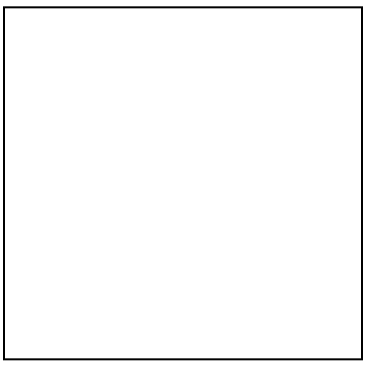
The Special Inspectors shall keep records of all inspections and shall furnish inspection reports to the Building Official, Owner and the Registered Design Professional in Responsible Charge. Reports shall indicate that work inspected was or was not completed in conformance to approved construction documents. Discovered discrepancies shall be brought to the immediate attention of the Contractor for correction. If such discrepancies are not corrected, the discrepancies shall be brought to the attention of the Building Official and the Registered Design Professional in Responsible Charge prior to the completion of that phase of the Work.

Interim reports shall be submitted by Special Inspectors to the Building Official, Owner and the Registered Design Professional in Responsible Charge bi-monthly during the related phase of the Work.

A Final Report of Special Inspections documenting completion of all required Special Inspections, testing and correction of any discrepancies noted in the inspections shall be submitted by a date agreed upon prior to the start of the Work by the permit applicant and Building Official, and prior to issuance of a Certificate of Use and Occupancy. Final Reports are proposed to be submitted no later than the date of Substantial Completion.

Statement of Special Inspections Prepared by:

Registered Design Professional In Responsible Charge
Chris Drobat, AIA
Lavallee Brensinger Architects
155 Dow Street, Suite #400
Manchester, NH 03101
603-622-5450



Architect's Signature: _____ Date: _____

Structural Tests and Inspections: The firms, agencies, or individuals identified (hereafter referred to collectively as agents) shall perform the structural tests and inspections under the direction of the SER.

The complete set of Contract Documents (Drawings, Specifications and Addenda) that accompany the application for building permit is to be considered attached to this program as reference material.

The Special Inspections program does not relieve the Contractor of his or her responsibilities. Job site safety and means and methods of construction are solely the responsibility of the Contractor. This program does not relieve the Contractor of their responsibility to conduct the work in accordance with the requirements of the Construction Documents, the approved Shop Drawings and the aforementioned state building codes.

Owner's Authorization: Building Official's Acceptance:

_____ _____

Signature Date Signature Date

Construction Categories: If Construction Categories are indicated as applicable to this Project, a program, identified herein of structural tests and inspections are required for this Project.

Performance Specifications: If indicated as applicable, Performance Specifications are designated in the Contract Documents and shall be designed by the Contractor's or Subcontractor's registered professional engineer in accordance with the 2009 IBC and the Construction Documents. The design of these structural elements or systems shall be reviewed by the SER and their construction is included in the program for structural tests and inspections.

Construction Category / Activity	**Scope**	**Applicable to this Project**		
		Performance Specification	**Agent**	**Frequency**
Mechanical & Electrical Component Anchorage	Divisions 21, 22, 23, 26			
Attachment methods for seismic resisting systems for emergency or standby power equipment; HVAC ductwork carrying hazardous materials; and vibration isolation systems.	Periodically inspect screw, bolting, anchoring and other fastening of component within the seismic force resisting system including struts, braces and hold-downs for conformance with the approved Shop Drawings and Contract Documents. (IBC 1707.6)		AA SER	10% of all applicable items
Special Case – Unusual Design or Materials				

END OF DOCUMENT

SECTION 01 50 00
TEMPORARY FACILITIES

PART 1 GENERAL

1.01 SECTION INCLUDES

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

B. Temporary utilities include, but are not limited to, the following:

1. Water service.
2. Sanitary facilities, including toilets, and drinking-water facilities.
3. Heating facilities.
4. Ventilation.
5. Electric power service.
6. Lighting.
7. Telephone service.
8. Internet service.

C. Support facilities include, but are not limited to, the following:

1. Waste disposal facilities.
2. Field office.
3. Lifts and hoists.
4. Construction aids and miscellaneous services and facilities.
5. Snow removal.

D. Security and protection facilities include, but are not limited to, the following:

1. Environmental protection.
2. Tree and plant protection.
3. Perimeter enclosure fence for the site.
4. Security enclosure and lockup.
5. Barricades, warning signs, and lights.
6. Covered walkways.
7. Temporary enclosures.
8. Fire protection.

1.02 RELATED REQUIREMENTS

A. Section 01 00 00 - General Requirements.

B. Section 01 40 00 - Quality Requirements.

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

D. Division 01 Section "Submittal Procedures" for procedures for submitting copies of implementation and termination schedule and utility reports.

E. Division 01 Section “Construction Waste Management” for handling and processing construction debris.

F. Division 01 Section "Execution Requirements" for progress cleaning requirements.

G. Divisions 02 through 33 for temporary heat, ventilation, and humidity requirements for products in those Sections.

1.03 QUALITY ASSURANCE

A. Comply with NFPA 241 Building Construction and Demolition Operations, ANSI A10 Safety Requirements for Construction and Demolition, AGC and ASC industry recommendations, and other applicable standards.
   1. Temporary electrical service shall comply with NECA Temporary Electrical Facilities, NEMA, UL and NFPA 70 National Electric Code.

B. At the earliest time, when acceptable to the Owner, change over room use of temporary service to use of the permanent service.

C. Operate temporary service and facilities in a safe and efficient manner, taking necessary fire prevention measures.

D. The Contractor is responsible for the implementation, monitoring, and maintenance of job site safety program for the duration of the contract.

1.04 TEMPORARY UTILITIES

A. Owner will provide the following:
   1. Electrical power and metering, consisting of connection to existing facilities.
   2. Water supply, consisting of connection to existing facilities.

1.05 TELEPHONE SERVICES

A. Provide, maintain, and pay for telephone service to field office and Owner's field office at time of Project mobilization.

B. Telecommunications services shall include:
   1. Personal computer dedicated to project telecommunications, with necessary software and laser printer.
   2. Telephone Land Lines: One line, minimum; one handset per line.
   3. Internet Connections: Minimum of one; DSL modem or faster.
   4. Email: Account/address reserved for project use.

1.06 TEMPORARY SANITARY FACILITIES

A. Use of existing facilities is permitted.

B. Maintain daily in clean and sanitary condition.

C. At end of construction, return facilities to same or better condition as originally found.

1.07 BARRIERS

A. Provide barriers to prevent unauthorized entry to construction areas, to prevent access to areas that could be hazardous to workers or the public, to allow for owner's use of site and to protect existing facilities and adjacent properties from damage from construction operations and demolition.

B. Provide barricades and covered walkways required by governing authorities for public rights-of-way and for public access to existing building.

C. Protect non-owned vehicular traffic, stored materials, site, and structures from damage.

1.08 INTERIOR ENCLOSURES

A. Provide temporary partitions and ceilings as indicated to separate work areas from Owner-occupied areas, to prevent penetration of dust and moisture into Owner-occupied areas, and to prevent damage to existing materials and equipment.

B. Construction: Framing and gypsum board sheet materials with closed joints and sealed edges at intersections with existing surfaces:

C. Paint surfaces exposed to view from Owner-occupied areas.

1.09 SECURITY

A. Provide security and facilities to protect Work, and Owner's operations from unauthorized entry, vandalism, or theft.

B. Coordinate with Owner's security program.

1.10 VEHICULAR ACCESS AND PARKING

A. Comply with regulations relating to use of streets and sidewalks, access to emergency facilities, and access for emergency vehicles.

B. Coordinate access and haul routes with governing authorities and Owner.

C. Provide and maintain access to fire hydrants, free of obstructions.

D. Designated existing on-site roads may be used for construction traffic.

E. Provide temporary parking areas to accommodate construction personnel. When site space is not adequate, provide additional off-site parking.

1.11 WASTE REMOVAL

A. See Section 01 74 19 - Waste Management, for additional requirements.

B. Provide waste removal facilities and services as required to maintain the site in clean and orderly condition.

C. Provide containers with lids. Remove trash from site periodically.

D. If materials to be recycled or re-used on the project must be stored on-site, provide suitable non-combustible containers; locate containers holding flammable material outside the structure unless otherwise approved by the authorities having jurisdiction.

E. Open free-fall chutes are not permitted. Terminate closed chutes into appropriate containers with lids.

1.12 PROJECT IDENTIFICATION

A. Provide project identification sign.

B. Erect on site at location approved by Owner and governing authorities.

C. No other signs are allowed without Owner permission except those required by law.

D. Content: Display names and addresses of the Project, Owner, Architect, and Contractor. Graphics, text, lettering, colors, and location shall be provided by the Architect and approved by the Owner, at a later date.

E. Temporary Signs: Prepare signs to provide directional information to construction personnel and visitors. Do not permit installation of unauthorized signs. No other signs or advertisements shall be displayed on the premises without the approval of the Owner.

1.13 FIELD OFFICES

A. The Contractor shall provide and maintain an insulated, weather tight, field office at the site. The office shall be of sufficient size to accommodate required office personnel and meeting place for six people. Provide electrical service, heat, lighting, telephone, fax machine, and personal computer, Internet connected with e-mail capability and printer. At a minimum, furnish with a desk and chair for each Superintendent, conference table and chairs, 4-drawer file cabinet, plan table, plan rack, and bulletin board. Equip with a water cooler and first aid cabinet unit. Existing facilities and/or new construction shall not be available for this purpose.

B. Temporary offices shall be maintained until the issuance of a Certificate of Substantial Completion and shall be removed when no longer required. The Contractor shall pay all costs in connection with the construction, servicing, maintenance, and removal of temporary offices.

C. Locate offices a minimum distance of 30 feet from existing and new structures.

1.14 REMOVAL OF UTILITIES, FACILITIES, AND CONTROLS

A. Remove temporary utilities, equipment, facilities, materials, prior to Substantial Completion inspection.

B. Clean and repair damage caused by installation or use of temporary work.

C. Restore existing facilities used during construction to original condition.

1.15 PROJECT CONDITIONS

A. Temporary Utilities: At earliest feasible time, when acceptable to Owner, change over from use of temporary service to use of permanent service.

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

B. Conditions of Use: The following conditions apply to use of temporary services and facilities by all parties engaged in the Work:

1. Keep temporary services and facilities clean and neat.

2. Relocate temporary services and facilities as required by progress of the Work.

C. Restrict use of noise-making tools and equipment to hours that will minimize complaints from persons or firms near the site. Construction noise from machinery, equipment, construction traffic, hammering and similar loud noises shall be restricted to the hours of 7:30 a.m. to 7:00 p.m. Obey State and local noise ordinances.

1. Comply with Owner’s requirements during hours when classes are being held.

PART 2 PRODUCTS

2.01 PRODUCTS

A. Tarpaulins: Waterproof, fire-resistant, UL labeled, with flame spread rating of 15 or less.

B. Water: Potable water.

2.02 EQUIPMENT

A. General: Provide equipment suitable for use intended.

B. Field Offices: Use of space within second floor being renovated will be permitted.

C. Fire Extinguishers: Hand carried, portable, UL rated. Provide class and extinguishing agent as indicated or a combination of extinguishers of NFPA-recommended classes for exposures.

1. Comply with NFPA 10 and NFPA 241 for classification, extinguishing agent, and size required by location and class of fire exposure.

D. Self-Contained Toilet Units: Single-occupant units of chemical, aerated recirculation, or combustion type; vented; fully enclosed with a glass-fiber-reinforced polyester shell or similar nonabsorbent material.

E. Drinking-Water Fixtures: Containerized, tap-dispenser, bottled-water drinking-water units, including paper cup supply.

F. Heating Equipment: Owner authorizes use of permanent heating system.

G. Electrical Outlets: Properly configured, NEMA-polarized outlets to prevent insertion of 110- to 120-V plugs into higher-voltage outlets; equipped with ground-fault circuit interrupters, reset button, and pilot light.

H. Lamps and Light Fixtures: Provide general service incandescent lamps of wattage required for adequate illumination. Provide guard cages or tempered-glass enclosures where exposed to breakage. Provide exterior fixtures where exposed to moisture.

I. Security Fence: Perimeter security fencing shall be minimum 4 feet high, orange tensar fencing with post supports to maintain position. Provide access and entry control gates for vehicle traffic and workers as necessary.

PART 3 EXECUTION

3.01 GENERAL

A. Review locations of temporary facilities, equipment, and storage with the Architect and Owner, for the Owner's approval.

B. Use qualified personnel for the installation of temporary facilities. Do not remove until facilities are no longer needed, or are replaced by authorized use of completed permanent facilities.

3.02 TEMPORARY UTILITY INSTALLATION

A. Temporary Water Service: The existing water service may be used as temporary water during construction. The Owner will pay for all water used throughout the construction period, providing its use is not excessive or otherwise unreasonable. The Contractor shall:
   1. Obtain water required for the work from location designated by the Owner.
   2. Use the water service in a manner approved by governing authorities.
   3. Extend a supply adequate for all construction purposes and convenient to all trades.
   4. Protect lines against freezing and be fully responsible for the temporary installation in every way.
   5. Provide backflow preventer(s), vacuum breakers, etc., as required to protect water systems from contamination.
   6. Provide any and all hose needed. All service hoses shall be bubble-tight at all times. Trigger operated nozzles shall be used to reduce water waste. No leakage shall be acceptable. Remove all temporary equipment and materials completely upon completion of construction.
   7. Repair all damage caused by his use of temporary or permanent water services.

B. Temporary Electrical Services: The Contractor shall provide and maintain temporary light and power for the execution of the Work of this Contract. The existing electrical service may be used for temporary lighting and power providing that it is safe and adequate, and its use is acceptable to governing authorities. Should the Contractor determine that the existing service is not suitable for use as temporary lighting and power, he shall arrange for temporary electric services and pay for all charges of installation and removal of same. Such services shall be installed and maintained in conformance with NEMA, NECA, UL standards for temporary electric service, National Electric Code and in a manner approved by the governing authorities. The Owner will pay monthly user charges throughout the construction period, providing such charges are not excessive or otherwise unreasonable. The Contractor shall:
   1. Pay for permits, if applicable, as required by governing authorities. Obtain easements across private property if required. Comply with National Electrical Code, latest edition and applicable local codes and utility regulations.
   2. Extend from the source a supply of temporary lighting and power adequate for all construction purposes and convenient to all trades.
   3. Accept full responsibility for the temporary installation in every way. Remove all temporary equipment and materials completely upon completion of construction.
   4. Determine that construction use of power will not affect the operation or performance of any equipment or appliances within the existing building.

C. Sanitary Facilities: Provide temporary toilets and drinking-water fixtures. Comply with regulations and health codes for type, number, location, operation, and maintenance of fixtures and facilities.
   1. Disposable Supplies: Provide toilet tissue, paper towels, paper cups, and similar disposable materials for each facility. Maintain adequate supply. Provide covered waste containers for disposal of used material.
   2. Toilets: Install self-contained toilet units. Shield toilets to ensure privacy.
   3. Drinking-Water Facilities: Provide bottled-water, drinking-water units.
   4. Use of the Owner's existing toilet facilities will not be permitted.

D. Temporary Ventilation: Ventilate enclosed areas to achieve curing of materials, to dissipate humidity, and to prevent accumulation of dust, fumes, vapors, or gases.
   1. Provide temporary ventilation required by construction activities for curing or drying of completed installations or for protecting installed construction from adverse effects of high humidity. Coordinate ventilation requirements to produce ambient condition required and minimize energy consumption.

E. Heating: Heating will be by existing heating system within the facility. Provide temporary protection to reduce heat loss for the work where existing construction is disturbed at exterior wall openings.
   1. The Contractor shall pay for all maintenance related to such use of new and existing heating systems during the construction phase. Upon Substantial Completion, filters shall be replaced and the system shall be cleaned and adjusted. Such cleaning shall include the insides of all ductwork used during construction and intended to remain in operation.
   2. The Contractor shall inspect/survey the existing heating system and as necessary provide temporary relocation of system returns as applicable to prevent the transfer of dust, fumes, vapors and gases incurred during construction from migrating into areas served by said systems outside the area of construction.
      a. Prior to use of system obtain approval by Owner.

F. Telephone Service: Provide temporary cellular telephone service with voice mail throughout construction period.

G. Internet Service: Provide laptop computer service for daily use at the site. Wireless internet connection is available at the site for the contractor's use.

3.03 TEMPORARY SUPPORT FACILITIES INSTALLATION

A. Storage Sheds and Trailers: Existing facilities and/or new construction shall not be available for this purpose.
   1. All field offices, storage sheds, and trailers located within the construction area, or within 30 feet of building lines shall be of non-combustible construction, complying with requirements of NFPA 241.
   2. Construction shanties, sheds, and temporary facilities provided as required above or for the Contractor's convenience shall be located as approved by the Owner and governing authorities and maintained in good condition and neat appearance.

B. Temporary Stairs, Lifts, and Hoists: The Contractor shall furnish and maintain all equipment such as temporary stairs, ladders, ramps, scaffolds, runways, chutes, etc., as required for the proper execution of the Work, unless specifically included under the Work of other trades.
   1. All such apparatus, equipment, and construction shall meet all requirements of applicable laws, regulations, and standards of safety and good practice.
   2. All hoisting equipment and machinery required for the proper and expeditious prosecution and progress of the Work shall be furnished, installed, operated, and maintained in safe condition by the Contractor for the use of all subcontractors' material and/or equipment delivered to the designated hoisting area. All costs for such equipment operating services shall be paid by the Contractor.
   3. In the event that a particular subcontractor has certain specific requirements which are peculiar to his needs, and which cannot be satisfied with the hoist provided by the Contractor, the subcontractor shall provide, maintain, operate, and pay for hoisting equipment necessary for the proper execution and completion of his work.
   4. Truck cranes and similar devices used for hoisting materials are considered "tools and equipment" and not temporary facilities.

C. Construction and Waste Disposal Facilities: Provide waste-collection containers in sizes adequate to handle waste from construction operations. Containerize and clearly label hazardous, dangerous, or unsanitary waste materials separately from other waste. Comply with Division 1 Section "Execution Requirements" for progress cleaning requirements.
   1. Provide separate containers, clearly labeled, for each type of waste material to be deposited.

2. Comply with Section “Construction Waste Management.”

D. Contractor’s Field Office: Contractor will be permitted to work out of the second floor area being renovated. Keep area clean and orderly
   1. The Contractor is responsible for cleaning of their floors, including access routes to the office area, and emptying trash.

3.04 SECURITY AND PROTECTION FACILITIES INSTALLATION

A. Temporary Fire Protection: Until fire protection needs are supplied by permanent facilities, the Contractor shall provide and maintain in good operating condition temporary fire protection facilities of the types needed to protect against reasonably predictable and controllable fire losses, and as recommended by representatives of the fire insurance company carrying insurance on the Work or by governing fire or building authorities. Comply with NFPA 10 "Standard for Portable Fire Extinguishers" and NFPA 241 "Standard for Safeguarding Construction, Alterations, and Demolition Operations". Comply with USM campus requirements.
   1. The area within the site limits shall be kept orderly and clean, and all combustible rubbish shall be promptly removed from the site.
   2. Provide fire extinguishers, installed on walls on mounting brackets, visible and accessible from space being served, with sign mounted above.
      a. Field Offices: Class A stored-pressure water-type extinguishers.
      b. Other Locations: Class ABC dry-chemical extinguishers or a combination of extinguishers of NFPA-recommended classes for exposures.
      c. Locate fire extinguishers where convenient and effective for their intended purpose; provide not less than one extinguisher on each floor at or near each usable stairwell.
   3. Store combustible materials in containers in fire-safe locations.
   4. Maintain unobstructed access to fire extinguishers, fire hydrants, temporary fire-protection facilities, stairways, and other access routes for firefighting. Prohibit smoking in hazardous fire-exposure areas.
   5. Supervise welding operations, combustion-type temporary heating units, and similar sources of fire ignition.
   6. Permanent Fire Protection: At earliest feasible date in each area of Project, complete installation of permanent fire-protection facility, including connected services, and place into operation and use. Instruct key personnel on use of facilities.
   7. Develop and supervise an overall fire-prevention and first-aid fire-protection program for personnel at Project site. Review needs with local fire department and establish procedures to be followed. Instruct personnel in methods and procedures. Post warnings and information.

B. 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.

C. 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. Minimize the use of tools and equipment that product excessive noise and restrict their use to hours that will minimize complaints from persons near the site.

D. Temporary Enclosures: Provide temporary enclosure for protection of construction in progress and completed, from exposure, foul weather, other construction operations, and similar activities.
   1. Install tarpaulins securely, with non-combustible wood framing and other materials. Close openings 25 sq. feet or less with plywood or similar materials.

2. Close openings through floor or roof decks and horizontal surfaces with load-bearing temporary construction. Where temporary wood or plywood is used and exceeds 100 sq feet in area, use fire-retardant treated framing and plywood.
3. Where heating is needed and permanent enclosure is not complete, provide insulated temporary enclosures. Coordinate enclosure with ventilating and material drying or curing requirements to avoid dangerous conditions and effects.
4. Provide temporary weathertight enclosure for building exterior.

E. Protective Covering of the Work: The Contractor shall protect all finished surfaces, including the jambs and soffits of all openings used as passageways or through which materials are handled, against any possible damage resulting from the conduct of work by all trades.
1. All finished surfaces, including factory-finished and job-finished items, shall be clean and not marred upon delivery of the building to the Owner. The Contractor shall, without extra compensation, refinish all spaces where such surfaces prove to have been inadequately protected and are damaged.
2. Tight wood sheathing shall be laid under any materials that are stored on or moved over finished surfaces. Reinforced non-staining kraft building paper and plywood or planking shall be laid over all types of finished floor surfaces in traffic areas before moving any material over these finished areas. Wheelbarrows, if used over such areas, shall have rubber-tired wheels.
3. Roof surfaces shall not be subjected to unnecessary traffic nor shall they be used for storage of material. Wherever such activity must take place in order to carry out the Work of the Contract, adequate protection shall be provided.
4. Prohibit traffic on grass and landscaped areas.

F. Worker I.D. Badges: The Contractor shall provide worker I.D. badges for all personnel present on the site involved with the Project. A list shall be maintained in the field office, identifying workers with their assigned badge number. Badges shall be prominently displayed at all times when on-site.

G. Tree and Plant Protection: Install temporary fencing located as indicated or outside the drip line of trees to protect vegetation from construction damage. Protect tree root systems from damage.

H. Security Fence: Before work begins, install an enclosure fence at exterior construction area where work occurs. Provide access and entry control gates for vehicle traffic and workers as necessary. Fencing shall be such to limit access to the work area by pedestrian traffic around the site. Install in a manner that will prevent people, dogs, and other animals from easily entering the site, except by the entrance gates.
1. Locate fence so as to not hinder site work or progress on the building. Relocate without additional expense as needed during progress of the work.
2. Provide signage to warn people to “keep out” and area is dangerous to non-construction personnel. Locate signs as recommended by AGC and USM requirements.

I. Security Enclosure and Lockup: Install substantial temporary enclosure around partially completed areas of the building. Provide lockable entrances to prevent unauthorized entrance, vandalism, theft, and similar violations of security.

J. Temporary Dust Partitions:
1. Provide temporary dust partitions isolating the work from occupied spaces before starting any demolition and remove after work is completed. Obtain approval from Architect before removal of partitions.
2. Construct temporary dust partitions out of metal studs and 1/2" fire-retardant plywood on one side. Seal all gaps and around perimeter with duct tape. Temporary doors for partitions shall be 3'-0" x 6'-8" hollow core doors with standard mortise hardware, closers, weatherstripping and keyed locksets to match Owner's. Insulate partition to provide noise protection to occupied areas.
3. All temporary dust partitions in place less than 10 days may be fire-retardant vinyl and adequately supported sealed with duct tape.

4. Hang vinyl around area while stud and plywood temporary partition is being constructed.
5. Insulate and weatherproof temporary partitions and doors exposed to exterior and exposed to unheated spaces.

K. Covered Walkway: Erect a structurally adequate, protective covered walkway for passage of persons at exits from the building with potential danger from falling objects. Comply with regulations of authorities having jurisdiction.

3.05 TERMINATION AND REMOVAL

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

B. Maintenance: Maintain facilities in good operating condition until removal. Protect from damage caused by freezing temperatures and similar elements.
1. Maintain operation of temporary enclosures, heating, cooling, humidity control, ventilation, and similar facilities on a 24-hour basis where required to achieve indicated results and to avoid possibility of damage.
2. Snow removal: Provide snow removal necessary to do the work and maintain access to materials and temporary facilities

C. Flooring Protection: Protect flooring against mars, marks, indentations, and other damage from construction operations and placement of equipment and fixtures during construction period. Use protection methods indicated or recommended by flooring manufacturer.
1. Cover flooring with undyed, untreated building paper at high traffic areas until inspection for Substantial Completion.
2. Do not move heavy and sharp objects directly over flooring. Place plywood or hardboard panels over flooring and under objects while they are being moved. Slide or roll objects over panels without moving panels.

D. Restoration of Roadways and Pavement: Roadways, pavements and curbs that are broken, damaged, settled, or otherwise defective as a result of receiving, handling, storage of materials or the performance of any work under this Contract, shall be fully restored to the satisfaction of the authorities having jurisdiction.

E. Termination and Removal: Remove each temporary facility when need for its service has ended, when it has been replaced by authorized use of a permanent facility, or no later than Substantial Completion. Complete or, if necessary, restore permanent construction that may have been delayed because of interference with temporary facility. Repair damaged Work, clean exposed surfaces, and replace construction that cannot be satisfactorily repaired.
1. Materials and facilities that constitute temporary facilities are the property of Contractor. Owner reserves right to take possession of Project identification signs.
2. At Substantial Completion, clean and renovate permanent facilities used during construction period. Comply with final cleaning requirements in Division 1 Section "Closeout Procedures."

F. Materials and facilities that constitute temporary facilities are the property of the Contractor.

C. At Substantial Completion, clean and restore permanent facilities that have been used during construction, including but not limited to, replacing air filters, cleaning ductwork, and replacing lamps affected by substantial use.

END OF SECTION

SECTION 01 57 21
INDOOR AIR QUALITY CONTROLS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Construction procedures to promote adequate indoor air quality after construction.

B. Building flush-out after construction and before occupancy.

C. Testing indoor air quality before commencement of construction; existing building areas only.

D. Testing indoor air quality after completion of construction.

1.02 PROJECT GOALS

A. Dust and Airborne Particulates: Prevent deposition of dust and other particulates in HVAC ducts and equipment.
   1. Contractor shall bear the cost of cleaning required due to failure to protect ducts and equipment from construction dust.
   2. Establish condition of existing ducts and equipment prior to start of alterations.

B. Airborne Contaminants: Procedures and products have been specified to minimize indoor air pollutants.
   1. Furnish products meeting the specifications.
   2. Avoid construction practices that could result in contamination of installed products leading to indoor air pollution.

1.03 RELATED REQUIREMENTS

A. Section 01 40 00 - Quality Requirements: Testing and inspection services.

1.04 REFERENCE STANDARDS

A. ASHRAE Std 52.2 - Method of Testing General Ventilation Air-Cleaning Devices for Removal Efficiency by Particle Size; 2012.

B. ASHRAE Std 62.1 - Ventilation For Acceptable Indoor Air Quality; 2013.

C. ASTM D5197 - Standard Test Method for Determination of Formaldehyde and Other Carbonyl Compounds in Air (Active Sampler Methodology); 2009.

D. CAL (CDPHSM) - Standard Practice for the Testing of Volatile Organic Emissions From Various Sources Using Environmental Chambers; State of California Department of Public Health; v1.1, 2010.

E. EPA 600/4-90/010 - Compendium of Methods for the Determination of Air Pollutants in Indoor Air; April 1990.

F. EPA 625/R-96/010b - Compendium of Methods for the Determination of Toxic Organic Compounds in Ambient Air; January 1999.

G. SMACNA 1072 - IAQ Guideline for Occupied Buildings Under Construction; 2007.

1.05 DEFINITIONS

A. Adsorptive Materials: Gypsum board, acoustical ceiling tile and panels, carpet and carpet tile, fabrics, fibrous insulation, and other similar products.

B. Contaminants: Gases, vapors, regulated pollutants, airborne mold and mildew, and the like, as specified.

C. Particulates: Dust, dirt, and other airborne solid matter.

D. Wet Work: Concrete, plaster, coatings, and other products that emit water vapor or volatile organic compounds during installation, drying, or curing.

1.06 SUBMITTALS

A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.

B. Indoor Air Quality Management Plan: Describe in detail measures to be taken to promote adequate indoor air quality upon completion; use SMACNA 1072 as a guide.
   1. Submit not less than 30 days before start of construction.
   2. Identify potential sources of odor and dust.
   3. Identify construction activities likely to produce odor or dust.
   4. Identify areas of project potentially affected, especially occupied areas.
   5. Evaluate potential problems by severity and describe methods of control.
   6. Describe construction ventilation to be provided, including type and duration of ventilation, use of permanent HVAC systems, types of filters and schedule for replacement of filters.
   7. Describe cleaning and dust control procedures.
   8. Describe coordination with commissioning procedures.

C. Interior Finishes Installation Schedule: Identify each interior finish that either generates odors, moisture, or vapors or is susceptible to adsorption of odors and vapors, and indicate air handling zone, sequence of application, and curing times.

D. Duct and Terminal Unit Inspection Report.

E. Air Contaminant Test Plan: Identify:
   1. Testing agency qualifications.
   2. Locations and scheduling of air sampling.
   3. Test procedures, in detail.
   4. Test instruments and apparatus.
   5. Sampling methods.

F. Air Contaminant Test Reports: Show:
   1. Location where each sample was taken, and time.
   2. Test values for each air sample; average the values of each set of 3.
   3. HVAC operating conditions.
   4. Certification of test equipment calibration.
   5. Other conditions or discrepancies that might have influenced results.

1.07 QUALITY ASSURANCE

A. Testing and Inspection Agency Qualifications: Independent testing agency having minimum of 5 years experience in performing the types of testing specified.

PART 2 PRODUCTS

2.01 MATERIALS

A. Low VOC Materials: See other sections for specific requirements for materials with low VOC content.

B. Auxiliary Air Filters: MERV of 8, minimum, when tested in accordance with ASHRAE 52.2.

PART 3 EXECUTION

3.01 CONSTRUCTION PROCEDURES

A. Prevent the absorption of moisture and humidity by adsorptive materials by:
   1. Sequencing the delivery of such materials so that they are not present in the building until wet work is completed and dry, to the greatest extent possible.
   2. Delivery and storage of such materials in fully sealed moisture-impermeable packaging.
   3. Provide sufficient ventilation for drying within reasonable time frame.

B. Begin construction ventilation when building is substantially enclosed.

C. If extremely dusty or dirty work must be conducted inside the building, shut down HVAC systems for the duration; remove dust and dirt completely before restarting systems.

D. When working in a portion of an occupied building, prevent movement of air from construction area to occupied area.

E. HVAC equipment and ductwork may NOT be used for ventilation during construction:
   1. Provide temporary ventilation equivalent to 1.5 air changes per hour, minimum.
   2. Exhaust directly to outside.
   3. HVAC ductwork shall be kept clean, free of dust during storage, handling and installation. Seal HVAC air inlets and outlets immediately after duct installation with tape and plastic sheeting. All seams in ductwork shall be sealed.

F. All inspection and filter replacement shall occur with the HVAC equipment turned off.

G. Do not store construction materials or waste in mechanical or electrical rooms.

H. Prior to use of return air ductwork without intake filters clean up and remove dust and debris generated by construction activities.
   1. Inspect duct intakes, return air grilles, and terminal units for dust.
   2. Clean plenum spaces, including top sides of lay-in ceilings, outsides of ducts, tops of pipes and conduit.
   3. Clean tops of doors and frames.
   4. Clean mechanical and electrical rooms, including tops of pipes, ducts, and conduit, equipment, and supports.
   5. Clean return plenums of air handling units.
   6. Remove intake filters last, after cleaning is complete.

I. Do not perform dusty or dirty work after starting use of return air ducts without intake filters.

J. Use other relevant recommendations of SMACNA 1072 for avoiding unnecessary contamination due to construction procedures.

3.02 BUILDING FLUSH-OUT

A. Contractor's Option: Either full continuous flush-out OR satisfactory air contaminant testing is required, not both.

B. Perform building flush-out before occupancy.

C. Do not start flush-out until:
   1. All construction is complete.
   2. HVAC systems have been tested, adjusted, and balanced for proper operation.
   3. Inspection of inside of return air ducts and terminal units confirms that cleaning is not necessary.
   4. New HVAC filtration media have been installed.

D. Building Flush-Out: Operate all ventilation systems at normal flow rates with 100 percent outside air until a total air volume of 14,000 cubic feet per square foot of floor area has been supplied.
   1. Obtain Owner's concurrence that construction is complete enough before beginning flush-out.
   2. Maintain interior temperature of at least 60 degrees F and interior relative humidity no higher than 60 percent.
   3. If additional construction involving materials that produce particulates or any of the specified contaminants is conducted during flush-out, start flush-out over.
   4. If interior spaces must be occupied prior to completion of the flush-out, supply a minimum of 25 percent of the total air volume prior to occupancy, and:
      a. Begin ventilation at least three hours prior to daily occupancy.
      b. Continue ventilation during all occupied periods.
      c. Provide minimum outside air volume of 0.30 cfm per square foot or design minimum outside air rate, whichever is greater.

E. Install new HVAC filtration media after completion of flush-out and before occupancy or further testing.

3.03 AIR CONTAMINANT TESTING

A. Contractor's Option: Either full continuous flush-out OR satisfactory air contaminant testing is required, not both.

B. Perform air contaminant testing before starting construction, as base line for evaluation of post-construction testing.

C. Perform air contaminant testing before occupancy.

D. Do not start air contaminant testing until:
   1. All construction is complete, including interior finishes.
   2. HVAC systems have been tested, adjusted, and balanced for proper operation.
   3. New HVAC filtration media have been installed.

E. Indoor Air Samples: Collect from spaces representative of occupied areas:
   1. Collect samples while operable windows and exterior doors are closed, HVAC system is running normally as if occupied, with design minimum outdoor air, but with the building unoccupied.
   2. Collect samples from spaces in each contiguous floor area in each air handler zone, but not less than one sample per 25,000 square feet; take samples from areas having the least ventilation and those having the greatest presumed source strength.
   3. Collect samples from height from 36 inches to 72 inches above floor.
   4. Collect samples from same locations on 3 consecutive days during normal business hours; average the results of each set of 3 samples.
   5. When retesting the same building areas, take samples from at least the same locations as in first test.

F. Outdoor Air Samples: Collect samples at outside air intake of each air handler at the same time as indoor samples are taken.

G. Analyze air samples and submit report.

H. Air Contaminant Concentration Limits:
   1. Formaldehyde: Not more than 27 parts per billion.
   2. PM10 Particulates: Not more than 50 micrograms per cubic meter.
   3. Total Volatile Organic Compounds (TVOCs): Not more than 500 micrograms per cubic meter.
   4. Chemicals Listed in CAL CDPH Standard Method Table 4-1, except formaldehyde: Allowable concentrations listed in Table 4-1.
   5. Carbon Monoxide: Not more than 9 parts per million and not more than 2 parts per million higher than outdoor air.

I. Air Contaminant Concentration Test Methods:
   1. Formaldehyde: ASTM D5197, EPA 625 Method TO-11A, or EPA 600 Method IP-6.
   2. Particulates: EPA 600 Method IP-10.
   3. Total Volatile Organic Compounds (TVOC): EPA 625 Method TO-1, TO-15, or TO-17; or EPA 600 Method IP-1.
   4. Chemicals Listed in CAL CDPH Standard Method Table 4-1, except formaldehyde: ASTM D5197, or EPA 625 Method TO-1, TO-15, or TO-17.
   5. Carbon Monoxide: EPA 600 Method IP-3, plus measure outdoor air; measure in ppm; report both indoor and outdoor measurements.

J. If air samples show concentrations higher than those specified, ventilate with 100 percent outside air and retest at no cost to Owner, or conduct full building flush-out specified above.

END OF SECTION

SECTION 01 60 00
PRODUCT REQUIREMENTS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Section includes administrative and procedural requirements for selection of products for use in Project; product delivery, storage, and handling; manufacturers' standard warranties on products; special warranties; and comparable products.

B. General product requirements.

C. Re-use of existing products.

D. Transportation, handling, storage and protection.

E. Product option requirements.

F. Substitution limitations and procedures.

G. Procedures for Owner-supplied products.

H. Maintenance materials, including extra materials, spare parts, tools, and software.

1.02 RELATED REQUIREMENTS

A. Document 00 21 13 - Instructions to Bidders: Product options and substitution procedures prior to bid date.

B. Section 01 00 00 - General Requirements.

C. Section 012500 "Substitution Procedures" for requests for substitutions.

D. Section 01 40 00 - Quality Requirements: Product quality monitoring.

E. Section 014200 "References" for applicable industry standards for products specified.

F. Section 01 74 19 - Construction Waste Management and Disposal: Waste disposal requirements potentially affecting packaging and substitutions.

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

1.03 SUBMITTALS

A. Product Data Submittals: Submit manufacturer's standard published data. Mark each copy to identify applicable products, models, options, and other data. Supplement manufacturers' standard data to provide information specific to this Project. See Section 01 30 00 - Administrative Requirements, for more information regarding product data submittals.

B. Shop Drawing Submittals: Prepared specifically for this Project; indicate utility and electrical characteristics, utility connection requirements, and location of utility outlets for service for functional equipment and appliances. See Section 01 30 00 - Administrative Requirements, for more information regarding Shop Drawings.

C. Sample Submittals: Illustrate functional and aesthetic characteristics of the product, with integral parts and attachment devices. Coordinate sample submittals for interfacing work.

1. For selection from standard finishes, submit samples of the full range of the manufacturer's standard colors, textures, and patterns.

1.04 DEFINITIONS

A. Products: Items obtained for incorporating into the Work, whether purchased for Project or taken from previously purchased stock. The term "product" includes the terms "material," "equipment," "system," and terms of similar intent.

1. Named Products: Items identified by manufacturer's product name, including make or model number or other designation shown or listed in manufacturer's published product literature, that is current as of date of the Contract Documents.

2. New Products: Items that have not previously been incorporated into another project or facility. Products salvaged or recycled from other projects are not considered new products.
3. Comparable Product: Product that is demonstrated and approved through submittal process to have the indicated qualities related to type, function, dimension, in-service performance, physical properties, appearance, and other characteristics that equal or exceed those of specified product.

B. Basis-of-Design Product Specification: A specification in which a specific manufacturer's product is named and accompanied by the words "basis-of-design product," including make or model number or other designation, to establish the significant qualities related to type, function, dimension, in-service performance, physical properties, appearance, and other characteristics for purposes of evaluating comparable products of additional manufacturers named in the specification.

1.05 ACTION SUBMITTALS

A. Comparable Product Requests: Submit request for consideration of each comparable product. Identify product or fabrication or installation method to be replaced. Include Specification Section number and title and Drawing numbers and titles.
1. Include data to indicate compliance with the requirements specified in "Comparable Products" Article.
2. Engineer's Action: If necessary, Engineer will request additional information or documentation for evaluation within one week of receipt of a comparable product request. Engineer will notify Contractor of approval or rejection of proposed comparable product request within 15 days of receipt of request, or seven days of receipt of additional information or documentation, whichever is later.
   a. Form of Approval: As specified in Section 013300 "Submittal Procedures."
   b. Use product specified if Engineer does not issue a decision on use of a comparable product request within time allocated.

B. Basis-of-Design Product Specification Submittal: Comply with requirements in Section 013300 "Submittal Procedures." Show compliance with requirements.

1.06 QUALITY ASSURANCE

A. Compatibility of Options: If Contractor is given option of selecting between two or more products for use on Project, select product compatible with products previously selected, even if previously selected products were also options.
1. Each contractor is responsible for providing products and construction methods compatible with products and construction methods of other contractors.
2. If a dispute arises between contractors over concurrently selectable but incompatible products, Engineer will determine which products shall be used.

1.07 PRODUCT DELIVERY, STORAGE, AND HANDLING

A. Deliver, store, and handle products using means and methods that will prevent damage, deterioration, and loss, including theft and vandalism. Comply with manufacturer's written instructions.

B. Delivery and Handling:
1. Schedule delivery to minimize long-term storage at Project site and to prevent overcrowding of construction spaces.
2. Coordinate delivery with installation time to ensure minimum holding time for items that are flammable, hazardous, easily damaged, or sensitive to deterioration, theft, and other losses.
3. Deliver products to Project site in an undamaged condition in manufacturer's original sealed container or other packaging system, complete with labels and instructions for handling, storing, unpacking, protecting, and installing.
4. Inspect products on delivery to determine compliance with the Contract Documents and to determine that products are undamaged and properly protected.

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

1.08 PRODUCT WARRANTIES

A. Warranties specified in other Sections shall be in addition to, and run concurrent with, other warranties required by the Contract Documents. Manufacturer's disclaimers and limitations on product warranties do not relieve Contractor of obligations under requirements of the Contract Documents.
   1. Manufacturer's Warranty: Written warranty furnished by individual manufacturer for a particular product and specifically endorsed by manufacturer to Owner.
   2. Special Warranty: Written warranty required by the Contract Documents to provide specific rights for Owner.

B. Special Warranties: Prepare a written document that contains appropriate terms and identification, ready for execution.
   1. Manufacturer's Standard Form: Modified to include Project-specific information and properly executed.
   2. Specified Form: When specified forms are included with the Specifications, prepare a written document using indicated form properly executed.
   3. See other Sections for specific content requirements and particular requirements for submitting special warranties.

C. Submittal Time: Comply with requirements in Section 017700 "Closeout Procedures."

PART 2 PRODUCTS

2.01 PRODUCT SELECTION PROCEDURES

A. General Product Requirements: Provide products that comply with the Contract Documents, are undamaged and, unless otherwise indicated, are new at time of installation.
   1. Provide products complete with accessories, trim, finish, fasteners, and other items needed for a complete installation and indicated use and effect.
   2. Standard Products: If available, and unless custom products or nonstandard options are specified, provide standard products of types that have been produced and used successfully in similar situations on other projects.
   3. Owner reserves the right to limit selection to products with warranties not in conflict with requirements of the Contract Documents.
   4. Where products are accompanied by the term "as selected," Engineer will make selection.
   5. Descriptive, performance, and reference standard requirements in the Specifications establish salient characteristics of products.
   6. Or Equal: For products specified by name and accompanied by the term "or equal," or "or approved equal," or "or approved," comply with requirements in "Comparable Products" Article to obtain approval for use of an unnamed product.

B. Product Selection Procedures:
   1. Product: Where Specifications name a single manufacturer and product, provide the named product that complies with requirements. Comparable products or substitutions for Contractor's convenience will not be considered.

2. Manufacturer/Source: Where Specifications name a single manufacturer or source, provide a product by the named manufacturer or source that complies with requirements. Comparable products or substitutions for Contractor's convenience will not be considered.
3. Products:
    a. Restricted List: Where Specifications include a list of names of both manufacturers and products, provide one of the products listed that complies with requirements. Comparable products or substitutions for Contractor's convenience will be considered.
4. Manufacturers:
    a. Restricted List: Where Specifications include a list of manufacturers' names, provide a product by one of the manufacturers listed that complies with requirements. Comparable products or substitutions for Contractor's convenience will be considered.
5. Basis-of-Design Product: Where Specifications name a product, or refer to a product indicated on Drawings, and include a list of manufacturers, provide the specified or indicated product or a comparable product by one of the other named manufacturers. Drawings and Specifications indicate sizes, profiles, dimensions, and other characteristics that are based on the product named. Comply with requirements in "Comparable Products" Article for consideration of an unnamed product by one of the other named manufacturers.

2.02 COMPARABLE PRODUCTS

A. Conditions for Consideration: Engineer will consider Contractor's request for comparable product when the following conditions are satisfied. If the following conditions are not satisfied, Engineer may return requests without action, except to record noncompliance with these requirements:
1. Evidence that the proposed product does not require revisions to the Contract Documents, that it is consistent with the Contract Documents and will produce the indicated results, and that it is compatible with other portions of the Work.
2. Detailed comparison of significant qualities of proposed product with those named in the Specifications. Significant qualities include attributes such as performance, weight, size, durability, visual effect, and specific features and requirements indicated.
3. Evidence that proposed product provides specified warranty.
4. List of similar installations for completed projects with project names and addresses and names and addresses of Engineers and owners, if requested.
5. Samples, if requested.

2.03 EXISTING PRODUCTS

A. Do not use materials and equipment removed from existing premises unless specifically required or permitted by the Contract Documents.

B. Unforeseen historic items encountered remain the property of the Owner; notify Owner promptly upon discovery; protect, remove, handle, and store as directed by Owner.

C. Existing materials and equipment indicated to be removed, but not to be re-used, relocated, reinstalled, delivered to the Owner, or otherwise indicated as to remain the property of the Owner, become the property of the Contractor; remove from site.

2.04 NEW PRODUCTS

A. Provide new products unless specifically required or permitted by the Contract Documents.

B. Do not use products made using or containing CFC's or HCFC's.

C. Where all other criteria are met, Contractor shall give preference to products that:
1. Are extracted, harvested, and/or manufactured closer to the location of the project.
2. Have longer documented life span under normal use.
3. Result in less construction waste.

2.05 PRODUCT OPTIONS

A. Products Specified by Reference Standards or by Description Only: Use any product meeting those standards or description.

B. Products Specified by Naming One or More Manufacturers with product model: Use a product of one of the manufacturers named; no substitutions if so indicated; substitutions by following substitution procedures.

C. Products Specified by Naming One manufacturer with other acceptable manufacturers listed without product model: Submit a request for substitution following substitutions procedures.

2.06 MAINTENANCE MATERIALS

A. Furnish extra materials, spare parts, tools, and software of types and in quantities specified in individual Specification Sections.

B. Deliver to Project site; obtain receipt prior to final payment.

PART 3 EXECUTION

3.01 SUBSTITUTION PROCEDURES

A. Substitutions are changes, modifications or deviations in those products, materials, equipment, and methods of construction required by the Contract Documents proposed by the Contractor after the receipt of Bids. Substitutions for the convenience of the Contract or subcontractors, or materials suppliers will only be considered if submitted prior to the receipt of Bids, in strict conformance with the Instructions to Sub-bidders. The following shall not be considered substitutions:
   1. Changes, modifications, or deviations requested by Bidders during the bidding period and accepted prior to the receipt of Bids shall be considered as included in the Contact Documents and are not subject to the requirements of this Section.
   2. Revisions to Contract Documents requested by the Owner or Architect.
   3. Specified options of products or materials included in the Contract Documents.
   4. The Contractor's compliance with governing regulations and orders issued by governing authorities, subject to the Architect's prior written notice and approval.

B. Substitution Requests: Request for substitution will be considered only if, in the opinion of the Architect, such substitution will be of benefit to the Owner. Substitution requests after receipt of bids will not be considered solely related to an "or approved equal" clause in the Contract Documents.
   1. The Contractor's substitution request will be considered by the Architect when all of the following conditions are satisfied, as determined by the Architect; otherwise requests will be returned without action.
      a. Extensive revision to the Contract Documents is not required.
      b. Proposed changes are in keeping with the general intent of the Contract Documents.
      c. The request is timely, fully documented and properly submitted.
      d. In addition to the above conditions, one or more of the following conditions must be satisfied, as determined by the Architect. The Contractor shall provide written documentation for each condition noted.
         1) The specified product cannot be provided within the Contract Time. However, the request will not be considered if the specified product cannot be provided as a result of the Contractor's failure to submit to the Architect or order from the manufacturer in a timely fashion.
         2) The specified product cannot receive necessary approval of governing authority and the requested substitution can be approved.
         3) A substantial advantage is offered to 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. Additional responsibilities for the Owner may include compensation to the Architect for

redesign and evaluation services, increased cost of other construction by the Owner or separate Contractors, and similar considerations.

4) The specified product cannot be provided in a manner that is compatible with or coordinated with other materials, and where the Contractor certifies that the substitution will overcome the incompatibility.
5) The specified product cannot provide the warranty required by the Contract Documents and where the Contractor certifies that the proposed substitution provides the required warranty.

C. Substitution Request Procedure: Complete the Contractor's Substitution Request form provided at the end of this Section. Submit electronically or three (3) hard copies of each request for substitution using the provided form with all required information. Incomplete forms will not be reviewed.

D. Architect's Action: Within five (5) working days of receipt, the Architect will request additional information to evaluate the substitution if any is required. Within ten (10) working days of receipt of all necessary information, the Architect will notify the Contractor of acceptance or rejection of the proposed substitute. If a decision on the use of a proposed substitute is not or cannot be made or obtained within the time allocated, the Contractor shall use the specified product. Acceptance will be in the form of a Change Order.

E. Instructions to Bidders specify time restrictions for submitting requests for substitutions during the bidding period. Comply with requirements specified in this Section.

F. A request for substitution constitutes a representation that the submitter:
1. Has investigated proposed product and determined that it meets or exceeds the quality level of the specified product.
2. Will provide the same or better warranty for the substitution as for the specified product.
3. Will coordinate installation and make changes to other Work that may be required for the Work to be complete with no additional cost to Owner.
4. Waives claims for additional costs or time extension that may subsequently become apparent.

G. Substitutions will not be considered when they are indicated or implied on shop drawing or product data submittals, without separate written request, or when acceptance will require revision to the Contract Documents.

3.02 OWNER-SUPPLIED PRODUCTS

A. Owner's Responsibilities:
1. Arrange for and deliver shop drawings, product data, certificates, manufacturer's instructions and samples, to Owner.
2. Arrange and pay for product delivery to site in accordance with the progress schedule.
3. On delivery, inspect products jointly with Contractor.
4. Submit claims for transportation damage and arrange for replacement of damaged, defective, or deficient items.
5. Arrange for manufacturers' warranties, inspections, and service.

B. Contractor's Responsibilities:
1. Review Owner reviewed shop drawings, product data, and samples. Submit to the Architect with notification of any observed discrepancies or problems anticipated due to non-conformance with the Contract Documents.
2. Designating delivery dates for each product in accordance with the progress schedule.
3. Receive and unload products at site; inspect for completeness or damage jointly with Owner. Record shortages and damaged or defective items.
4. Install blocking and supports as required for proper installation.
5. Handle, uncrate, store, assemble, install, connect, adjust and finish products.
6. Protecting products from damage and from exposure to the elements.
7. After receipt, repair or replace items damaged the Contractor or persons under his control.

C. Owner furnished equipment for installation by the Contractor may be indicated on the Drawings, or otherwise identified for the Contractor's information. Concealed wood blocking shall be provided for mounting equipment. See Section 06 10 54. Such equipment shall include, but not be limited to:
   1. Soap dispensers - surface mounted.
   2. Paper towel dispensers - surface mounted.
   3. Interior signage - Surface mounted.

3.03 TRANSPORTATION AND HANDLING

A. The Contractor shall be responsible for the proper protection from damage of all materials and equipment prior to and following their incorporation into the Work. Materials and equipment shall be inspected by the Contractor

B. Coordinate schedule of product delivery to designated prepared areas in order to minimize site storage time and potential damage to stored materials.

C. Transport and handle products in accordance with manufacturer's instructions.

D. Transport materials in covered trucks to prevent contamination of product and littering of surrounding areas.

E. Promptly inspect shipments to ensure that products comply with requirements, quantities are correct, products are undamaged and if found to be damaged or otherwise unsuitable, shall be promptly rejected.

F. Provide equipment and personnel to handle products by methods to prevent soiling, disfigurement, or damage.

G. Arrange for the return of packing materials, such as wood pallets, where economically feasible.

H. All materials stored on or off the site shall be kept in secured, weathertight enclosures, and the Contractor shall correct, at no additional cost to the Owner, any damages resulting from his failure to provide proper protection. Such corrective work shall include total replacement if so required by the Architect.

I. The Contractor shall exercise caution in temporarily loading materials on floors, decks, roofs, etc. It shall be the Contractor's responsibility to determine the size of loads to be imposed and the adequacy of the affected structure to support such loads. The Contractor shall correct, at no additional cost to the Owner, any resultant damages.

3.04 STORAGE AND PROTECTION

A. Designate receiving/storage areas for incoming products so that they are delivered according to installation schedule and placed convenient to work area in order to minimize waste due to excessive materials handling and misapplication.

B. Store and protect products in accordance with manufacturers' instructions.

C. Store with seals and labels intact and legible.

D. Store sensitive products in weather tight, climate controlled, enclosures in an environment favorable to product.

E. For exterior storage of fabricated products, place on sloped supports above ground.

F. Cover products subject to deterioration with impervious sheet covering. Provide ventilation to prevent condensation and degradation of products.

G. Prevent contact with material that may cause corrosion, discoloration, or staining.

H. Provide equipment and personnel to store products by methods to prevent soiling, disfigurement, or damage.

I. Arrange storage of products to permit access for inspection. Periodically inspect to verify products are undamaged and are maintained in acceptable condition.

END OF SECTION

CONTRACTOR'S SUBSTITUTION REQUEST

To Architect: _____ Date: _____

From Contractor_____ Number: _____

Specification Section:_____ Page: _____

Article / Paragraph: _____

1. Product data for proposed substitution to include: Description of product, reference standards, performance, and test data.

   Sample attached: Yes__ No __ To be sent if requested by Architect Yes ___ No ___

2. Itemized comparison of proposed substitution with product specified is attached.

	ORIGINAL PRODUCT	PROPOSED SUBSTITUTION
Trade Name, Model:	_____	_____
Manufacturer:	_____	_____
Installer:	_____	_____

   History of proposed substitution: New product __ 2-5 years old __ 5-10 years old__ > 10 years old ___

   Significant variations of proposed substitution from original product: _____

   _____

   Proposed substitution affects other parts of the Work: No __ Yes, explain _____

   _____

   Similar installations within 150 miles: Provide project name, address, architect, install date: _____

   Reason for not providing specified item: _____

3. Unit costs, if applicable: State if cost is materials only ___ or materials installed ___.

   Original product $ _____ per _____ Substitution $ _____ per _____

   Savings to Owner for accepting substitution: _____ $_____

   Proposed substitution changes Contract Time: No ___ Yes __ Add/Deduct _____ days.

   The Undersigned certifies:

   - Proposed substitution has been fully investigated and determined to be equal or superior to the specified product.
   - Same warranty will be furnished for proposed substitution as for the specified product.
   - Same maintenance service and source of replacement parts, as applicable, is available.
   - Proposed substitution will have no adverse effect on other trades and will not affect or delay progress schedule.
   - Cost data as stated herein is complete. Claims for additional costs related to accepted substitution which may subsequently become apparent are to be waived.
   - Proposed substitution does not affect dimensions, functional clearances or design appearance.
   - Payment will be made for changes to building design, including A/E design, detailing, and construction costs caused by the substitution.
   - Coordination, installation and changes in the Work as necessary for accepted substitution will be complete in all respects.

   Submitted by: _____

   Attachments: _____

SECTION 01 71 00
CUTTING AND PATCHING

PART 1 - GENERAL

1.01 DESCRIPTION

A. Work Included in This Section:
   1. Provide all labor, materials, equipment and services, etc., required for all cutting, removal, fitting, patching, and/or repairs as required to:
      a. Make the several parts fit properly.
      b. Uncover work to provide for installing, inspecting, or both, of ill-timed work.
      c. Remove and replace work not conforming to requirements of the Contract Documents.
      d. Remove and replace defective work.

B. Related Work:
   1. In addition to other requirements noted or specified, upon the Architect's request uncover work to provide for observation by the Architect of covered work, and remove samples of installed materials for testing.
   2. Do not cut or alter work performed under separate contracts without the Architect's written permission.

1.02 SUBMITTALS

A. Where cutting and/or patching is required, the Architect's review of proposed cutting and patching procedures is required. The following information shall be included in the submission prior to proceeding with cutting:
   1. Clearly describe the extent of cutting and patching required and how it is to be performed. Layout the work on-site as appropriate. Indicate why it cannot be avoided.
   2. Describe the anticipated results in terms of changes to existing construction. Include changes to structural elements and operating components and changes in the building's appearance and other visual elements.
   3. List products to be used and firms that will perform the Work. Indicate dates for cutting and patching. Submit samples of actual materials to be used for patching.
   4. List any utilities that will be disturbed, relocated, made temporarily out-of–service, and indicate the length of service disruption.
   5. Where cutting and patching involves the addition of reinforcement to structural elements, submit details and engineering calculations to show how reinforcement is integrated with the original structure.

B. Acceptance of the cutting and patching proposal by the Architect does not waive the Architect's right to later require complete removal and replacement of Work found to be unsatisfactory, nor does it alter the Contractor's sole responsibility for the safe and proper execution of all cutting and patching.

C. Submit written notice to the Architect designating the time the Work will be uncovered, to provide for the Architect's observation.

1.03 QUALITY ASSURANCE

A. Structural Work: Do not cut and patch structural elements in a manner that would reduce their structural characteristics such as load-carrying capacity or load deflection ratio.
   1. Obtain approval of the cutting and patching proposal before cutting and patching structural elements, including but not necessarily limited to:
      a. Bearing walls.
      b. Structural concrete.
      c. Structural steel.
      d. Lintels.
      e. Structural decking.

f. Miscellaneous structural metals.
g. Equipment supports.
h. Piping, ductwork, vessels, and equipment.

B. 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.
1. Obtain approval of the cutting and patching proposal before cutting and patching operating elements or safety related systems, including but not necessarily limited to:
a. Shoring, bracing, and sheeting.
b. Primary operational systems and equipment.
c. Firewalls and fire separation assemblies.
d. Fire-rated and non-fire-rated smoke barriers.
e. Water, moisture, or vapor retarders.
f. Membranes and flashings.
g. Fire protection systems.
h. Noise and vibration control elements and systems.
i. Control systems.
j. Voice, video, and data systems.
k. Electrical wiring systems.

C. Miscellaneous: Do not cut and patch elements in a manner that would reduce their capacity to perform as intended, or that results in increased maintenance or decreased operational life or safety.
1. Obtain approval of the cutting and patching proposal before cutting and patching building elements, including but not necessarily limited to:
a. Water, moisture or vapor barriers.
b. Membranes and flashings.
c. Noise and vibration control elements and systems.
2. 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.

D. Remove, replace, patch and repair materials and surfaces cut or damaged during cutting and patching operations, by methods and with materials so as not to void existing warranties.

PART 2 - PRODUCTS

2.01 MATERIALS

A. For replacement of items removed, 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.

2.02 PAYMENT FOR COSTS

A. Perform cutting and patching needed to comply with the Contract Documents at no additional cost to the Owner.

B. All costs resulting from ill-timed or defective work, or work otherwise not conforming to the Contract Documents shall be borne by the Contractor.

PART 3 - EXECUTION

3.01 SURFACE CONDITIONS

A. Inspection: Inspect existing conditions, including elements subject to movement or damage during cutting, excavating, patching, and backfilling.

B. After uncovering the work, inspect conditions affecting installation of new work.

C. Prior to proceeding, meet with all parties involved in cutting and patching including mechanical and electrical trades. Review areas of potential interference and conflict. Coordinate procedures and resolve potential conflicts before proceeding.

D. Discrepancies: If uncovered conditions are not as anticipated, immediately notify the Architect and secure needed directions. Do not proceed until unsatisfactory conditions are corrected.

3.02 PREPARATION PRIOR TO CUTTING

A. Provide required protection including, but not necessarily limited to, shoring, bracing, and support to maintain structural integrity of the Work.

B. Protect existing construction during cutting and patching to prevent damage. Provide protection from adverse weather conditions for portions of the Work that might be exposed during cutting and patching operations.

C. Avoid interference with use of adjoining areas or interruption of free passage to adjoining areas. Take all precautions to avoid cutting existing pipe, conduit, or ductwork serving the building, but scheduled to be removed or relocated until provisions have been made to bypass them.

D. Provide proper dirt, dust, fume, vapor, and noise control.

E. Verify the conditions and requirements of all existing warranties that may be affected by cutting and patching (such as roofing warranties). It is the intent that all cutting and patching be performed in a manner that preserves all such warranties in full, without compromise.

3.03 PERFORMANCE

A. General: Cutting and patching shall be kept to an absolute minimum by careful planning and through proper holes, sleeves, anchors, inserts, or other built-ins as the Work progresses.

B. Employ skilled workers to perform cutting and patching. Proceed with cutting and patching at the earliest feasible time and complete without delay.

C. The Contractor shall properly restore work that has been cut or removed and install new products to provide completed work in accordance with the requirements of the Contract Documents. Existing surfaces shall be restored to their original condition.

D. Cutting: Perform cutting and demolition by methods least likely to damage elements to be retained or adjoining construction and that will provide proper surfaces to receive installation of repair and new work. Where possible, review procedures with the original installer. Comply with the original installer's recommendations.

E. In general, where cutting is required use hand or small power tools designed for sawing or grinding, not hammering and chopping. Cut holes and slots to size required with minimum disturbance of adjacent surfaces. Temporarily cover openings when not in use.

F. To avoid marring existing finished surfaces, cut or drill from the exposed or finished side into concealed surfaces.

G. Cut through concrete and masonry using a cutting machine such as a carborundum saw or diamond core drill.

H. By-pass utility services such as pipe or conduit, before cutting, where services are shown, or removal required, relocated, or abandoned. Cut off pipe or conduit in walls or partitions, to be removed. Cap, valve, or plug and seal the remaining portion of pipe or conduit to prevent entrance of moisture or other foreign matter after by-passing and cutting.

I. Patching: Perform fitting and adjusting of products as required to provide finished installations complying with the specified tolerances and finishes or otherwise satisfactory to the Architect.

J. Patch with durable seams that are as invisible as possible. Comply with specified tolerances.

K. Restore exposed finishes of patched areas and extend finish restoration into retained adjoining construction in a manner that will eliminate evidence of patching and refinishing.

L. Where the removal of walls or partitions extends one finished area into another, patch and repair floor and wall surfaces in the new space to provide an even surface of uniform color and

appearance. Remove existing floor and wall coverings and replace with new materials, if necessary to achieve uniform color and appearance.

M. Where patching occurs in a smooth painted surface, extend final paint coat over the entire unbroken surface containing the patch, after the patched area has received primer and first coat.

N. Patch, repair, or re-hang existing ceilings, as necessary to provide an even plane surface of uniform appearance.

O. At penetrations in fire-resistive rated walls, partitions, ceilings, floors, or roof construction, completely seal voids with firestopping materials in compliance with Section 07 84 00 - Firestopping.

3.04 CLEAN-UP

A. All debris and rubbish shall be properly removed from the premises as it occurs. All materials shall be properly disposed of off-site, in strict accordance with all applicable Laws, Rules, Regulations, and Ordinances.

B. Thoroughly clean areas and spaces where cutting and patching is performed or used as access. Completely remove paint, mortar, oils, putty, and similar items. Thoroughly clean surfaces before painting or finishing.

END OF SECTION

SECTION 01 73 00
EXECUTION

PART 1 GENERAL

1.01 RELATED DOCUMENTS

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

1.02 SUMMARY

A. Section includes general administrative and procedural requirements governing execution of the Work.

B. Related Requirements:

1. Section 011000 "Summary" for limits on use of Project site.
2. Section 013300 "Submittal Procedures" for submitting surveys.
3. Section 017700 "Closeout Procedures" for submitting final property survey with Project Record Documents, recording of Owner-accepted deviations from indicated lines and levels, and final cleaning.

1.03 DEFINITIONS

A. Cutting: Removal of in-place construction necessary to permit installation or performance of other work.

B. Patching: Fitting and repair work required to restore construction to original conditions after installation of other work.

1.04 QUALITY ASSURANCE

A. Cutting and Patching: Comply with requirements for and limitations on cutting and patching of construction elements.

1. Structural Elements: When cutting and patching structural elements, notify Engineer of locations and details of cutting and await directions from Engineer before proceeding. Shore, brace, and support structural elements during cutting and patching. Do not cut and patch structural elements in a manner that could change their load-carrying capacity or increase deflection
2. Operational Elements: Do not cut and patch operating elements and related components in a manner that results in reducing their capacity to perform as intended or that results in increased maintenance or decreased operational life or safety.
3. Other Construction Elements: Do not cut and patch other construction elements or components in a manner that could change their load-carrying capacity, that results in reducing their capacity to perform as intended, or that results in increased maintenance or decreased operational life or safety.
4. Visual Elements: Do not cut and patch construction in a manner that results in visual evidence of cutting and patching. Do not cut and patch exposed construction in a manner that would, in Engineer's opinion, reduce the building's aesthetic qualities. Remove and replace construction that has been cut and patched in a visually unsatisfactory manner.

B. Manufacturer's Installation Instructions: Obtain and maintain on-site manufacturer's written recommendations and instructions for installation of products and equipment.

PART 2 PRODUCTS

2.01 MATERIALS

A. General: Comply with requirements specified in other Sections.

B. In-Place Materials: Use materials for patching identical to in-place materials. For exposed surfaces, use materials that visually match in-place adjacent surfaces to the fullest extent possible.

1. If identical materials are unavailable or cannot be used, use materials that, when installed, will provide a match acceptable to Engineer for the visual and functional performance of in-place materials.

PART 3 EXECUTION

3.01 EXAMINATION

A. Examination and Acceptance of Conditions: Before proceeding with each component of the Work, examine substrates, areas, and conditions, with Installer or Applicator present where indicated, for compliance with requirements for installation tolerances and other conditions affecting performance. Record observations.

1. Examine roughing-in for mechanical and electrical systems to verify actual locations of connections before equipment and fixture installation.
2. Examine walls, floors, and roofs for suitable conditions where products and systems are to be installed.
3. Verify compatibility with and suitability of substrates, including compatibility with existing finishes or primers.

B. Proceed with installation only after unsatisfactory conditions have been corrected. Proceeding with the Work indicates acceptance of surfaces and conditions.

3.02 PREPARATION

A. Field Measurements: Take field measurements as required to fit the Work properly. Recheck measurements before installing each product. Where portions of the Work are indicated to fit to other construction, verify dimensions of other construction by field measurements before fabrication. Coordinate fabrication schedule with construction progress to avoid delaying the Work.

B. Space Requirements: Verify space requirements and dimensions of items shown diagrammatically on Drawings.

C. Review of Contract Documents and Field Conditions: Immediately on discovery of the need for clarification of the Contract Documents caused by differing field conditions outside the control of Contractor, submit a request for information to Engineer.

3.03 INSTALLATION

A. General: Locate the Work and components of the Work accurately, in correct alignment and elevation, as indicated.

1. Make vertical work plumb and make horizontal work level.
2. Where space is limited, install components to maximize space available for maintenance and ease of removal for replacement.
3. Conceal pipes, ducts, and wiring in finished areas unless otherwise indicated.

B. Comply with manufacturer's written instructions and recommendations for installing products in applications indicated.

C. Install products at the time and under conditions that will ensure the best possible results. Maintain conditions required for product performance until Substantial Completion.

D. Conduct construction operations so no part of the Work is subjected to damaging operations or loading in excess of that expected during normal conditions of occupancy.

E. Sequence the Work and allow adequate clearances to accommodate movement of construction items on site and placement in permanent locations.

F. Tools and Equipment: Do not use tools or equipment that produce harmful noise levels.

G. Templates: Obtain and distribute to the parties involved templates for work specified to be factory prepared and field installed. Check Shop Drawings of other work to confirm that adequate provisions are made for locating and installing products to comply with indicated requirements.

H. Attachment: Provide blocking and attachment plates and anchors and fasteners of adequate size and number to securely anchor each component in place, accurately located and aligned with other portions of the Work. Where size and type of attachments are not indicated, verify size and type required for load conditions.

1. Mounting Heights: Where mounting heights are not indicated, mount components at heights directed by Engineer.

2. Allow for building movement, including thermal expansion and contraction.

3. Coordinate installation of anchorages. Furnish setting drawings, templates, and directions for installing anchorages, including sleeves, concrete inserts, anchor bolts, and items with integral anchors, that are to be embedded in concrete or masonry. Deliver such items to Project site in time for installation.

I. Joints: Make joints of uniform width. Where joint locations in exposed work are not indicated, arrange joints for the best visual effect. Fit exposed connections together to form hairline joints.

J. Hazardous Materials: Use products, cleaners, and installation materials that are not considered hazardous.

3.04 CUTTING AND PATCHING

A. Cutting and Patching, General: Employ skilled workers to perform cutting and patching. Proceed with cutting and patching at the earliest feasible time, and complete without delay.

1. Cut in-place construction to provide for installation of other components or performance of other construction, and subsequently patch as required to restore surfaces to their original condition.

B. Existing Warranties: Remove, replace, patch, and repair materials and surfaces cut or damaged during installation or cutting and patching operations, by methods and with materials so as not to void existing warranties.

C. Temporary Support: Provide temporary support of work to be cut.

D. Protection: Protect in-place construction during cutting and patching to prevent damage. Provide protection from adverse weather conditions for portions of Project that might be exposed during cutting and patching operations.

E. Adjacent Occupied Areas: Where interference with use of adjoining areas or interruption of free passage to adjoining areas is unavoidable, coordinate cutting and patching according to requirements in Section 011000 "Summary."

F. Existing Utility Services and Mechanical/Electrical Systems: Where existing services/systems are required to be removed, relocated, or abandoned, bypass such services/systems before cutting to minimize interruption to occupied areas.

G. Cutting: Cut in-place construction by sawing, drilling, breaking, chipping, grinding, and similar operations, including excavation, using methods least likely to damage elements retained or adjoining construction. If possible, review proposed procedures with original Installer; comply with original Installer's written recommendations.

1. In general, use hand or small power tools designed for sawing and grinding, not hammering and chopping. Cut holes and slots neatly to minimum size required, and with minimum disturbance of adjacent surfaces. Temporarily cover openings when not in use.

2. Finished Surfaces: Cut or drill from the exposed or finished side into concealed surfaces.

3. Concrete and Masonry: Cut using a cutting machine, such as an abrasive saw or a diamond-core drill.
4. Mechanical and Electrical Services: Cut off pipe or conduit in walls or partitions to be removed. Cap, valve, or plug and seal remaining portion of pipe or conduit to prevent entrance of moisture or other foreign matter after cutting.
5. Proceed with patching after construction operations requiring cutting are complete.

H. Patching: Patch construction by filling, repairing, refinishing, closing up, and similar operations following performance of other work. Patch with durable seams that are as invisible as practicable. Provide materials and comply with installation requirements specified in other Sections, where applicable.

1. Inspection: Where feasible, test and inspect patched areas after completion to demonstrate physical integrity of installation.
2. Exposed Finishes: Restore exposed finishes of patched areas and extend finish restoration into retained adjoining construction in a manner that will minimize evidence of patching and refinishing.
    a. Clean piping, conduit, and similar features before applying paint or other finishing materials.
    b. Restore damaged pipe covering to its original condition.
3. Floors and Walls: Where walls or partitions that are removed extend one finished area into another, patch and repair floor and wall surfaces in the new space. Provide an even surface of uniform finish, color, texture, and appearance. Remove in-place floor and wall coverings and replace with new materials, if necessary, to achieve uniform color and appearance.
    a. Where patching occurs in a painted surface, prepare substrate and apply primer and intermediate paint coats appropriate for substrate over the patch, and apply final paint coat over entire unbroken surface containing the patch. Provide additional coats until patch blends with adjacent surfaces.
4. Ceilings: Patch, repair, or rehang in-place ceilings as necessary to provide an even-plane surface of uniform appearance.
5. Exterior Building Enclosure: Patch components in a manner that restores enclosure to a weathertight condition and ensures thermal and moisture integrity of building enclosure.

I. Cleaning: Clean areas and spaces where cutting and patching are performed. Remove paint, mortar, oils, putty, and similar materials from adjacent finished surfaces.

3.05 PROGRESS CLEANING

A. General: Clean Project site and work areas daily, including common areas. Enforce requirements strictly. Dispose of materials lawfully.

1. Comply with requirements in NFPA 241 for removal of combustible waste materials and debris.
2. Do not hold waste materials more than seven days during normal weather or three days if the temperature is expected to rise above 80 deg F.
3. Containerize hazardous and unsanitary waste materials separately from other waste. Mark containers appropriately and dispose of legally, according to regulations.
    a. Use containers intended for holding waste materials of type to be stored.

B. Site: Maintain Project site free of waste materials and debris.

C. Work Areas: Clean areas where work is in progress to the level of cleanliness necessary for proper execution of the Work.

1. Remove liquid spills promptly.

2. Where dust would impair proper execution of the Work, broom-clean or vacuum the entire work area, as appropriate.

D. Installed Work: Keep installed work clean. Clean installed surfaces according to written instructions of manufacturer or fabricator of product installed, using only cleaning materials specifically recommended. If specific cleaning materials are not recommended, use cleaning materials that are not hazardous to health or property and that will not damage exposed surfaces.

E. Concealed Spaces: Remove debris from concealed spaces before enclosing the space.

F. Exposed Surfaces in Finished Areas: Clean exposed surfaces and protect as necessary to ensure freedom from damage and deterioration at time of Substantial Completion.

3.06 STARTING AND ADJUSTING

A. Start equipment and operating components to confirm proper operation. Remove malfunctioning units, replace with new units, and retest.

B. Adjust equipment for proper operation. Adjust operating components for proper operation without binding.

C. Test each piece of equipment to verify proper operation. Test and adjust controls and safeties. Replace damaged and malfunctioning controls and equipment.

D. Manufacturer's Field Service: Comply with qualification requirements in Section 014000 "Quality Requirements."

END OF SECTION

SECTION 01 74 19
CONSTRUCTION WASTE MANAGEMENT

PART 1 GENERAL

1.01 WASTE MANAGEMENT REQUIREMENTS

A. Section includes administrative and procedural requirements for the following:
   1. Salvaging nonhazardous demolition and construction waste.
   2. Recycling nonhazardous demolition and construction waste.
   3. Disposing of nonhazardous demolition and construction waste.
   4. Recycling of DEP-Regulated Universal waste.

B. Owner requires that this project generate the least amount of trash and waste possible.

C. Employ processes that ensure the generation of as little waste as possible due to error, poor planning, breakage, mishandling, contamination, or other factors.

D. Minimize trash/waste disposal in landfills; reuse, salvage, or recycle as much waste as economically feasible.

E. Required Recycling, Salvage, and Reuse: The following may not be disposed of in landfills or by incineration:
   1. Aluminum, glass and plastic beverage containers.
   2. Corrugated cardboard.
   3. Wood pallets.
   4. Clean dimensional wood.
   5. Metals, including packaging banding, metal studs, sheet metal, structural steel, piping, reinforcing bars, door frames, and other items made of steel, iron, galvanized steel, stainless steel, aluminum, copper, zinc, lead, brass, and bronze.
   6. Fluorescent lamps (light bulbs).
   7. Acoustical ceiling tile and panels.

F. Construction waste shall be sent to a certified recycling facility for sorting to recycle and reuse whenever possible. Any loads contaminated with municipal solid waste shall be taken to a municipal transfer station for off loading and trucking to a certified recycling facility. Materials that cannot be recycled or reused shall be landfilled. It is expected that at least 75% of loads shall be diverted from landfills.

G. Demolition debris shall be sent to a certified recycling facility for sorting to recycle, reuse and remainder to landfill. It is expected that at least 75% of loads shall be diverted from landfills.

H. Estimated Analysis of Construction Waste and Demolition Debris:
   1. Quantity of construction waste and Demolition shall be determined as the materials are removed from the job site. Certifications shall be provided by the construction waste / demolition waste removal contractor to confirm and document the quantities of recycled content and the quantity of landfill content.
   2. Detailed logs of all waste removal and recycling shall be provided by the certified recycling facilities on a monthly basis. The log shall include:
      a. Date, disposal ticket #, materials type, total weight of the load, weight of material recycled from the load, % of materials recycled, materials destinations, tipping fees and disposal cost.

I. Contractor shall submit periodic Waste Disposal Reports; all landfill disposal, recycling, salvage, and reuse must be reported regardless of to whom the cost or savings accrues; use the same units of measure on all reports.

J. Contractor shall develop and follow a Waste Management Plan designed to implement these requirements.

K. Methods of trash/waste disposal that are not acceptable are:
   1. Burning on the project site.

2. Burying on the project site.
3. Dumping or burying on other property, public or private.
4. Other illegal dumping or burying.
5. Incineration, either on-site or off-site.

L. Regulatory Requirements: Contractor is responsible for knowing and complying with regulatory requirements, including but not limited to Federal, state and local requirements, pertaining to legal disposal of all construction and demolition waste materials.

1.02 RELATED DOCUMENTS

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

B. Section 02 41 00 – Demolition.

1.03 DEFINITIONS

A. Clean: Untreated and unpainted; not contaminated with oils, solvents, caulk, or the like.

B. Construction and Demolition Waste: Solid wastes typically including building materials, packaging, trash, debris, and rubble resulting from construction, remodeling, repair and demolition operations. Construction waste includes packaging.

C. Demolition Waste: Building and site improvement materials resulting from demolition or selective demolition operations.

D. Disposal: Removal off-site of demolition and construction waste and subsequent sale, recycling, reuse, or deposit in landfill or incinerator acceptable to authorities having jurisdiction.

E. Hazardous: Exhibiting the characteristics of hazardous substances, i.e., ignitibility, corrosivity, toxicity or reactivity.

F. Nonhazardous: Exhibiting none of the characteristics of hazardous substances, i.e., ignitibility, corrosivity, toxicity, or reactivity.

G. Nontoxic: Neither immediately poisonous to humans nor poisonous after a long period of exposure.

H. Recyclable: The ability of a product or material to be recovered at the end of its life cycle and remanufactured into a new product for reuse by others.

I. Recycle: To remove a waste material from the project site to another site for remanufacture into a new product for reuse by others.

J. Recycling: The process of sorting, cleansing, treating and reconstituting solid waste and other discarded materials for the purpose of using the altered form. Recycling does not include burning, incinerating, or thermally destroying waste.

K. Return: To give back reusable items or unused products to vendors for credit.

L. Reuse: To reuse a construction waste material in some manner on the project site.

M. Salvage: To remove a waste material from the project site to another site for resale or reuse by others.

N. Sediment: Soil and other debris that has been eroded and transported by storm or well production run-off water.

O. Source Separation: The act of keeping different types of waste materials separate beginning from the first time they become waste.

P. Toxic: Poisonous to humans either immediately or after a long period of exposure.

Q. Trash: Any product or material unable to be reused, returned, recycled, or salvaged.

R. Universal Waste: Any waste designated by the Maine Department of Environmental Protection as Universal Waste i.e. fluorescent lamps, ballasts, thermostats and other lead and mercury

containing devices. Information can be found on the DEP's website: http://www.maine.gov/dep/index.html

S. USM Waste Minimization Policy: This policy and additional Information on recycling and waste can be found on the USM Recycling Website: http://www.usm.maine.edu/sustainability/recycling

T. Waste: Extra material or material that has reached the end of its useful life in its intended use. Waste includes salvageable, returnable, recyclable, and reusable material.

1.04 PERFORMANCE REQUIREMENTS

A. General: Practice efficient waste management in the use of materials in the course of the Work. Use all reasonable means to divert construction and demolition waste from landfills and incinerators by sorting prior to leaving the jobsite. Facilitate recycling and salvage of materials. All waste must be disposed of at facilities that operate in accordance with all local, state, and federal waste regulations. Documentation of compliance can be requested by the University of Southern Maine at any time.

1.05 SUBMITTALS

A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.

B. Submit Waste Management Plan within 10 calendar days after receipt of Notice of Award of Bid, prior to commencement of work, or prior to any trash or waste removal, whichever occurs sooner; submit projection of all trash and waste that will require disposal and alternatives to landfilling.

C. Waste Management Plan: Include the following information:
   1. Analysis of the trash and waste projected to be generated during the entire project construction cycle, including types and quantities.
      a. See attached form 017419-A Anticipated Project Waste Sheet at the end of this Section.
      b. Include the following information on Waste Reporting Sheet:
         1) Date of disposal
         2) Type of material(s)
         3) Method(s) of disposal: recycled, reused/salvaged, landfilled, incinerated.
         4) Weight(s): attach copies of scale tickets to form (see below)
   2. Landfill Options: The name, address, and telephone number of the landfill(s) where trash/waste will be disposed of, the applicable landfill tipping fee(s), and the projected cost of landfill disposal of all non-recycled project trash/waste.
   3. Landfill Alternatives: List all waste materials that will be diverted from landfills by reuse, salvage, or recycling.
   4. Meetings: Describe regular meetings to be held to address waste prevention, reduction, recycling, salvage, reuse, and disposal.
   5. Designation of the party who will be responsible for implementing the plan.

D. Monthly Reports: The certified recycling facility shall submit monthly reports of all project demolition debris and construction waste removed, recycled and landfilled. The report shall include:
   1. Date, disposal ticket #, materials type, total weight of the load, weight of material recycled from the load, % of materials recycled, materials destinations, tipping fees and disposal cost.
   2. See attached form 017419-B Waste Reporting Sheet at the end of this Section.

E. Copies of scale tickets from waste facilities, including transfer and processing facilities, for each haul must be attached to monthly 'Project Waste Sheet' on which the waste is listed.

F. Copies of Certificates of Recycling from DEP-approved consolidators for all hauls over the course of the project which involved Universal Waste must be attached to final Waste Reporting Sheet at conclusion of project.

G. Copy of Certificate of Refrigerant Recovery must be attached to Waste Reporting Sheet on which device is listed. Refrigerant Recovery must be performed by an EPA-approved Refrigerant Recovery Technician.

1.06 QUALITY ASSURANCE

A. Contractors must designate someone in their employ (a direct paid employee of the general contractor) to be the contact for waste reporting for the duration of the project.

B. Refrigerant Recovery Technician Qualifications: Certified by EPA-approved certification program.

C. Regulatory Requirements: Comply with hauling and disposal regulations of authorities having jurisdiction.
   1. For any questions or clarifications of waste handling procedures contact the USM project manager directly.

PART 3 EXECUTION

2.01 WASTE MANAGEMENT PLAN IMPLEMENTATION

A. Manager: Designate a person who will be responsible for implementing the plan, instructing workers, coordinating waste materials handling, any on-site separation requirements for all trades and overseeing and documenting results of the Waste Management Plan.

B. Communication: Distribute copies of the Waste Management Plan to job site superintendent, each subcontractor, Owner, and Architect.

C. Meetings: Discuss trash/waste management goals and issues at project meetings.
   1. Pre-bid meeting.
   2. Pre-construction meeting.
   3. Regular job-site meetings.
   4. Project Close-out meeting.

D. Facilities: Provide specific facilities for on-site containment and transportation of demolition debris and construction waste materials to off-site recycling and disposal facility for use by all contractors and installers
   1. Provide containers as required.
   2. Provide adequate space for pick-up and delivery of containers.
   3. Keep trash/waste bin areas neat and clean.

E. Keep trash/waste collection areas neat and clean.

F. Do not handle, separate, store, salvage, or recycle hazardous materials. Contact Owner if hazardous materials are encountered.

2.02 RECYCLING / SALVAGING DEMOLITION AND CONSTRUCTION WASTE, GENERAL

A. General: Recycle paper and beverage containers used by on-site workers in accordance with USM Waste Minimization policy.

B. Preparation of Waste: Prepare and maintain recyclable and salvageable waste materials according to recycling or reuse facility requirements. Maintain materials free of dirt, adhesives, solvents, petroleum contamination, and other substances deleterious to the recycling or reusing process.

C. Procedures: Separate recyclable and salvageable waste from other waste materials, trash, and debris. Sort recyclable waste by type at Project site to the maximum extent practical.
   1. Provide appropriately marked containers or bins for controlling recyclable waste until removed from Project site. Include list of acceptable and unacceptable materials at each container and bin.
   2. Inspect containers and bins for contamination and remove contaminated materials if found.

2.03 DISPOSAL OF WASTE

A. General: Except for items or materials to be salvaged/reused or recycled, remove waste materials from Project site and legally dispose of them in a landfill or incinerator acceptable to authorities having jurisdiction.
   1. Except as otherwise specified, do not allow waste materials that are to be disposed of accumulate on-site.
   2. Remove and transport debris in a manner that will prevent spillage on adjacent surfaces and areas.

END OF SECTION

Anticipated Project Waste Sheet

Building, Campus:_____ Project Description:_____

Company Name:_____ Project Number:_____

Designated Contact:_____ Phone: _____ Date: _____

List types of waste materials anticipated throughout the duration of the project. Include demolition waste, bulky waste, product packaging, and anything generated that will need to be disposed of. Complete a second sheet if additional space is necessary. Include estimates of quantities, if able. In the second column describe proposed method of disposal, if known. In the third column estimate when the waste will be generated over the duration of the project.

Waste Materials / Quantities	Method of Disposal	Week # / Date

Questions: contact Steve Sweeney, Resource Recovery Supervisor, USM Facilities Management: (207) 780-4160

Waste Reporting Sheet

Building, Campus:_____ Description of Project:_____

Company Name:_____ Project Number:_____

Designated Contact:_____ Phone: _____ Date: _____

This form must be filled out and submitted monthly with each Pay Requisition throughout the duration of the project and once prior to Final Requisition. Attach all scale tickets for items listed on the form.

Disposal: Recycled, Reused, Salvaged, Donated, Incinerated, Landfilled. Include packaging material.

Project waste generated:

Date	Material	Weight	Disposal/ Destination

Questions: contact Steve Sweeney, Resource Recovery Supervisor, USM Facilities Management: (207) 780-4160

SECTION 01 78 00
PROJECT CLOSE-OUT

PART 1 GENERAL

1.01 SECTION INCLUDES

A. This Section includes administrative and procedural requirements for contract closeout, including, but not limited to, the following:
   1. Inspection procedures.
   2. Warranties.
   3. Final cleaning.

B. Substantial Completion procedures.
   1. Project Close-out meeting.
   2. Occupancy Permit.

C. Project Record Documents.
   1. Record Drawings.
   2. List of Subcontractors and material suppliers.
   3. Operation and Maintenance Data.
   4. Warranties and bonds.
   5. Contractor's Certificate of No Hazardous Materials.
   6. Testing Agency Final Report.
   7. Air-Quality Final Report.

D. Architect's evaluation of the Work.

E. Final Acceptance procedures.

F. Operating and Maintenance Instructional Sessions.

G. Adjustments.

H. Final Cleaning.

1.02 RELATED REQUIREMENTS

A. Division 01 Section "Payment Procedures" for requirements for Applications for Payment for Substantial and Final Completion.

B. Division 01 Section "Execution Requirements" for progress cleaning of Project site.

C. Division 01 Section "Project Record Documents" for submitting Record Drawings, Record Specifications, and Record Product Data.

D. Division 01 Section "Operation and Maintenance Data" for operation and maintenance manual requirements.

E. Section 00 72 00 - General Conditions: Performance bond and labor and material payment bonds, warranty, and correction of work.

F. Section 01 00 00 - General Requirements.

G. Section 01 00 30 - Electronic Media: Record Drawing backgrounds.

H. Section 01 30 00 - Administrative Requirements: Submittals procedures, shop drawings, product data, and samples.

I. Section 01 40 00 - Quality Services: Final Test Reports.

J. Section 01 78 10 - Warranties: General warranty requirements.

K. Individual Product Sections: Specific requirements for operation and maintenance data.

L. Individual Product Sections: Warranties required for specific products or Work.

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

N. Divisions 02 through 33 Sections for specific closeout and special cleaning requirements for the Work in those Sections.

1.03 SUBSTANTIAL COMPLETION PRELIMINARY PROCEDURES

A. Prior to requesting evaluation of the Work for certification of Substantial Completion, the Contractor shall complete the following items.
   1. Prepare a list of items to be completed and corrected (punch list), the value of items on the list, and reasons why the Work is not complete.
   2. Advise Owner of pending insurance changeover requirements.
   3. Submit specific warranties, workmanship bonds, maintenance service agreements, final certifications, and similar documents.
   4. Obtain and submit releases permitting Owner unrestricted use of the Work and access to services and utilities. Include occupancy permits, operating certificates, and similar releases.
   5. Prepare and submit Project Record Documents, operation and maintenance manuals.
   6. Submit final checklists, schedule and reports in accordance with the document titled “Integrated Deliverables and Testing (IDAT).”
   7. Deliver tools, spare parts, extra materials, and similar items to location designated by Owner. Label with manufacturer's name and model number where applicable.
   8. Make final changeover of permanent locks and deliver keys to Owner. Advise Owner's personnel of changeover in security provisions.
   9. Complete startup testing of systems.
   10. Submit test/adjust/balance records.
   11. Terminate and remove temporary facilities from Project site, along with mockups, construction tools, and similar elements.
   12. Advise Owner of changeover in heat and other utilities.
   13. Submit changeover information related to Owner's occupancy, use, operation, and maintenance.
   14. Complete final cleaning requirements, including touchup painting.
   15. Touch up and otherwise repair and restore marred exposed finishes to eliminate visual defects.
   16. Submit initial draft copy of operation and maintenance manuals at least 15 days before requesting inspection for Substantial Completion.

B. Close-out Meeting: Not less than thirty (30) days prior to the anticipated date of Substantial Completion, the Contractor shall conduct a Project close-out meeting. Participants in the meeting shall include the Contractor, subcontractors, Commissioning Agent, Owner and Architect. The Contractor shall prepare the agenda and schedule of close-out tasks, for prior distribution, which, among other items as may be determined by the Contractor, shall include the following:
   1. HVAC Start-up Activities.
      a. Building "flush-out"
      b. Air and water balancing
      c. HVAC filter replacement
   2. Programming of Energy Management System
   3. HVAC System Commissioning
      a. Electrical and Mechanical Systems Final Testing
   4. Indoor Air Quality Testing (as applicable)
   5. Testing and Inspections with Authorities Having Jurisdiction:
      a. Fire alarm system test
      b. Sprinkler system testing
      c. Certificate of Occupancy inspection
   6. Other Testing.
      a. Security system
      b. Data and Telephone distribution systems

7. Owner's Equipment Testing.
    a. Telephone equipment
    b. Computer network equipment
    c. Laboratory equipment
8. Delivery of tools, spare parts, extra stock, etc.
9. Punch Lists:
    a. Contractor
    b. Architect / Owner
10. Final Cleaning Operations.
11. Transition Security Issues.
    a. Removal of construction trailers, fencing, gates, etc.
    b. Door key change-over
12. Transition Issues.
    a. Insurance change-over.
    b. Owner's schedule for move-in of furnishings and equipment
13. Instructional Sessions:
    a. Mechanical, sprinkler and electrical systems.
    b. Domestic water system
    c. Laboratory equipment
14. Record Information:
    a. Warranty binder
    b. Record Drawings
    c. O&M manuals
    d. Laboratory equipment binders
15. Close-out Paperwork:
    a. Release of Liens
    b. Consent of Surety
    c. Certification of No Hazardous Materials
    d. Testing Agency Final Report
    e. Final Affidavits
    f. Air Quality Certification

C. Adjust Contract Amount by Change Order to assess Owner for additional cost or savings due to increase or decrease in:
    1. Savings accrued under the Guaranteed Maximum Price.

D. Contractor's Punch List: Prior to preparation of a punch list by the Owner and Architect, the Contractor shall prepare his own comprehensive punch list, and along with his subcontractors, properly complete all Work items thereon. The receipt of the Contractor's written punch list, clearly identifying all completed and pending items, shall be considered a prerequisite for the commencement of the Owner and Architect's evaluation of the Work for Substantial Completion.

E. Deliver tools, spare parts, extra stock, and similar items.

F. Make final change-over for locks, keys, and other security provisions.

G. Complete start-up testing of equipment and systems, conduct Owner's training sessions.

H. Discontinue, change over and remove temporary facilities from the site. Remove temporary protection measures provided during construction.

I. Final Cleaning.

J. Certificate of Occupancy: The Contractor shall schedule various inspections with the Authority Having Jurisdiction as required to obtain a Certificate of Occupancy.

K. Inspection: Submit a written request for inspection for Substantial Completion. On receipt of request, Architect will either proceed with inspection or notify Contractor of unfulfilled requirements. Architect will prepare the Certificate of Substantial Completion after inspection or

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

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

1.04 FINAL COMPLETION

A. Preliminary Procedures: Before requesting final inspection for determining date of Final Completion, complete the following:
   1. Submit a final Application for Payment according to Division 1 Section "Payment Procedures."
   2. Submit certified copy of Architect's Substantial Completion inspection list of items to be completed or corrected (punch list), endorsed and dated by Architect. The certified copy of the list shall state that each item has been completed or otherwise resolved for acceptance.
   3. Submit evidence of final, continuing insurance coverage complying with insurance requirements.
   4. Instruct Owner's personnel in operation, adjustment, and maintenance of products, equipment, and systems.

B. Inspection: Submit a written request for final inspection for acceptance. On receipt of request, Architect will either proceed with inspection or notify Contractor of unfulfilled requirements. Architect will prepare a final Certificate for Payment after inspection or will notify Contractor of construction that must be completed or corrected before certificate will be issued.
   1. Reinspection: Request reinspection when the Work identified in previous inspections as incomplete is completed or corrected.

1.05 INSPECTION FEES

A. If the Architect Performs Reinspections Due to Failure of the Work to Comply with the Claims of Status of Completion Made by the Contractor, Or, Should the Contractor fail to complete the work, Or, Should the Contractor fail to promptly correct warranty items or work later found to be deficient:
   1. Owner will compensate Architect for such additional services.
   2. Owner will deduct the amount of such compensation from the final payment to the Contractor.

B. If the Work is not completed by the date set in the Agreement, and the Architect needs to perform additional Contract Administrative and on site observation duties:
   1. Owner will compensate Architect for such additional services.
   2. Owner will deduct the amount of such compensation from the final payment to the Contractor.

1.06 LIST OF INCOMPLETE ITEMS (PUNCH LIST)

A. Preparation: Submit three copies of list. Include name and identification of each space and area affected by construction operations for incomplete items and items needing correction including, if necessary, areas disturbed by Contractor that are outside the limits of construction.
   1. Organize list of spaces in sequential order.
   2. Organize items applying to each space by major element, including categories for ceiling, individual walls, floors, equipment, and building systems.
   3. Include the following information at the top of each page:
      a. Project name.
      b. Date.
      c. Name of Architect.
      d. Name of Contractor.
      e. Page number.

1.07 SUBMITTALS

A. Project Record Documents: Submit documents to Architect with claim for final Application for Payment.
   1. Record Drawings: Shall be required for all Architecture, Building Structure, Mechanical Systems, Fire Protection Systems and Electrical Systems.
      a. The Contractor shall maintain one set of Contract Drawings for use in the preparation of Record Drawings. This set shall be maintained at the site, and upon them, the Contractor shall clearly and accurately record all Addenda, Supplementary Instructions, Change Orders, Architect's responses to Contractor's Requests for Information, and all significant changes made during construction to the Work hereinafter listed.
      b. Upon completion of the Contract, and as a prerequisite to final Payment, the Contractor shall prepare (draft as necessary), check, and certify the Record Drawings for completeness and accuracy and submit them to the Architect. The Contractor's submittal shall include one set of CD Rom electronic media files and one set blackline hard copy Record Drawings. The Contractor shall imprint the following text on each Record Drawing and Record Drawing Electronic Media File:
         1) NOTE: This drawing has been produced by (name and address of contractor). It is not the originally designed Contract Document. It is a Record Drawing."
         2) See Section 01 00 30 - Electronic Media for information regarding obtaining electronic Contract Documents for use in preparing for Record Drawings.
      c. The Architect will casually review such drawings, but will in no way ascertain or certify their completeness or correctness, which shall remain the sole responsibility of the Contractor. The Architect shall be entitled to rely upon the thoroughness and accuracy of the Contractor's documents, without further verification. Following his review, the Architect will forward all Record Drawings to the Owner for his use.
   2. Miscellaneous Record Submittals: Refer to other Specification Sections for requirements of miscellaneous record keeping and submittals in connection with actual performance of the Work. Complete miscellaneous records, place in good order, properly identified and bound ready for reference and submit to the Architect for the Owner's records.
   3. List of Subcontractors: The Contractor shall submit to the Architect two (2) typed updated lists of all subcontractors, service organizations, and principal vendors, including names, addresses, and telephone numbers where they can be reached for emergency service at all times including nights, weekends, and holidays.

B. Operation and Maintenance Data:
   1. Submit two copies of preliminary draft or proposed formats and outlines of contents before start of Work. Architect will review draft and return one copy with comments.
   2. For equipment, or component parts of equipment put into service during construction and operated by Owner, submit completed documents within ten days after acceptance.
   3. Submit one copy of completed documents 15 days prior to final inspection. This copy will be reviewed and returned after final inspection, with Architect comments. Revise content of all document sets as required prior to final submission.
   4. Submit two sets of revised final documents in final form within 10 days after final inspection.

C. Warranties and Bonds:
   1. Submittal Time: Submit written warranties on request of Architect for designated portions of the Work where commencement of warranties other than date of Substantial Completion is indicated in the contract documents.
      a. Unless indicated otherwise, all warranties shall commence on the date of Substantial Completion.
   2. Partial Occupancy: Submit properly executed warranties within 15 days of completion of designated portions of the Work that are completed and occupied or used by Owner during construction period by separate agreement with Contractor.

3. Organize warranty documents into an orderly sequence based on the table of contents of the Project Manual.
    a. Submit final warranties as a package for the entire project, assembled and identified as described below.
    b. Bind warranties and bonds in heavy-duty, D-ring, vinyl-covered, loose-leaf binders, thickness as necessary to accommodate contents but not greater than 2 inches, and sized to receive 8-1/2-by-11-inch paper. Do not over fill D-ring, allowing 1/2-inch space for future additions.
    c. Provide heavy paper dividers with plastic-covered tabs for each separate warranty. Mark tab to identify the product or installation. Provide a typed description of the product or installation, including the name of the product and the name, address, and telephone number of Installer.
    d. Identify each binder on the front and spine with the typed or printed title "WARRANTIES," Project name, and name of Contractor.
    e. Electronic Media: Submit copy of warranty binder on CD-R in .PDF format. Bookmark based on the table of contents, and for each warranty within each section.
4. Provide additional electronic media copies of each warranty to include in operation and maintenance manuals.

1.08 ARCHITECT'S EVALUATION

A. On receipt of a written request from the Contractor, the Architect will either proceed with evaluation of the Work for Substantial Completion or advise the Contractor of requirements yet to be completed prior to evaluation.

B. Based on his/her observations, the Architect will provide a written list, or "Punch List", of items to be corrected or to be completed. The Architect's list may not include all Work necessary for completion in accordance with the Contract Documents and shall not in any way relieve the Contractor of responsibility for compliance with the Contract Documents.

C. The Architect shall prepare the AIA G704 Certificate of Substantial Completion form and attach his/her written evaluation list thereto.

D. Additional Work found to be incomplete or not in conformance with the Contract Documents after the Architect's evaluation shall be completed or corrected before Final Acceptance and Final Payment.

E. When Work has been completed or corrected, the Contractor shall submit to the Architect a written request for re-evaluation. Include a copy of the Architect's previous evaluation report with notation of action taken for each item.

1.09 FINAL ACCEPTANCE

A. Within five (5) working days after the date of Substantial Completion, the Contractor shall provide a list of final Contract requirements with anticipated completion dates including:
    1. List of incomplete Work.
    2. Final Change Orders.
    3. Consent of Surety to final payment
    4. Assurances that unsettled claims will be settled.
    5. Record Drawings, O& M Manuals, Final Project Photos, Damage or Settlement Survey or other final record information.
    6. Final Application for Payment with releases and supporting documentation, including final waivers of lien.
    7. Written confirmation that corrective work related to any failed quality control testing has been provided, and that satisfactory retesting has been performed and approved by the testing agency.

B. Re-evaluation Procedure: The Architect will re-evaluate the Work upon receipt of written notice from the Contractor that the Work, including correction of items previously noted, has been completed.

1. Upon completion of re-evaluation, the Architect will prepare a Certificate of Final Acceptance, or advise the Contractor of Work that is incomplete or of obligations that have not been fulfilled but are required for Final Acceptance.
2. If necessary, re-evaluation for Final Acceptance will be repeated. Cost of re-evaluation will be the responsibility of the Contractor.

PART 2 PRODUCTS

2.01 MATERIALS

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

PART 3 EXECUTION

3.01 INDOOR AIR QUALITY MANAGEMENT

A. The Contractor and his various subcontractors as he may direct shall implement the procedures throughout construction in an effort to improve indoor air quality during the Owner's occupancy. See 01 57 21 - Indoor Air Quality Controls.

3.02 BUILDING COMMISSIONING

A. The Owner shall employ an independent Commissioning Agent for the purpose of performing Building Commissioning. See Division 18: Building Commissioning for additional information.

B. Mechanical and Electrical Systems Final Testing: The Contractor shall submit final performance acceptance reports prepared by licensed professional mechanical and electrical engineers as required. See Section 01 40 00 - Quality Services.

3.03 PROJECT RECORD DOCUMENTS

A. Maintain on site one set of the following record documents; record actual revisions to the Work:
   1. Drawings.
   2. Specifications.
   3. Addenda.
   4. Change Orders and other modifications to the Contract.
   5. Reviewed shop drawings, product data, and samples.

B. Ensure entries are complete and accurate, enabling future reference by Owner.

C. Store record documents separate from documents used for construction.

D. Record information concurrent with construction progress.

E. Specifications: Legibly mark and record at each product section description of actual products installed, including the following:
   1. Manufacturer's name and product model and number.
   2. Changes made by Addenda and modifications.

F. Record Drawings and Shop Drawings: Legibly mark each item to record actual construction including:
   1. Measured locations of internal utilities and appurtenances concealed in construction, referenced to visible and accessible features of the Work.
   2. Field changes of dimension and detail.
   3. Details not on original Contract drawings.

3.04 OPERATION AND MAINTENANCE DATA

A. Source Data: For each product or system, list names, addresses and telephone numbers of Subcontractors and suppliers, including local source of supplies and replacement parts.

B. Product Data: Mark each sheet to clearly identify specific products and component parts, and data applicable to installation. Delete inapplicable information.

C. Drawings: Supplement product data to illustrate relations of component parts of equipment and systems, to show control and flow diagrams. Do not use Project Record Documents as maintenance drawings.

D. Typed Text: As required to supplement product data. Provide logical sequence of instructions for each procedure, incorporating manufacturer's instructions.

3.05 OPERATION AND MAINTENANCE DATA FOR MATERIALS AND FINISHES

A. For Each Product, Applied Material, and Finish:
   1. Product data, with catalog number, size, composition, and color and texture designations.

B. Instructions for Care and Maintenance: Manufacturer's recommendations for cleaning agents and methods, precautions against detrimental cleaning agents and methods, and recommended schedule for cleaning and maintenance.

C. Additional information as specified in individual product specification sections.

D. Where additional instructions are required, beyond the manufacturer's standard printed instructions, have instructions prepared by personnel experienced in the operation and maintenance of the specific products.

3.06 OPERATION AND MAINTENANCE DATA FOR EQUIPMENT AND SYSTEMS

A. For Each Item of Equipment and Each System:
   1. Description of unit or system, and component parts.
   2. Identify function, normal operating characteristics, and limiting conditions.
   3. Include performance curves, with engineering data and tests.
   4. Complete nomenclature and model number of replaceable parts.

B. Where additional instructions are required, beyond the manufacturer's standard printed instructions, have instructions prepared by personnel experienced in the operation and maintenance of the specific products.

C. Panelboard Circuit Directories: Provide electrical service characteristics, controls, and communications; typed.

D. Operating Procedures: Include start-up, break-in, and routine normal operating instructions and sequences. Include regulation, control, stopping, shut-down, and emergency instructions. Include summer, winter, and any special operating instructions.

E. Maintenance Requirements: Include routine procedures and guide for preventative maintenance and troubleshooting; disassembly, repair, and reassembly instructions; and alignment, adjusting, balancing, and checking instructions.

F. Provide servicing and lubrication schedule, and list of lubricants required.

G. Include manufacturer's printed operation and maintenance instructions.

H. Include sequence of operation by controls manufacturer.

I. Provide original manufacturer's parts list, illustrations, assembly drawings, and diagrams required for maintenance.

J. Provide control diagrams by controls manufacturer as installed.

K. Provide charts of valve tag numbers, with location and function of each valve, keyed to flow and control diagrams.

L. Include test and balancing reports.

M. Additional Requirements: As specified in individual product specification sections.

3.07 ASSEMBLY OF OPERATION AND MAINTENANCE MANUALS

A. Assemble operation and maintenance data into durable manuals for Owner's personnel use, with data arranged in the same sequence as, and identified by, the specification sections.

B. Where systems involve more than one specification section, provide separate tabbed divider for each system.

C. Prepare instructions and data by personnel experienced in maintenance and operation of described products.

D. Prepare data in the form of an instructional manual.

E. Binders: Commercial quality, 8-1/2 by 11 inch three D side ring binders with durable plastic covers; 2 inch maximum ring size. When multiple binders are used, correlate data into related consistent groupings.

F. Cover: Identify each binder with typed or printed title OPERATION AND MAINTENANCE INSTRUCTIONS; identify title of Project; identify subject matter of contents.

G. Project Directory: Title and address of Project; names, addresses, and telephone numbers of Architect, Consultants, Contractor and subcontractors, with names of responsible parties.

H. Tables of Contents: List every item separated by a divider, using the same identification as on the divider tab; where multiple volumes are required, include all volumes Tables of Contents in each volume, with the current volume clearly identified.

I. Dividers: Provide tabbed dividers for each separate product and system; identify the contents on the divider tab; immediately following the divider tab include a description of product and major component parts of equipment.

J. Text: Manufacturer's printed data, or typewritten data on 24 pound paper.

K. Drawings: Provide with reinforced punched binder tab. Bind in with text; fold larger drawings to size of text pages, house in plastic sleeves.

L. Arrange content by systems under section numbers and sequence of Table of Contents of this Project Manual.

M. Contents: Prepare a Table of Contents for each volume, with each product or system description identified, in three parts as follows:
   1. Part 1: Directory, listing names, addresses, and telephone numbers of Architect, Contractor, Subcontractors, and major equipment suppliers.
   2. Part 2: Operation and maintenance instructions, arranged by system and subdivided by specification section. For each category, identify names, addresses, and telephone numbers of Subcontractors and suppliers. Identify the following:
      a. Significant design criteria.
      b. List of equipment.
      c. Parts list for each component.
      d. Operating instructions.
      e. Maintenance instructions for equipment and systems.
      f. Maintenance instructions for special finishes, including recommended cleaning methods and materials, and special precautions identifying detrimental agents.
   3. Part 3: Project documents and certificates, including the following:
      a. Shop drawings and product data.
      b. Air and water balance reports.
      c. Certificates.

3.08 SPARE PARTS AND MAINTENANCE PRODUCTS

A. Provide spare parts, maintenance, and extra products in quantities as specified in individual Specification Sections. Deliver to the site and place in locations as directed by the Owner. Obtain receipts signed by Owner's Representative and submit copies to the Architect if so directed.

3.09 WARRANTIES AND BONDS

A. See Section 01 78 10: Warranties, for additional information.

B. Retain warranties and bonds until time specified for submittal.

C. Manual: Bind in commercial quality 8-1/2 by 11 inch three D side ring binders with durable plastic covers.

D. Cover: Identify each binder with typed or printed title WARRANTIES AND BONDS, with title of Project; name, address and telephone number of Contractor and equipment supplier; and name of responsible company principal.

E. Table of Contents: Neatly typed, in the sequence of the Table of Contents of the Project Manual, with each item identified with the number and title of the specification section in which specified, and the name of product or work item.

F. Separate each warranty or bond with index tab sheets keyed to the Table of Contents listing. Provide full information, using separate typed sheets as necessary. List Subcontractor, supplier, and manufacturer, with name, address, and telephone number of responsible principal.

3.10 CERTIFICATE OF NO ASBESTOS

A. See Section 01 30 00 - Administrative Requirements, for requirements for submission of Certificate(s) of No Asbestos.

3.11 FINAL TESTING REPORTS

A. See Section 01 40 00 - Quality Services, for requirements for the Testing Agency's Final Report.

3.12 OPERATING AND MAINTENANCE INSTRUCTIONS / OWNER TRAINING

A. Instructions: The Contractor and his subcontractors and suppliers shall jointly, thoroughly instruct the Owner's representative and maintenance personnel in the proper maintenance and operation of all materials and systems that require training for proper operation and/or regular maintenance as follows:

1. Demonstrated and written detailed instructions shall be provided and reviewed for materials and systems listed in Substantial Completion Preliminary Procedures paragraph of this Section, shall include, but not be limited to:
    a. Start-up and Shut-down procedures.
    b. Emergency operations.
    c. Noise and vibration adjustments.
    d. Control sequences.
    e. Trouble-shooting.
    f. Safety procedures.
    g. Maintenance manuals.
    h. Maintenance agreements.
    i. Warranties.
    j. Record Drawings.
    k. Tools, spare parts, lubricants.
    l. Cleaning, economy and efficiency adjustments.
    m. Fuels, and fuel conversion, if applicable.
    n. Identification systems.
    o. Hazards. Any operations that, if improperly performed, might endanger the building's occupants or damage the building's equipment or contents.
2. Video all demonstrations of operation and maintenance sessions, which shall be held at the completed facility to instruct the Owner in the proper operation of equipment and systems. Prior to final payment, deliver two (2) copies to the Architect for forwarding to the Owner.
3. The Contractor shall obtain sign-off from the Owner for meeting with each installer or manufacturer's representative.
4. For equipment or systems requiring seasonal operation perform demonstrations for the other season within six (6) months.

3.13 ADJUSTING

A. Adjust operating products and equipment to ensure smooth and unhindered operation. For testing, adjusting and balancing of HVAC systems see Division 25 - Mechanical.

3.14 FINAL CLEANING

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

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

1. Complete the following cleaning operations before requesting inspection for certification of Substantial Completion for entire Project or for a portion of Project:
    a. Clean Project site, yard, and grounds, in areas disturbed by construction activities, including landscape development areas, of rubbish, waste material, litter, and other foreign substances.
    b. Sweep paved areas broom clean. Remove petrochemical spills, stains, and other foreign deposits.
    c. Rake grounds that are neither planted nor paved to a smooth, even-textured surface.
    d. Remove tools, construction equipment, machinery, and surplus material from Project site.
    e. Remove snow and ice to provide safe access to building.
    f. Clean exposed exterior and interior hard-surfaced finishes to a dirt-free condition, free of stains, films, and similar foreign substances. Avoid disturbing natural weathering of exterior surfaces. Restore reflective surfaces to their original condition.
    g. Remove debris and surface dust from limited access spaces, including roofs, plenums, shafts, trenches, equipment vaults, manholes, attics, and similar spaces.
    h. Sweep concrete floors broom clean in unoccupied spaces.
    i. Vacuum carpet and similar soft surfaces, removing debris and excess nap; shampoo if visible soil or stains remain.
    J. Resilient flooring shall be scrubbed and cleaned with cleaner recommended by the flooring manufacturer just prior to occupation by Owner. No-wax floors shall buffed in accordance with flooring manufacturer’s requirements.
    k. Floors to receive wax shall be waxed just prior to occupation by Owner. Waxing shall consist of three coats, properly buffed to a uniform sheen. Work shall be done by a floor care subcontractor. Coordinate selection of wax with flooring manufacturer and Owner’s maintenance program.
    l. Clean transparent materials, including mirrors and glass in doors and windows. Remove glazing compounds and other noticeable, vision-obscuring materials. Replace chipped or broken glass and other damaged transparent materials. Polish mirrors and glass, taking care not to scratch surfaces.
    m. Remove labels that are not permanent.
    n. Touch up and otherwise repair and restore marred, exposed finishes and surfaces. Replace finishes and surfaces that cannot be satisfactorily repaired or restored or that already show evidence of repair or restoration.
    o. Do not paint over "UL" and similar labels, including mechanical and electrical nameplates.
    p. Wipe surfaces of mechanical and electrical equipment, elevator equipment, and similar equipment. Remove excess lubrication, paint and mortar droppings, and other foreign substances.
    q. Replace parts subject to unusual operating conditions.
    r. Clean plumbing fixtures to a sanitary condition, free of stains, including stains resulting from water exposure.
    s. Replace disposable air filters and clean permanent air filters that are exposed to the work. Clean exposed surfaces of diffusers, registers, and grills.
    t. Clean ducts, blowers, and coils if units were operated without filters during construction.

u. Clean light fixtures, lamps, globes, and reflectors to function with full efficiency. Replace burned-out bulbs, and those noticeably dimmed by hours of use, and defective and noisy starters in fluorescent and mercury vapor fixtures to comply with requirements for new fixtures.

v. Leave Project clean and ready for occupancy.

c. Comply with safety standards for cleaning. Do not burn waste materials. Do not bury debris or excess materials on Owner's property. Do not discharge volatile, harmful, or dangerous materials into drainage systems. Remove waste materials from Project site and dispose of lawfully.

END OF SECTION

SECTION 01 78 10
WARRANTIES

PART 1 - GENERAL

1.01 SECTION INCLUDES

A. Administrative and procedural requirements for warranties.

1.02 RELATED SECTIONS

A. Section 01 00 00 - General Requirements.

B. Section 01 78 00 - Project Close-out.

C. Divisions 2 through 28 for specific Section requirements.

1.03 GENERAL

A. Manufacturers' disclaimers and limitations on product warranties do not relieve the 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 Contractor.

B. "Standard Product Warranties" are preprinted written warranties published by individual manufacturers of particular products and are specifically endorsed by the manufacturer to the Owner.

C. "Special Warranties" are written warranties required by or incorporated in the Contract Documents, either to extend time limits provided by standard warranties or to provide greater rights for the Owner.

1.04 WARRANTY REQUIREMENTS

A. 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.

B. Reinstatement of Warranty: When Work covered by a warranty has failed and has 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.

C. 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 the Contract Documents. The Contractor is responsible for the cost of replacing or rebuilding defective Work regardless of whether the Owner has benefited from use of the Work through a portion of its anticipated useful service life.

D. 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. 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.

E. 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.

F. Commencement Date of Warranties: The Date of Substantial Completion designates the commencement date for warranties unless specifically indicated otherwise.

1. Commencement of warranties for items not accepted shall not begin until after items have been accepted.

2. In the event that portions of a system are made operational, are in service for the benefit of the Owner for projects with phased occupancy, the entire system shall remain under warranty until the entire system is completed, operational and accepted.
   a. At that time, a one (1) year total system warranty period shall begin.

1.05 SUBMITTALS

A. Submit written warranties and bonds to the Architect in conformance with Section 01 78 00 - Project Close-out.

B. When a special warranty is required from the Contractor, or the Contractor and a subcontractor, supplier or manufacturer, prepare a written document that contains appropriate terms and identification, ready for execution by the required parties. Submit a draft to the Architect for review by the Owner prior to final execution.

C. Form of Submittal: At Final Completion, compile two copies of each required warranty and bond properly executed by the Contractor, or by the Contractor, subcontractor, supplier, or manufacturer.
   1. Verify the documents are in proper form, contain full information, and are notarized. Co-execute warranties when required.

1.06 SCHEDULE OF GUARANTEES, WARRANTIES, AND BONDS

A. Guarantee: The Contractor shall guarantee the entire Work to be free from defective or improper work or materials, and shall make good any damage due to such work or materials for a term of one year from the date of the satisfactory completion and acceptance of the Work. In general the commencement date for warranties and guarantees shall be the date of Substantial Completion. Under no circumstances shall any warranties or guarantees for any individual or collective materials or items of equipment commence prior to the date of Substantial Completion. Extended guarantees or warranties shall be provided as specified elsewhere.

B. Provide guarantees, warranties, and bonds on products and installations as specified in individual Sections.

END OF SECTION

SECTION 01 78 23
OPERATION AND MAINTENANCE DATA

PART 1 GENERAL

1.01 RELATED DOCUMENTS

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

1.02 SUMMARY

A. This Section includes administrative and procedural requirements for preparing operation and maintenance manuals, including the following:

1. Operation and maintenance documentation directory.
2. Operation manuals for systems, subsystems, and equipment.
3. Maintenance manuals for the care and maintenance of products, materials, and finishes, systems and equipment.

B. Related Sections include the following:

1. Division 01 Section "Submittal Procedures" for submitting copies of submittals for operation and maintenance manuals.
2. Division 01 Section "Closeout Procedures" for submitting operation and maintenance manuals.
3. Division 01 Section "Project Record Documents" for preparing Record Drawings for operation and maintenance manuals.
4. Divisions 02 through 33 Sections for specific operation and maintenance manual requirements for the Work in those Sections.

1.03 DEFINITIONS

A. System: An organized collection of parts, equipment, or subsystems united by regular interaction.

B. Subsystem: A portion of a system with characteristics similar to a system.

1.04 SUBMITTALS

A. Initial Submittal: Submit 2 draft copies of each manual at least 15 days before requesting inspection for Substantial Completion. Include a complete operation and maintenance directory. Architect will review concurrently with Owner for comment. Architect will return copy of draft and mark whether general scope and content of manual are acceptable.

B. Final Submittal: Submit 2 copies of each manual in final form at least 15 days before final inspection. Architect will review concurrently with Owner for comment. Architect will return copy with comments after final inspection.

1. Correct or modify each manual to comply with comments. Submit copies of each corrected manual within 15 days of receipt of Architect's comments.

C. Preliminary Operation and Maintenance Manual Summary: Submit two copies concurrently with the submittal of the Schedule of Values in accordance with Division 01 section, "Submittal Procedures."

1.05 COORDINATION

A. Where operation and maintenance documentation includes information on installations by more than one factory-authorized service representative, assemble and coordinate information furnished by representatives and prepare manuals.

PART 2 PRODUCTS

2.01 OPERATION AND MAINTENANCE DOCUMENTATION DIRECTORY

A. Organization: Include a section in the directory for each of the following:

1. List of documents.
2. List of systems.
3. List of equipment.
4. Table of contents.

B. List of Systems and Subsystems: List systems alphabetically. Include references to operation and maintenance manuals that contain information about each system.

C. List of Equipment: List equipment for each system, organized alphabetically by system. For pieces of equipment not part of system, list alphabetically in separate list.

D. Tables of Contents: Include a table of contents for each emergency, operation, and maintenance manual.

E. Identification: In the documentation directory and in each operation and maintenance manual, identify each system, subsystem, and piece of equipment with same designation used in the Contract Documents. If no designation exists, assign a designation according to ASHRAE Guideline 4, "Preparation of Operating and Maintenance Documentation for Building Systems."

2.02 MANUALS, GENERAL

A. Organization: Unless otherwise indicated, organize each manual into a separate section for each system and subsystem, and a separate section for each piece of equipment not part of a system. Each manual shall contain the following materials, in the order listed:

1. Title page.
2. Table of contents.
3. Manual contents.

B. Title Page: Enclose title page in transparent plastic sleeve. Include the following information:

1. Subject matter included in manual.
2. Name and address of Project.
3. Name and address of Owner.
4. Date of submittal.
5. Name, address, and telephone number of Contractor and primary subcontractors.
6. Name and address of Architect.
7. Cross-reference to related systems in other operation and maintenance manuals.

C. Table of Contents: List each product included in manual, identified by product name, indexed to the content of the volume, and cross-referenced to Specification Section number in Project Manual.

1. If operation or maintenance documentation requires more than one volume to accommodate data, include comprehensive table of contents for all volumes in each volume of the set.

D. Manual Contents: Organize into sets of manageable size. Arrange contents alphabetically by system, subsystem, and equipment. If possible, assemble instructions for subsystems, equipment, and components of one system into a single binder.

1. Binders: Heavy-duty, D-ring, vinyl-covered, loose-leaf binders, in thickness necessary to accommodate contents but not greater than 2 inches, sized to hold 8-

1/2-by-11-inch paper; with clear plastic sleeve on spine to hold label describing contents and with pockets inside covers to hold folded oversize sheets. Do not over fill D-ring, allowing 1/2-inch space for future additions.

a. If two or more binders are necessary to accommodate data of a system, organize data in each binder into groupings by subsystem and related components. Cross-reference other binders if necessary to provide essential information for proper operation or maintenance of equipment or system.

b. Identify each binder on front and spine, with printed title "OPERATION AND MAINTENANCE MANUAL," Project title or name, and subject matter of contents. Indicate volume number for multiple-volume sets.

2. Dividers: Heavy-paper dividers with plastic-covered tabs for each section. Mark each tab to indicate contents. Include typed list of products and major components of equipment included in the section on each divider, cross-referenced to Specification Section number and title of Project Manual.

3. Protective Plastic Sleeves: Transparent plastic sleeves designed to enclose diagnostic software diskettes for computerized electronic equipment.

4. Supplementary Text: Prepared on 8-1/2-by-11-inch white bond paper.

5. Drawings: Attach reinforced, punched binder tabs on drawings and bind with text.

a. Maximum size of drawings to be included in the binders shall not exceed 11-by-17-inch. Fold drawings to same size as text pages and use as foldouts.

b. If drawings are too large to be used as foldouts, fold and place drawings in labeled envelopes and submit envelopes with manual. At appropriate locations in manual, insert typewritten pages indicating drawing titles, descriptions of contents, and drawing locations.

E. Electronic Media: Submit one copy of each complete manual, including Record Shop Drawings and Product Data on CD-R in .PDF format. Bookmark based on the specifications table of contents and manual dividers.

F. Follow ASHRAE Guideline 4 - 2008 in the preparation of operating and maintenance documentation.

2.03 OPERATION MANUALS

A. Content: Daily operations and management of systems and equipment. In addition to requirements in this Section, include operation data required in individual Specification Sections and the following information:

1. System, subsystem, and equipment descriptions.
2. Performance and design criteria if Contractor is delegated design responsibility.
3. Operating standards.
4. Operating procedures.
5. Operating logs.
6. Wiring diagrams.
7. Control diagrams.
8. Piped system diagrams.
9. Precautions against improper use.
10. License requirements including inspection and renewal dates.

B. Descriptions: Include the following:

1. Product name and model number.
2. Manufacturer's name.
3. Equipment identification with serial number of each component.

4. Equipment function.
5. Operating characteristics.
6. Limiting conditions.
7. Performance curves.
8. Engineering data and tests.
9. Complete nomenclature and number of replacement parts.

C. Operating Procedures: Include the following, as applicable:

1. Startup procedures.
2. Equipment or system break-in procedures.
3. Routine and normal operating instructions.
4. Regulation and control procedures.
5. Instructions on stopping.
6. Normal shutdown instructions.
7. Seasonal and weekend operating instructions.
8. Required sequences for electric or electronic systems.
9. Special operating instructions and procedures.

D. Systems and Equipment Controls: Describe the sequence of operation, and diagram controls as installed.

E. Piped Systems: Diagram piping as installed, and identify color-coding where required for identification.

2.04 PRODUCT MAINTENANCE MANUAL

A. Content: Organize manual into a separate section for each product, material, and finish. Include source information, product information, maintenance procedures, repair materials and sources, and warranties and bonds, as described below.

B. Source Information: List each product included in manual, identified by product name and arranged to match manual's table of contents. For each product, list name, address, and telephone number of Installer or supplier and maintenance service agent, and cross-reference Specification Section number and title in Project Manual.

C. Product Information: Include the following, as applicable:

1. Product name and model number.
2. Manufacturer's name.
3. Color, pattern, and texture.
4. Material and chemical composition.
5. Reordering information for specially manufactured products.

D. Maintenance Procedures: Include manufacturer's written recommendations and the following:

1. Inspection procedures.
2. Types of cleaning agents to be used and methods of cleaning.
3. List of cleaning agents and methods of cleaning detrimental to product.
4. Schedule for routine cleaning and maintenance.
5. Repair instructions.

E. Repair Materials and Sources: Include lists of materials and local sources of materials and related services.

F. Warranties and Bonds: Include copies of warranties and bonds and lists of circumstances and conditions that would affect validity of warranties or bonds.

1. Include procedures to follow and required notifications for warranty claims.

2.05 SYSTEMS AND EQUIPMENT MAINTENANCE MANUAL

A. Content: For each system, subsystem, and piece of equipment not part of a system, include source information, manufacturers' maintenance documentation, maintenance procedures, maintenance and service schedules, spare parts list and source information, maintenance service contracts, and warranty and bond information, as described below.

B. Source Information: List each system, subsystem, and piece of equipment included in manual, identified by product name and arranged to match manual's table of contents. For each product, list name, address, and telephone number of Installer or supplier and maintenance service agent, and cross-reference Specification Section number and title in Project Manual.

C. Manufacturers' Maintenance Documentation: Manufacturers' maintenance documentation including the following information for each component part or piece of equipment:

1. Standard printed maintenance instructions and bulletins.
2. Drawings, diagrams, and instructions required for maintenance, including disassembly and component removal, replacement, and assembly.
3. Identification and nomenclature of parts and components.
4. List of items recommended to be stocked as spare parts.

D. Maintenance Procedures: Include the following information and items that detail essential maintenance procedures:

1. Test and inspection instructions.
2. Troubleshooting guide.
3. Precautions against improper maintenance.
4. Disassembly; component removal, repair, and replacement; and reassembly instructions.
5. Aligning, adjusting, and checking instructions.
6. Demonstration and training videotape, if available.

E. Maintenance and Service Schedules: Include service and lubrication requirements, list of required lubricants for equipment, and separate schedules for preventive and routine maintenance and service with standard time allotment.

1. Scheduled Maintenance and Service: Tabulate actions for daily, weekly, monthly, quarterly, semiannual, and annual frequencies.
2. Maintenance and Service Record: Include manufacturers' forms for recording maintenance.

F. Spare Parts List and Source Information: Include lists of replacement and repair parts, with parts identified and cross-referenced to manufacturers' maintenance documentation and local sources of maintenance materials and related services.

G. Maintenance Service Contracts: Include copies of maintenance agreements with name and telephone number of service agent.

H. Warranties and Bonds: Include copies of warranties and bonds and lists of circumstances and conditions that would affect validity of warranties or bonds.

1. Include procedures to follow and required notifications for warranty claims.

PART 3 EXECUTION

3.01 MANUAL PREPARATION

A. Operation and Maintenance Documentation Directory: Prepare a separate manual that provides an organized reference to emergency, operation, and maintenance manuals.

B. Emergency Manual: Assemble a complete set of emergency information indicating procedures for use by emergency personnel and by Owner's operating personnel for types of emergencies indicated.

C. Product Maintenance Manual: Assemble a complete set of maintenance data indicating care and maintenance of each product, material, and finish incorporated into the Work.

D. Operation and Maintenance Manuals: Assemble a complete set of operation and maintenance data indicating operation and maintenance of each system, subsystem, and piece of equipment not part of a system.

1. Engage a factory-authorized service representative to assemble and prepare information for each system, subsystem, and piece of equipment not part of a system.

2. Prepare a separate manual for each system and subsystem, in the form of an instructional manual for use by Owner's operating personnel.

E. Manufacturers' Data: Where manuals contain manufacturers' standard printed data, include only sheets pertinent to product or component installed. Mark each sheet to identify each product or component incorporated into the Work. If data include more than one item in a tabular format, identify each item using appropriate references from the Contract Documents. Identify data applicable to the Work and delete references to information not applicable.

1. Prepare supplementary text if manufacturers' standard printed data are not available and where the information is necessary for proper operation and maintenance of equipment or systems.

F. Drawings: Prepare drawings supplementing manufacturers' printed data to illustrate the relationship of component parts of equipment and systems and to illustrate control sequence and flow diagrams. Coordinate these drawings with information contained in Record Drawings to ensure correct illustration of completed installation.

1. Do not use original Project Record Documents as part of operation and maintenance manuals.

G. Comply with Division 1 Section "Closeout Procedures" for schedule for submitting operation and maintenance documentation.

END OF SECTION

SECTION 01 78 39
PROJECT RECORD DOCUMENTS

PART 1 GENERAL

1.01 RELATED DOCUMENTS

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

1.02 SUMMARY

A. This Section includes administrative and procedural requirements for Project Record Documents, including the following:

1. Record Drawings.
2. Record Specifications.
3. Record Product Data.
4. Record Shop Drawings.

B. Related Sections include the following:

1. Division 01 Section "Closeout Procedures" for general closeout procedures.
2. Divisions 02 through 33 Sections for specific requirements for Project Record Documents of the Work in those Sections.

1.03 SUBMITTALS

A. Record Drawings: Comply with the following:

1. Number of Copies: Submit copies of Record Drawings as follows:
   a. Submit one set(s) of marked-up Record Prints

B. Record Specifications: Submit one hard copy and one copy on electronic media of Project's Specifications, including addenda and contract modifications.

C. Record Shop Drawings and Product Data: Submit one hard copy and one copy on electronic media of each Product Data submittal.

1. Where Record Shop Drawings and Product Data is required as part of operation and maintenance manuals, submit marked-up Shop Drawings and Product Data as an insert in manual instead of submittal as Record Shop Drawings and Product Data. Insert typewritten pages indicating drawing titles, descriptions of contents, and Record Shop Drawings and Product Data locations that are part of operation and maintenance manuals.
2. Electronic Media: In addition to paper copy, submit record copy of record Shop Drawings and Product Data specification on CD-R in .PDF format. Bookmark Product Data based on the table of contents.

D. Directories: Material supplier directory and subcontractor directory.+

PART 2 PRODUCTS

2.01 RECORD DRAWINGS

A. Record Prints: Maintain one set of blue- or black-line white prints of the Contract Drawings and Shop Drawings.

1. Preparation: Mark Record Prints to show the actual installation where installation varies from that shown originally. Require individual or entity who obtained record data, whether individual or entity is Installer, subcontractor, or similar entity, to prepare the marked-up Record Prints.

a. Give particular attention to information on concealed elements that would be difficult to identify or measure and record later.

b. Accurately record information in an understandable drawing technique.

c. Record data as soon as possible after obtaining it. Record and check the markup before enclosing concealed installations.

2. Content: Types of items requiring marking include, but are not limited to, the following:

a. Dimensional changes to Drawings.

b. Revisions to details shown on Drawings.

c. Depths of foundations below first floor.

d. Locations and depths of underground utilities.

e. Revisions to routing of piping and conduits.

f. Revisions to electrical circuitry.

g. Actual equipment locations.

h. Duct size and routing.

i. Locations of concealed internal utilities.

j. Changes made by Change Order or Construction Change Directive.

k. Changes made following Architect's written orders.

l. Details not on the original Contract Drawings.

m. Field records for variable and concealed conditions.

n. Record information on the Work that is shown only schematically.

3. Mark the Contract Drawings or Shop Drawings, whichever is most capable of showing actual physical conditions, completely and accurately. If Shop Drawings are marked, show cross-reference on the Contract Drawings.

4. Mark record sets with erasable, red-colored pencil. Use other colors to distinguish between changes for different categories of the Work at same location.

5. Mark important additional information that was either shown schematically or omitted from original Drawings.

6 Note Construction Change Directive numbers, alternate numbers, Change Order numbers, and similar identification, where applicable.

B. Format: Identify and date each Record Drawing; include the designation "PROJECT RECORD DRAWING" in a prominent location.

1. Record Prints: Organize Record Prints into manageable sets. Bind each set with durable paper cover sheets. Include identification on cover sheets.

2.02 RECORD SPECIFICATIONS

A. Preparation: Mark Specifications to indicate the actual product installation where installation varies from that indicated in Specifications, addenda, and contract modifications.

1. Give particular attention to information on concealed products and installations that cannot be readily identified and recorded later.

2. Mark copy with the proprietary name and model number of products, materials, and equipment furnished, including substitutions, change orders and product options selected.

3. Record the name of manufacturer, supplier, Installer, and other information necessary to provide a record of selections made.

4. For each principal product, indicate whether Record Product Data has been submitted in operation and maintenance manuals instead of submitted as Record Product Data.
5. Note related Change Orders, Record Product Data, and Record Drawings where applicable.
6. Electronic Media: Submit record copy of record specification on CD-R in .PDF format. Bookmark based on the table of contents.

2.03 RECORD SHOP DRAWINGS AND PRODUCT DATA

A. Preparation: Mark Shop Drawings and Product Data to indicate the actual product installation where installation varies substantially from that indicated in Shop Drawings and Product Data submittal.

1. Give particular attention to information on concealed products and installations that cannot be readily identified and recorded later.
2. Include significant changes in the product delivered to Project site and changes in manufacturer's written instructions for installation.
3. Note related Change Orders, Record Specifications, and Record Drawings where applicable.
4. Bind product data in heavy-duty, D-ring, vinyl-covered, loose-leaf binders, thickness as necessary to accommodate contents but not greater than 2 inches, and sized to receive 8-1/2-by-11-inch paper. Do not over fill D-ring, allowing 1/2 inch space for future additions.
5. Provide heavy paper dividers with plastic-covered tabs for each specification section with product data. Mark tab to identify the specification section. Provide a typed description of the product or installation, including the name of the product and the name, address, and telephone number of Installer.
6. Identify each binder on the front and spine with the typed or printed title "PRODUCT DATA," Project name, and name of Contractor.
7. Drawings: Attach reinforced, punched binder tabs on drawings and bind with text.
    a. Maximum size of drawings to be included in the binders shall not exceed 11-by-17-inch. Fold drawings to same size as text pages and use as foldouts.
    b. If drawings are too large to be used as foldouts, fold and place drawings in labeled envelopes and submit envelopes with manual. At appropriate locations in manual, insert typewritten pages indicating drawing titles, descriptions of contents, and drawing locations.
8. Electronic Media: Submit record copy of marked-up Shop Drawings and Product Data on CD-R in .PDF format. Bookmark based on the table of contents, and for each Shop Drawings and Product Data within each section. Where Record Shop Drawings and Product Data is required as part of operation and maintenance manuals, submit electronic media of marked-up Shop Drawings and Product Data as part of manual instead of submittal as Record Shop Drawings and Product Data.

2.04 MISCELLANEOUS RECORD SUBMITTALS

A. Assemble miscellaneous records required by other Specification Sections for miscellaneous record keeping and submittal in connection with actual performance of the Work. Bind or file miscellaneous records and identify each, ready for continued use and reference.

B. Subcontractor Directory: Name, address and telephone number for all major subcontractors, organized by specification section.

C. Material Supplier Directory: Name, address and telephone number for major material suppliers, organized by specification section.

PART 3 EXECUTION

3.01 RECORDING AND MAINTENANCE

A. Recording: Maintain one copy of each submittal during the construction period for Project Record Document purposes. Post changes and modifications to Project Record Documents as they occur; do not wait until the end of Project.

B. Maintenance of Record Documents and Samples: Store Record Documents and Samples in the field office apart from the Contract Documents used for construction. Do not use Project Record Documents for construction purposes. Maintain Record Documents in good order and in a clean, dry, legible condition, protected from deterioration and loss. Provide access to Project Record Documents for Architect's reference during normal working hours.

END OF SECTION

SECTION 01 79 00
DEMONSTRATION AND TRAINING

PART 1 GENERAL

1.01 RELATED DOCUMENTS

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

1.02 SUMMARY

A. This Section includes administrative and procedural requirements for instructing Owner's personnel, including the following:

1. Demonstration of operation of systems, subsystems, and equipment.
2. Training in operation and maintenance of systems, subsystems, and equipment.

B. Related Sections include the following:

1. Division 01 Section "Project Management and Coordination" for requirements for preinstruction conferences.
2. Divisions 02 through 33 Sections for specific requirements for demonstration and training for products in those Sections.

1.03 SUBMITTALS

A. Attendance Record: For each training session, submit list of participants.

1.04 QUALITY ASSURANCE

A. Demonstrator and Instructor Qualifications: A factory-authorized service representative, complying with requirements in Division 1 Section "Quality Requirements," experienced in operation and maintenance procedures and training.

1.05 COORDINATION

A. Coordinate instruction schedule with Owner's operations. Adjust schedule as required to minimize disrupting Owner's operations.

B. Coordinate providing notification of dates, times, length of instruction time, and training content.

C. Coordinate content of training with content of approved operation and maintenance manuals.

PART 2 PRODUCTS

2.01 INSTRUCTION PROGRAM

A. Program: Develop an instruction program that includes individual training for each system and equipment not part of a system, as required by individual Specification Sections, and as follows:

1. HVAC systems equipment.
2. Lighting equipment and controls.

B. Training Modules: Include instruction as applicable for the following:

1. Basis of System Design, Operational Requirements, and Criteria: Include the following:
   a. System, subsystem, and equipment descriptions.
   b. Performance and design criteria if Contractor is delegated design responsibility.
   c. Operating standards.

d. Regulatory requirements.
e. Equipment function.
f. Operating characteristics.
g. Limiting conditions.
h. Performance curves.

2. Documentation: Review the following items in detail:
   a. Operations and maintenance manuals.
   b. Project Record Documents.
   c. Warranties and bonds.
   d. Maintenance service agreements and similar continuing commitments.
3. Emergencies: Include the following, as applicable:
   a. Instructions on meaning of warnings, trouble indications, and error messages.
   b. Instructions on stopping.
   c. Shutdown instructions for each type of emergency.
   d. Operating instructions for conditions outside of normal operating limits.
   e. Sequences for electric or electronic systems.
   f. Special operating instructions and procedures.
4. Operations: Include the following, as applicable:
   a. Instructions on meaning of warnings, trouble indications, and error messages.
   b. Startup procedures.
   c. Equipment or system break-in procedures.
   d. Routine and normal operating instructions.
   e. Regulation and control procedures.
   f. Control sequences.
   g. Safety procedures.
   h. Instructions on stopping.
   i. Normal and emergency shutdown instructions.
   j. Operating procedures for system, subsystem, or equipment failure.
   k. Seasonal and weekend operating instructions.
   l. Required sequences for electric or electronic systems.
   m. Special operating instructions and procedures.
5. Adjustments: Include the following:
   a. Alignments.
   b. Checking adjustments.
   c. Noise and vibration adjustments.
   d. Economy and efficiency adjustments.
6. Troubleshooting: Include the following:
   a. Diagnostic instructions.
   b. Test and inspection procedures.
7. Maintenance: Include the following:
   a. Inspection procedures.
   b. Types of cleaning agents to be used and methods of cleaning.

c. List of cleaning agents and methods of cleaning detrimental to product.
d. Procedures for routine cleaning
e. Procedures for preventive maintenance.
f. Procedures for routine maintenance.
g. Instruction on use of special tools.

8. Repairs: Include the following:
   a. Diagnosis instructions.
   b. Repair instructions.
   c. Disassembly; component removal, repair, and replacement; and reassembly instructions.
   d. Instructions for identifying parts and components.
   e. Review of spare parts needed for operation and maintenance.

PART 3 EXECUTION

3.01 PREPARATION

A. Assemble materials necessary for instruction.

B. Set up instructional equipment at instruction location.

3.02 INSTRUCTION

A. Engage qualified instructors to instruct Owner's personnel to adjust, operate, and maintain systems, subsystems, and equipment not part of a system.
   1. Owner will furnish Contractor with names and positions of participants.

B. Scheduling: Provide instruction at mutually agreed on times. For equipment that requires seasonal operation, provide similar instruction at start of each season.
   1. Schedule training with Owner with at least fifteen days' advance notice.

END OF SECTION

SECTION 01 95 00
TESTING, ADJUSTING, AND BALANCING

PART 1 GENERAL

1.01 FOR INFORMATION ONLY

A. The testing, adjusting and balancing (TAB) Agent shall be contracted directly with the Owner. This Specification section has been included for information only, to inform the Contractor that testing, adjusting and balancing will be performed on the mechanical systems and that the Contractor is responsible for assisting and coordinating with the TAB Agency as described in this section.

1.02 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.

1.03 RELATED SECTIONS

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

B. Section 014000 - Quality Requirements: Testing laboratory services: Employment of testing agency and payment for services.

C. Section 017700 – Project Closeout

D. Section 017810 –Project Record Documents

E. Division 23 – Warranty:

1. TAB warranties shall conform to guidelines indicated in Division 23 with all references to Mechanical Contractor changes to TAB Contractor.

1.04 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.

F. IDAT – Integrated Deliverables And Testing Plan.

1.05 SUBMITTALS

A. Submit under provisions of Section 013300.

B. Submit name of Testing, Adjusting, and Balancing (TAB) Agency for approval within 30 days after award of Contract.

C. Design Review Reports:

1. Submit prior to commencement of construction under provisions of Section 014000.

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 30 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, forms prepared following ASHRAE 111, or NEBB forms.

1.06 QUALITY ASSURANCE

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

B. Instrument Calibration: Calibrate instruments every 6 months, or more frequently if Manufacturer requires same."

1. Keep an updated record of instrument calibration that indicates date of calibration and the name of party performing instrument calibration.

C. A joint TAB Conference: Meet with Owner's and Architect's representatives on approval of TAB strategies and procedures plan to develop a mutual understanding of the details. Ensure the participation of TAB team members, equipment manufacturers' authorized service representatives, HVAC controls installers, and other support personnel. Provide seven days' advance notice of scheduled meeting time and location.

1. Agenda Items: Include at least the following:

a. Submittal distribution requirements.

b. The Contract Documents examination report.

c. TAB plan.

d. Work schedule and Project-site access requirements.

e. Coordination and cooperation of trades and subcontractors.

f. Coordination of documentation and communication flow.

D. Certification of TAB Reports: Certify TAB field data reports. This certification includes the following:

1. Review field data reports to validate accuracy of data and to prepare certified TAB reports.

2. Certify that TAB team complied with approved TAB plan and the procedures specified and referenced in this Specification.

3. TAB Report Forms: Use standard forms from AABC's "National Standards for Testing and Balancing Heating, Ventilating, and Air Conditioning Systems." or NEBB's "Procedural Standards for Testing, Adjusting, and Balancing of Environmental Systems."

1.07 QUALIFICATIONS

A. Agency: Company specializing in the testing, adjusting, and balancing of systems specified in this Section with minimum three 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 paragraph 3.01 AGENCIES in this Section.

B. 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 in the state of Maine.

C. The approved Agency shall be in no way affiliated with the installing Subcontractor.

1.08 SEQUENCING

A. Sequence work under the provisions of Section 011000.

B. Sequence work to commence after completion of systems or portions of work, and schedule completion of work before Substantial Completion of Project.

C. Acceptance of work shall be upon written completion and acceptance of the IDAT plan.

PART 2 PRODUCTS – NOT USED

PART 3 EXECUTION

3.01 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. Pumps are rotating correctly.
14. Proper strainer baskets are clean and in place.
15. Service and balance valves are open.
16. Condensing units are charged with refrigerant and factory started.

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. Field reports shall be submitted in accordance with the IDAT plan.

C. Beginning of work means acceptance of existing conditions.

3.02 PREPARATION

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

3.03 INSTALLATION TOLERANCES

A. Air Handling Systems: Adjust to within plus or minus 5 percent of design for supply systems and plus or minus 5 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.

3.04 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.

3.05 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 with required and actual air quantities recorded at each outlet or inlet.

H. Measure static air pressure conditions on air supply units, including filter and coil pressure drops, and total pressure across the fan. Make allowances for 50 percent loading of filters.

I. 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.

J. Measure temperature conditions across outside air, return air, and exhaust dampers to check leakage.

K. Where modulating dampers are provided, take measurements and balance at extreme conditions. Balance variable volume systems at maximum air flow rate, full cooling, and at minimum air flow rate, full heating.

L. Measure building static pressure and adjust supply, return, and exhaust air systems to provide required relationship between each to maintain approximately 0.05 inches (12.5 Pa) positive static pressure near the building entries.

M. For variable air volume system powered units set volume controller to air flow setting indicated. Confirm connections properly made and confirm proper operation for automatic variable air volume temperature control.

N. 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.

3.06 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.

F. Where available pump 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.

G. When the available pump head is more than 15% above the required head to meet the design flow, trim the pump impeller to bring the head within 100 to 110 percent of the required head to meet the design flow. At least one balancing valve in the system, and one balancing valve per each multi-circuit sub-main branch served by a branch balancing valve, shall be fully open when balancing is complete.

3.07 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.

3.08 COORDINATION OF SERVICES

A. The General Contractor and his Subcontractors shall be responsible for providing the following assistance to the TAB Agent:

1. Provide access to the Contractors on site ladders and man-lifts as required to allow access to required equipment by the TAB Agent.

2. Keep the TAB Agent informed of the project schedule and ensure that adequate notice is given to the TAB Agent to allow for the proper testing, adjusting and balancing of mechanical systems before ceilings are flooded or access to systems is otherwise obstructed.

3. Ensure that adequate time is allotted in the project schedule to allow for the proper testing, adjusting and balancing of the mechanical systems.

4. Coordinate with the TAB Agent to correct system deficiencies that are discovered by the TAB Agent. Notify the TAB Agent once system deficiencies are corrected.

3.09 PROJECT CLOSEOUT

A. At final inspection, recheck random selections of data recorded in IDAT report. Recheck points or areas as selected and witnessed by the Architect.

1. Check and adjust systems approximately six months after final acceptance and submit final IDAT report. Systems shall be rechecked and adjusted during each season.

2. Retests: If random tests elicit a measured flow deviation of ten percent or more from that recorded in the certified report listings, at ten percent or more of the rechecked selections, the report shall be automatically rejected. In the event the report is rejected, systems shall be readjusted and tested, new data recorded, new certified reports submitted, and new inspection tests made.

3. System shall be verified for proper performance 90 days after Owner acceptance.

B. Provide instrument calibration reports by type used for air and water procedures and dates of last calibration.

3.10 SCHEDULES

A. Equipment Requiring Testing, Adjusting, and Balancing:

HVAC Pumps

Air Coils

Air Handling Units

Fans

Air Filters

Air Terminal Units

Air Inlets and Outlets

Condensing Unit

Terminal Transfer Units (FTR, CUH, UH)

END OF SECTION

SECTION 02 41 00
DEMOLITION

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Selective demolition of building elements for alterations purposes and as otherwise required for the complete and proper execution of the Work.

B. The Work of this Section is not necessarily fully represented on the Drawings or specifically identified herein. The Contractor, either himself or through his various subcontractors, shall thoroughly review all available documents and shall visit the site and existing building prior to bidding, as required to fully satisfy himself as to the types, locations and quantities of demolition work required for the complete and proper execution of the Work. No pleas of misunderstanding resulting from the failure to adequately inspect existing conditions will be entertained and no additional expenses related thereto will be granted.

1.02 RELATED REQUIREMENTS

A. Section 01 10 00 - Summary: Limitations on Contractor's use of site and premises.

B. Section 01 50 00 - Temporary Facilities: Security, protective barriers, and waste removal.

C. Section 01 71 00 - Cutting and Patching

D. Section 01 74 19 - Construction Waste Management and Disposal: Limitations on disposal of removed materials; requirements for recycling.

1.03 REFERENCE STANDARDS

A. 29 CFR 1926 - U.S. Occupational Safety and Health Standards; current edition.

B. NFPA 241 - Standard for Safeguarding Construction, Alteration, and Demolition Operations; 2013.

1.04 SUBMITTALS

A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.

B. Site Plan: Showing:
   1. Areas for temporary construction and field offices.

C. Demolition Plan: Submit demolition plan as specified by OSHA and local authorities.
   1. Indicate extent of demolition, removal sequence, bracing and shoring, and location and construction of barricades and fences.
   2. Identify demolition firm and submit qualifications.
   3. Include a summary of safety procedures.

D. Project Record Documents: Accurately record actual locations of capped and active utilities.

1.05 QUALITY ASSURANCE

A. Demolition Firm Qualifications: Company specializing in the type of work required.
   1. Minimum of 5 years of documented experience.

PART 2 PRODUCTS

2.01 MATERIALS

A. For replacement of Work removed, use materials that comply with the pertinent Sections of these Specifications. All other materials, not specifically described but required for a complete and proper job, shall be as selected by the Contractor, subject to the approval of the Architect.

PART 3 EXECUTION

3.01 SPECIAL REQUIREMENTS FOR DEMOLITION

A. All methods, techniques and procedures of safety, shoring, barricading, fencing, protection, demolition, removal and disposal are left solely to the discretion of, and shall be the responsibility of the Contractor. Special attention shall be paid to the issues of safety and protection of existing construction and/or landscaping and site improvements to remain. The Contractor shall take all precautions necessary to prevent the movement, settlement, or failure of adjacent construction. See Section 01 00 00 - General Requirements, for additional information.

B. The Contractor shall be responsible for compliance with all applicable Local, State and Federal environmental regulations, including but not limited to the National Emission Standard for Hazardous Air Pollutants, as enforced by the United States Environmental Protection Agency. It shall be the Contractor's responsibility to provide all inspections and notifications related thereto.

3.02 GENERAL PROCEDURES AND PROJECT CONDITIONS

A. Comply with applicable codes and regulations for demolition operations and safety of adjacent structures and the public.
   1. Obtain and pay for all required permits and approvals required for demolition, hauling, dumping and in general, all activities related to the Work of this Section.
   2. Comply with applicable requirements of NFPA 241.

B. The Contractor shall be alert to potential problems or dangerous conditions. He shall exercise caution during demolition or removal which may affect structural safety. He shall proceed only when he has fully satisfied himself that he has provided proper support, shoring, bracing, protection, and safety precautions.
   1. If uncovered conditions are not as anticipated, immediately notify the Architect and secure needed directions. Do not proceed in areas of discrepancy until all such discrepancies have been fully resolved
   2. Take precautions to prevent catastrophic or uncontrolled collapse of structures to be removed; do not allow worker or public access within range of potential collapse of unstable structures.
   3. Provide, erect, and maintain temporary barriers and security devices.
   4. Use physical barriers to prevent access to areas that could be hazardous to workers or the public.
   5. Conduct operations to minimize effects on and interference with adjacent structures and occupants.
   6. Do not close or obstruct roadways or sidewalks without permit.
   7. Conduct operations to minimize obstruction of public and private entrances and exits; do not obstruct required exits at any time; protect persons using entrances and exits from removal operations.
   8. Obtain written permission from owners of adjacent properties when demolition equipment will traverse, infringe upon or limit access to their property.

C. Do not begin removal until receipt of notification to proceed from Owner.

D. Do not begin removal until built elements to be salvaged or relocated have been removed.

E. Protect existing structures and other elements that are not to be removed.
   1. Provide bracing and shoring.
   2. Prevent movement or settlement of adjacent structures.
   3. Stop work immediately if adjacent structures appear to be in danger.

F. Minimize production of dust due to demolition operations; do not use water.

G. The Architect's Scope of Services and responsibilities exclude the investigation, discovery, detection, identification, presence, leakage, release, use, handling, disposal, encapsulation, abatement, treatment or removal of, or exposure of a person or persons to, hazardous

materials, pollutants, contaminants, or disease transmitting organisms, pre existing or otherwise deposited at any time and in any form at the Project, including but not limited to volatile organic compounds, molds, fungus, bacteria, petroleum products, lead, asbestos or asbestos products, radon and electro-magnetic frequency radiation or other radiation. Should any such substances be encountered, the Owner and Architect shall be promptly notified, in writing.

H. Perform demolition in a manner that maximizes salvage and recycling of materials.
   1. Comply with requirements of Section 01 74 19 - Waste Management.
   2. Dismantle existing construction and separate materials.
   3. Set aside reusable, recyclable, and salvageable materials; store and deliver to collection point or point of reuse.

3.03 SELECTIVE DEMOLITION FOR ALTERATIONS

A. Drawings showing existing construction and utilities are based on casual field observation and existing record documents only.
   1. Verify that construction and utility arrangements are as shown.
   2. Report discrepancies to Architect before disturbing existing installation.
   3. Beginning of demolition work constitutes acceptance of existing conditions that would be apparent upon examination prior to starting demolition.

B. Separate areas in which demolition is being conducted from other areas that are still occupied.
   1. Provide, erect, and maintain temporary dustproof partitions of construction specified in Section 01 50 00 in locations indicated on drawings.

C. Maintain weatherproof exterior building enclosure except for interruptions required for replacement or modifications; take care to prevent water and humidity damage.

D. Remove existing work as indicated and as required to accomplish new work.
   1. Remove rotted wood, corroded metals, and deteriorated masonry and concrete; replace with new construction specified.
   2. Remove items indicated on drawings.

E. Services (Including but not limited to HVAC, Plumbing, Fire Protection, Electrical, Telecommunications, and data systems): Remove existing systems and equipment as indicated.
   1. Maintain existing active systems that are to remain in operation; maintain access to equipment and operational components.
   2. Where existing active systems serve occupied facilities but are to be replaced with new services, maintain existing systems in service until new systems are complete and ready for service.
   3. Verify that abandoned services serve only abandoned facilities before removal.
   4. Remove abandoned pipe, ducts, conduits, and equipment, including those above accessible ceilings; remove back to source of supply where possible, otherwise cap stub and tag with identification.

F. Protect existing work to remain.
   1. Prevent movement of structure; provide shoring and bracing if necessary.
   2. Perform cutting to accomplish removals neatly and as specified for cutting new work.
   3. Repair adjacent construction and finishes damaged during removal work.
   4. Patch as specified for patching new work.

3.04 DEBRIS AND WASTE REMOVAL

A. Remove debris, junk, and trash from site.

B. Remove from site all materials not to be reused on site; comply with requirements of Section 01 74 19 - Waste Management.

C. Contractor shall leave the site in neat, clean and safe condition, with all appropriate barricades, fencing, warning signage, etc. securely in place, ready for subsequent work.

D. Clean up spillage and wind-blown debris from public and private lands.

END OF SECTION

SECTION 03 54 00
CAST UNDERLAYMENT

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Liquid-applied self-leveling floor underlayment.
   1. Use cementitious type throughout the renovated area including Chemistry Lab C300, Prep Room C300A, Entry C300B and Office C300C to provide a smooth, patched and level subsurface to receive new finishes.

1.02 RELATED REQUIREMENTS

A. Section 01 23 00 - Alternates: Concrete Slab Moisture Barrier System.

1.03 REFERENCE STANDARDS

A. ASTM C109 - Standard Test Method for Compressive Strength of Hydraulic Cement Mortars (Using 2-in. or (50-mm) Cube Specimens); 2012.

B. ASTM C348 - Standard Test Method for Flexural Strength of Hydraulic-Cement Mortars; 2008.

C. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials; 2014.

1.04 SUBMITTALS

A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.

B. Product Data: Provide manufacturer's data sheets documenting physical characteristics and product limitations of underlayment materials. Include information on surface preparation, environmental limitations, and installation instructions.

C. Certificate: Certify that products meet or exceed specified requirements.

1.05 QUALITY ASSURANCE

A. Applicator Qualifications: Company specializing in performing the work of this section with minimum five years of experience and approved by the manufacturer.
   1. Approved by manufacturer.

1.06 DELIVERY, STORAGE, AND HANDLING

A. Store products in manufacturer's unopened packaging until ready for installation.

B. Keep dry and protect from direct sun exposure, freezing, and ambient temperature greater than 105 degrees F.

1.07 MOCK-UP

A. Provide a mock-up for evaluation of surface preparation techniques and application workmanship.

B. Accepted mock-up(s) may remain as part of the Work. Unsatisfactory mock-ups shall be removed.

1.08 FIELD CONDITIONS

A. Do not install underlayment until floor penetrations and peripheral work are complete.

B. Do not install underlayment until Owner Testing for concrete slab is complete and determination of moisture barrier system requirements have been determined.

C. Maintain minimum ambient temperatures of 50 degrees F 24 hours before, during and 72 hours after installation of underlayment.

D. During the curing process, ventilate spaces to remove excess moisture.

PART 2 PRODUCTS

2.01 MATERIALS

A. Cementitious Underlayment: Blended cement mix, that when mixed with water in accordance with manufacturer's directions will produce self-leveling underlayment.
   1. Compressive Strength, ASTM C109: Minimum 4000 psi after 28 days.
   2. Flexural Strength, ASTM C348: Minimum 1000 psi after 28 days.
   3. Density: 125 lb/cu ft, nominal.
   4. Final Set Time: 1-1/2 to 2 hours, maximum.
   5. Thickness: Capable of thicknesses from feather edge to maximum 3-1/2 inch.
   6. Surface Burning Characteristics, ASTM E84: Flame spread/Smoke developed index of 0/0.
   7. Products:
      a. Ardex K15 by Ardex Engineered Cements.
      b. Koster SL Premium Self-Leveling Underlayment by Koster.
      c. Laticrete Supercap by Laticrete LLC.
      d. Substitutions: See Section 01 60 00 - Product Requirements.

B. Aggregate: Dry, well graded, washed silica aggregate, approximately 1/8 inch in size and acceptable to underlayment manufacturer.

C. Water: Potable and not detrimental to underlayment mix materials.

D. Primer: Manufacturer's recommended type.

E. Joint and Crack Filler: Latex based filler, as recommended by manufacturer.

2.02 MIXING

A. Site mix materials in accordance with manufacturer's instructions.

B. Add aggregate for areas where thickness will exceed 1/2 inch. Mix underlayment and water for at least two minutes before adding aggregate, and continue mixing to assure that aggregate has been thoroughly coated.

C. Mix to self-leveling consistency without over-watering.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify that underlayment is compatible with scheduled floor covering and adhesives.

B. Verify that substrate surfaces are clean, dry, unfrozen, do not contain petroleum byproducts, or other compounds detrimental to underlayment material bond to substrate. Do not use acid or mastic removers on any surface. Surfaces shall be 50 degrees F, minimum and 90 degrees F maximum.

C. Owner's testing agency shall test concrete slabs prior to installation of any self-leveling underlayment. Test results shall be made available to the contractor for determination of appropriate product. Contractor shall obtain instructions from manufacturer if test results are not within their recommendation limits. Testing shall include:
   1. Internal relative humidity, per ASTM F2170
   2. MVER per ASTM F-1869.
   3. Alkalinity, pH rates per ASTM 710.

D. See Section 01 23 00 - Alternates if Owner testing of concrete determines a moisture barrier system will be required prior to installation of underlayment.

3.02 CEMENTITIOUS UNDERLAYMENT PREPARATION

A. Concrete: Mechanically prepare steel troweled concrete to create a textured surface necessary to achieve the best bond; acceptable methods include bead blasting and scarifying. Do not use acid etching.

B. Remove substrate surface irregularities. Fill voids and deck joints with filler. Finish smooth.

C. Vacuum clean surfaces.

D. Prime substrate in accordance with manufacturer's instructions. Allow to dry.

E. Close floor openings.

3.03 APPLICATION

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

B. Pump or pour material onto substrate. Do not retemper or add water.
   1. Pump, move, and screed while the material is still highly flowable.
   2. Be careful not to create cold joints.
   3. Wear spiked shoes while working in the wet material to avoid leaving marks.

C. Place to indicated floor elevation, achieving a minimum 1/8 inch thickness, with top surface level to 1/8 inch in 10 ft.

D. Where additional aggregate has been used in the mix, add a top layer of neat mix (without aggregate), if needed to level and smooth the surface.

E. If a fine, feathered edge is desired, steel trowel the edge after initial set, but before it is completely hard.

3.04 CURING

A. Once underlayment starts to set, prohibit foot traffic until final set has been reached.

B. Air cure in accordance with manufacturer's instructions.

3.05 FIELD QUALITY CONTROL

A. An independent testing agency will perform field inspection and testing, as specified in Section 01 40 00.

B. Placed Material: Agency will inspect and test for conformance to specification requirements.

3.06 PROTECTION

A. Protect against direct sunlight, heat, and wind; prevent rapid drying to avoid shrinkage and cracking.

B. Do not permit traffic over unprotected floor underlayment surfaces.

END OF SECTION

SECTION 05 50 00
METAL FABRICATIONS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Shop fabricated miscellaneous steel items. Including but not limited to:
   1. Frames, brackets and supports for:
      a. Hardware, mechanical equipment, and electrical equipment.

B. It shall be a requirement of the Work of the Section to thoroughly review all of the Contract Documents and provide any and all miscellaneous metal fabrications required for a complete and proper job.

1.02 RELATED REQUIREMENTS

A. Section 06 10 54 - Blocking and Curbing.

B. Section 09 90 00 - Painting and Coating: Paint finish.

1.03 REFERENCE STANDARDS

A. ASTM A36 - Standard Specification for Carbon Structural Steel; 2008.

B. ASTM A53 - Standard Specification for Pipe, Steel, Black and Hot-Dipped, Zinc-Coated, Welded and Seamless; 2012.

C. ASTM A153 - Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware; 2009.

D. ASTM A283 - Standard Specification for Low and Intermediate Tensile Strength Carbon Steel Plates; 2012.

E. ASTM A307 - Standard Specification for Carbon Steel Bolts, Studs, and Threaded Rod 60 000 PSI Tensile Strength; 2012.

F. ASTM A325 - Standard Specification for Structural Bolts, Steel, Heat Treated, 120/105 ksi Minimum Tensile Strength; 2010.

G. ASTM A500 - Standard Specification for Cold-Formed Welded and Seamless Carbon Steel Structural Tubing in Rounds and Shapes; 2010a.

H. ASTM B209 - Standard Specification for Aluminum and Aluminum-Alloy Sheet and Plate; 2010.

I. ASTM B210 - Standard Specification for Aluminum and Aluminum-Alloy Drawn Seamless Tubes; 2012.

J. ASTM B211 - Standard Specification for Aluminum and Aluminum-Alloy Rolled or Cold Finished Bar, Rod, and Wire; 2012e1.

K. ASTM B221 - Standard Specification for Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes; 2013.

L. AWS D1.1 - Structural Welding Code - Steel; American Welding Society; 2010.

M. AWS D1.2 - Structural Welding Code - Aluminum; American Welding Society; 2008.

N. SSPC-Paint 15 - Steel Joist Shop Primer; Society for Protective Coatings; 1999 (Ed. 2004).

O. SSPC-SP; Society for Protective Coatings; 1982 (Ed. 2004).

1.04 SUBMITTALS

A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.

B. Product Data: Submit for manufactured products specified herein.

C. Shop Drawings: Indicate profiles, sizes, connection attachments, reinforcing, anchorage, size and type of fasteners, and accessories. Include erection drawings, elevations, and details where applicable.

D. Certifications:
   1. Submit seismic analysis certification sealed and signed by a registered professional structural engineer in the State in which the Project is located, that all equipment stands, frames, and supports comply with applicable codes.
   2. Welders' Certificates: Submit certification for welders employed on the project, verifying AWS qualification within the previous 12 months.
   3. Fabricator's Qualification Statement: Provide documentation showing steel fabricator is accredited under IAS AC172.
   4. Submit documentation of steel fabricator's in-plant special inspections program including registration of special inspections program, written procedural and quality control manuals and evidence of periodic auditing of fabrication practices by an approved inspection agency.

E. Samples: Submit samples representative of materials and finished products as may be requested by the Architect.

1.05 QUALITY ASSURANCE

A. Fabricator's Qualifications: Only fabricators that maintain an agreement with an approved independent inspection or quality control agency to conduct periodic in-plant inspections at the fabricator's plant, at a frequency that will assure the fabricator's conformance to the requirements of the inspection agency's approved quality control program will be approved for this project.

B. Design equipment supports under direct supervision of a Professional Structural Engineer experienced in design of this Work and licensed in the State in which the Project is located.

C. Welding Standards: Comply with applicable provisions of ASW D1.1 "Structural Welding Code - Steel" and ASW D1.3 "Structural Welding Code - Sheet Steel".

1.06 PRODUCT HANDLING

A. Delivery of Materials: Deliver, store and handle components in such a manner as to prevent damage to finished surfaces.

B. Storage of Materials: Store components in a dry, clean location, away from uncured masonry and concrete. Cover with tarpaulin or polyethylene sheeting.

PART 2 PRODUCTS

2.01 MATERIALS - STEEL

A. Steel Sections: ASTM A 36/A 36M.

B. Steel Tubing: ASTM A500/A500M, Grade B cold-formed structural tubing.

C. Plates: ASTM A 283.

D. Pipe: ASTM A 53/A 53M, Grade B Schedule 40, black finish.

E. Slotted Channel Framing: ASTM A653 Grade 33, electro-galvanized steel metal channel framing and ASTM A1011 channel fittings system; engineered, fabricated and installed by the manufacturer's authorized installer with a minimum of five (5) years of experience. Installation shall include:
   1. Field inspection to verify job conditions, dimensions, and suitability of primary structure to receive channel framing.
   2. Engineering of all channel framing, attachments between framing members, attachments between framing systems and building structure, and anchor points to receive attachments by the manufacturer of the building material or equivalent to be supported by the channel framing systems.
   3. Coordination of framing load capacity and anchor point types and locations with the requirements of the related material or equipment manufacturer.

4. Submission of structural calculations including, but not limited to design criteria, stress and deflection analysis and selected framing, fittings and anchors prepared by a professional structural engineer licensed in the State of Maine.
5. Manufacturer: Unistrut Corp.
   a. Substitutions: See Section 01 60 00 - Product Requirements.

F. Fasteners: ASTM B33, Class FE/An 25 for electro-plated zinc coating, for exterior use or where built into exterior walls. Select fasteners for the type, grade, and class required.
1. Bolts, Nuts, and Washers: ASTM A 325 (ASTM A 325M), Type 1, galvanized to ASTM A 153/A 153M where connecting galvanized components.
2. Machine Screws: ANSI B18.6.3.
3. Lag Bolts: ANSI B18.2.1.
4. Expansion Anchors: Carbon steel components zinc-plated to comply with ASTM B633.

G. Welding Materials: AWS D1.1/D1.1M; type required for materials being welded.

H. Shop and Touch-Up Primer: SSPC-Paint 15, complying with VOC limitations of authorities having jurisdiction.

2.02 MATERIALS - ALUMINUM

A. Extruded Aluminum: ASTM B221, 6063 alloy, T6 temper.

B. Sheet Aluminum: ASTM B209, 5052 alloy, H32 or H22 temper.

C. Aluminum-Alloy Drawn Seamless Tubes: ASTM B210, 6063 alloy, T6 temper.

D. Aluminum-Alloy Bars: ASTM B211, 6061 alloy, T6 temper.

E. Bolts, Nuts, and Washers: Stainless steel.

F. Welding Materials: AWS D1.2; type required for materials being welded.

2.03 FABRICATION

A. NOTE: It is the Owner's intent to use energy conserving, environmentally friendly materials to the greatest extent practical. The Contractor is therefore encouraged to use recycled steel products.

B. Metal fabrications shall be standard approved products, fabricated in accordance with best shop practices and, wherever possible, shop assembled, ready for erection.

C. Metals shall be free from defects impairing strength, durability, or appearance and shall be best commercial quality for purposes specified. Metals shall be made with structural properties, to safely sustain and withstand strains, stresses, to which they will be normally subjected.

D. Fit and shop assemble items in largest practical sections, for delivery to site.

E. Fabricate items with joints tightly fitted and secured.

F. Continuously seal joined members by continuous welds.

G. Grind exposed joints flush and smooth with adjacent finish surface. Make exposed joints butt tight, flush, and hairline. Ease exposed edges to small uniform radius.

H. Exposed Mechanical Fastenings: Flush countersunk screws or bolts; unobtrusively located; consistent with design of component, except where specifically noted otherwise.

I. Supply components required for anchorage of fabrications. Fabricate anchors and related components of same material and finish as fabrication, except where specifically noted otherwise.

2.04 FABRICATED ITEMS

A. Miscellaneous Framing and Supports: Provide steel framing and supports for applications indicated that are not a part of structural steel scope as required to complete the Work. Fabricate units to sizes, shapes, and profiles indicated and required to receive adjacent construction. Fabricate from steel shapes, plates, and steel bars of welded construction using mitered joints for field connections. Cut, drill, and tap units to receive hardware, hangers, and

similar items. Equip units with integrally welded anchors for casting into concrete or building into masonry.

B. Slotted Channel Framing: Fabricate channels and fittings from structural steel complying with the referenced standards; factory-applied, rust-inhibiting thermoset acrylic enamel finish.

2.05 FINISHES - STEEL

A. Shop Primer: Shop prime painted for field finishing.
   1. Preparation:
      a. Prepare interior steel to be primed in accordance with SS PC-SP3 Power Tool Cleaning Standard.
      b. Clean surfaces of rust, scale, grease, and foreign matter prior to finishing.
   2. Prime Paint: One coat shop standard primer, 2 - 3 mils DFT.

2.06 FABRICATION TOLERANCES

A. Squareness: 1/8 inch maximum difference in diagonal measurements.

B. Maximum Offset Between Faces: 1/16 inch.

C. Maximum Misalignment of Adjacent Members: 1/16 inch.

D. Maximum Bow: 1/8 inch in 48 inches.

E. Maximum Deviation From Plane: 1/16 inch in 48 inches.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify that field conditions are acceptable and are ready to receive work. Coordinate all work with the work of other trades.

3.02 PREPARATION

A. Clean and strip primed steel items to bare metal where site welding is required.

B. Supply setting templates to the appropriate entities for steel items required to be cast into concrete or embedded in masonry.

C. Shearing and punching shall leave clean true lines and surfaces. Weld or rivet permanent connections. Welds and flush rivets shall be finished flush and smooth on surfaces that will be exposed after installation. Welds shall be continuous unless otherwise noted. Welds shall not have voids or pockets and shall be ground to provide smooth transitions between metal surfaces. Do not use screws or bolts where they can be avoided; where used, heads shall be countersunk, screwed up tight and threads nicked to prevent loosening.

D. Fastenings shall be concealed where practicable. Thickness of metal and details of assembly and supports shall give ample strength and stiffness. Joints exposed to weather shall be formed to exclude water. Provide holes and connections for the work of other trades.

E. Connections and accessories shall be adequate to safely sustain, withstand stresses, strains, to which they will be normally subjected.
   1. Connections to steel unless otherwise specified shall be steel.
   2. Bolts, nuts, screws for exterior work shall be electrogalvanized, unless otherwise noted.

F. Furnish all standard screws, bolts, washers, and other such fastening devices as are necessary for attaching this work to other materials. Anchors and other connecting devices required in concrete or masonry shall be built-in as the work progresses. NOTE: Special attention shall be given to the firm and secure anchoring of overhead mounted materials and equipment.

G. Do cutting, punching, drilling, tapping required for attachment of other work coming in contact with miscellaneous metal where so indicated or where directions for same are given prior to or with review of shop drawings.

H. Unless otherwise indicated, bolt, and screw heads shall be flat countersunk in exposed faces of ornamental or finished character; elsewhere as required. Cut off bolts, screws, etc., where

exposed, flush with nuts, or other adjacent metal. Except as otherwise required, weld shop-assembled connections; welds, bolts, or machine screws may be used for field connections. Form exposed connections with hairline joints, flush and smooth, using concealed fasteners where possible. Locate joints where least conspicuous. Exposed fastenings shall be the same materials, color, and finish as metal to which they apply, unless otherwise required.

I. Make up threaded connections tightly so that threads will be entirely concealed by fittings.

J. Allow for thermal movement resulting from a maximum temperature range change of 120 degrees F ambient and 180 degrees F surface by preventing buckling, opening up of joints, overstressing of components, failure of connections, and other detrimental effects. Base engineering calculation on surface temperatures of materials due to both solar heat gain and night time sky heat loss.

3.03 INSTALLATION

A. Install items plumb and level, accurately fitted, free from distortion or defects. All work shall be designed for adjustment to field variation, fitted with proper joints and intersections, adequately anchored in place.

B. Provide for erection loads, and for sufficient temporary bracing to maintain true alignment until completion of erection and installation of permanent attachments.

C. Perform field welding in accordance with AWS D1.1.

D. Obtain approval prior to site cutting or making adjustments not scheduled.

E. After erection, prime welds, abrasions, and surfaces not shop primed or galvanized, except surfaces to be in contact with concrete.

F. Install all supporting members, fastening, framing, hangers, bracing, brackets, straps, bolts, angles, and the like required to set, connect work rigidly and properly to structural steel, masonry, other construction.

G. Immediately after erection, clean field welds, bolted connections and abraded areas of shop paint, and paint exposed areas with the same materials as used for shop painting, complying with SSPC-PA1. Apply by brush or spray to provide a minimum 2 mil dry film thickness. Clean field welds, bolted connections and abraded areas of galvanized surfaces to comply with ASTM A780.

3.04 TOLERANCES

A. Maximum Variation From Plumb: 1/4 inch per story, non-cumulative.

B. Maximum Offset From True Alignment: 1/4 inch.

C. Maximum Out-of-Position: 1/4 inch.

END OF SECTION

SECTION 06 10 54
WOOD BLOCKING AND CURBING

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Fire retardant treatment of wood.

B. Preservative treatment of wood.

C. Isolation Strips (to separate preservative treated wood from metal surfaces).

D. Telephone and electrical panel boards, not specified as part of Division 26 - Electrical.

E. Concealed wood blocking for support of wall mounted items furnished by contractor and furnished by Owner, including, but not limited to: wall cabinets, wood trim, counters, door bumpers, and millwork items.

F. At existing roof penetrations scheduled for re-use the Contractor shall be responsible for carefully examining existing roof deck, blocking and curbing to remain, verifying that it is structurally sound and suitable for continued use and notifying the Architect upon the discovery of any conditions which suggest that existing materials may be rotted, checked, warped, termite infested, improperly installed or otherwise unsuitable for continued use. Materials found to be unsuitable for use in re-roofing shall be replaced.

1.02 REFERENCES

A. ASTM A153 - Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware; 2009.

B. AWPA U1 - Use Category System: User Specification for Treated Wood; 2013.

C. PS 1 - Structural Plywood, 2009.

D. PS 20 - American Softwood Lumber Standard; National Institute of Standards and Technology; 2010.

E. SPIB - Grading Rules; Southern Pine Inspection Bureau, Inc.; 2002 and supplements.

1.03 SUBMITTALS

A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.

B. Product Data: Provide technical data on wood preservative materials.

C. Certifications: Submit wood preservative treated manufacturer's certifications that treated materials comply with requirements. Indicate type of preservative used, net amount of preservative retained, and chemical treatment manufacturer's written instructions for handling, storing, installing and finishing treated materials.
   1. Submit verification of compliant moisture content for waterborne treated products.
   2. Submit warranties from chemical treatment manufacturers for each type of treatment.

D. Submit dimension lumber certificates indicating compliance with minimum allowable unit stresses. Indicate species and grade selected for each used and design values approved by the American Lumber Standards Committee Board of Review.

1.04 QUALITY ASSURANCE

A. Lumber: Comply with PS 20 and approved grading rules and inspection agencies.
   1. Acceptable Lumber Inspection Agencies: Any agency with rules approved by American Lumber Standards Committee. Inspection agencies shall include: NLGA, SPIB, WCLIB, WWPA. Lumber shall be piece factory-marked with agency grade stamp.
   2. Lumber of other species or grades, or graded by other agencies, is acceptable provided structural and appearance characteristics are equivalent to or better than products specified.

B. Plywood: Comply with PS 1.

C. Coordination with other Trades: Coordinate the locating of blocking, nailers and similar supports for finish materials, millwork, casework, finish carpentry, equipment, hardware and accessories, regardless of whether such items are Owner or Contractor furnished, so that the installation of finish work may be properly executed in compliance with the intended design requirements. Before starting installation of supports, carefully check all related shop drawings and submittals.

PART 2 PRODUCTS

2.01 GENERAL REQUIREMENTS

A. Lumber fabricated from old growth timber is not permitted.

2.02 DIMENSION LUMBER

A. Grading Agency: Southern Pine Inspection Bureau, Inc. (SPIB).

B. Nominal sizes as indicated on drawings, S4S, kiln dried.

C. Miscellaneous Blocking, Furring, Nailers, and Curbs:
   1. Lumber: S4S, No. 2 or Standard Grade.

2.03 PLYWOOD PANELS

A. Plywood Sheathing: PS-1 APA rated; Grade C-C, Exterior Exposure; plugged or better.

B. Miscellaneous Panels:
   1. Concealed Plywood: APA rated sheathing, PS-1, C-C Plugged or better, exterior grade, thickness as indicated.
   2. Exposed Plywood: PS-1, A-C or better, interior grade, thickness as indicated.
   3. Electrical Component Mounting: APA rated sheathing, PS-1, C-C Plugged, not less than 15/32 inch thickness; painted with fire-retardant paint.

2.04 ACCESSORIES

A. Fasteners and Anchors:
   1. Fastener Coatings:
      a. Hot-dipped galvanized steel per ASTM A 153/A 153M or AISI Type 304 stainless steel for exposed to weather or high humidity locations.
      b. AISI Type 304 stainless steel at preservative treated wood locations, as appropriate to suit job conditions.
   2. Anchors: Expansion shield and lag bolt type for anchorage to solid masonry or concrete. Expansion anchors shall conform to Federal Specification FF-S325.
      a. Anchors shall be capable of sustaining without failure, a load equal to 6 times the load imposed when installed in unit masonry assemblies and equal to 4 times the load Imposed when installed in concrete as determined by ASTM E488.
      b. Materials: Carbon-steel, zinc plated, ASTM B633, Class FE/Zn5, or Stainless-steel with bolts and nuts, ASTM F593 and ASTM F594, Alloy Group 1 or 2.
   3. Lag Screws and Lag Bolts: Shall conform to Federal Specification FF-B-561 and ASME B18.2.1.
   4. Power Driven Fasteners; Shall conform to National Evaluation Report NER-272.
   5. Nails and Staples: Shall conform to Federal Specification FS-N-105 and ASTM F1667.
   6. Bolts: Shall conform to Federal Specifications FF-B-571 and FF-B-575, ASTM A307, Grade A and ASTM A563 for hex nuts and flat washers.
   7. Ground Anchorage: Wood plugs or nailing blocks are not acceptable for fastening grounds, furring, etc. to concrete or masonry. Hardened steel nails, expansion screws, toggle bolts, metal plugs, or metal inserts, as most appropriate for each type of masonry or concrete construction shall be used.

2.05 FACTORY WOOD TREATMENT

A. Treated Lumber and Plywood: Comply with requirements of AWPA U1 - Use Category System for wood treatments determined by use categories, expected service conditions, and specific applications.
   1. Fire-Retardant Treated Wood: Mark each piece of wood with producer's stamp indicating compliance with specified requirements.
   2. Preservative-Treated Wood: Provide lumber and plywood marked or stamped by an ALSC-accredited testing agency, certifying level and type of treatment in accordance with AWPA standards.

B. Fire Retardant Treatment, Exterior Type: AWPA U1, Use Category UCFB, Commodity Specification H, chemically treated and pressure impregnated, capable of providing a maximum flame spread rating of 25 when tested in accordance with ASTM E84 and with no evidence of significant combustion when test is extended for an additional 20 minutes both before and after accelerated weathering test performed in accordance with ASTM D2898.
   1. Kiln dried after treatment to maximum moisture content of 19 percent for lumber and 15 percent for plywood.
   2. Provide fire-retardant treated wood products in the following locations:
      a. Wood lumber and plywood indicated to be Fire-Retardant Treated (F.R.T.) or Fire Retardant (F.R.) on the Drawings.

C. Preservative Pressure Treatment of Lumber Above Grade: AWPA U1, Use Category UC3B, Commodity Specification A using waterborne preservative to 0.25 lb/cu ft retention.
   1. Kiln dry after treatment to maximum moisture content of 19 percent.
   2. Provide preservative pressure treated wood products in the following locations:
      a. Wood in contact with roofing, flashing, or waterproofing.
      b. Wood in contact with masonry or concrete.
      c. Wood at locations as indicated to be P.T. on the Drawings.

D. Preservative Pressure Treatment of Plywood Above Grade: AWPA U1, Use Category UC2 and UC3B, Commodity Specification F using waterborne preservative to 0.25 lb/cu ft retention.
   1. Kiln dry plywood after treatment to maximum moisture content of 19 percent.
   2. Provide preservative pressure treated plywood products in the following locations:
      a. Plywood in contact with roofing, flashing, or waterproofing.
      b. Plywood in contact with masonry or concrete.
      c. Plywood at locations as indicated to be P.T. on the Drawings.

E. Restrictions: Do not use lumber or plywood treated with chromated copper arsenate (CCA) or creosote.

F. Isolation Strips: Self-adhering, polymer modified asphalt sheet, 40 mil thickness, with strippable release paper.
   1. Products:
      a. Vycor V40 Tape.
      b. Vycor Ice & Watershield.
      c. Perm-A-Barrier Wall Membrane by W.R. Grace.
      d. Substitutions: See Section 01 60 00 - Product Requirements.

PART 3 EXECUTION

3.01 INSTALLATION - GENERAL

A. Examine and correct any conditions detrimental to the proper and timely completion of the Work. Do not proceed until unsatisfactory conditions have been corrected. Set members level and plumb, in correct position.

B. Place horizontal members with crown side up.

C. Construct curb members of single pieces.

D. Space framing and furring members 16 inches o.c.

E. Curb roof openings except where prefabricated curbs are provided. Form corners by alternating lapping side members.

F. Coordinate curb installation with installation of decking and support of deck openings.

G. Provide miscellaneous members as indicated or as required to support finishes, fixtures, specialty items, and trim.

H. Cut out and discard all defects that will render a piece unable to serve its intended function. The Architect may reject lumber whether or not it has been installed, for excessive checking, warp, twist, bow, crook, mildew, fungus or mold as well as for improper cutting and fitting.

I. Securely attach rough carpentry work to substrate by anchoring and fastening complying with CABO NER-272 for power-driven fasteners, and fastening schedules in the International Building Code, unless otherwise indicated.

J. All preservative treated wood shall be separated from all aluminum and steel surfaces by use of flexible membrane isolation strips.

3.02 INSTALLATION OF PLYWOOD

A. Secure with long dimension perpendicular to framing members, with ends over firm bearing and staggered, using nails, screws, or staples.

B. Materials shall be applied according to recommendations of the American Plywood Association.

C. Install telephone and electrical panel back boards made of plywood or other acceptable structural panels at locations indicated. Size back boards to be minimum 48 inches beyond size of telephone and electrical panels or as indicated per the Drawings.

D. All preservative treated plywood shall be separated from all metal (coated and uncoated) by use of isolation strips.

3.03 INSTALLATION OF WOOD BLOCKING

A. Install all wood blocking as required to provide anchorage for other materials, fixtures, accessories, etc. Blocking shall be minimum 1-1/2" thick materials.

B. Wedge, anchor and align blocking to provide a rigid and secure installation of both blocking and other work related thereto.

C. All wall-mounted door stops and interior signage attached to gypsum wallboard surfaces shall have blocking within the supporting wall.

D. Attach items to substrates to support applied loading. Recess bolts and nuts flush with surfaces, unless otherwise indicated. Build anchor bolts into masonry during installation of masonry work wherever possible. Secure anchor bolts to formwork before concrete placement wherever possible.

E. All preservative treated wood blocking shall be separated from all metal (coated and uncoated) by use of isolation strips.

3.04 INSTALLATION OF ROOF BLOCKING

A. Roof blocking shall be installed in accordance with FM Loss Prevention Data 1-49. The following shall be considered the minimum requirements for anchoring roof blocking. Provide a minimum of two (2) anchors per length of each piece of blocking, and within six (6) inches of each end. The Contractor shall provide additional fasteners as needed to suit specific job conditions. Perimeter roof blocking shall be secured to decking, structural steel, spaced steel angles, or plates as described below unless indicated otherwise on the Drawings:

1. Roof blocking parallel to metal decking ribs: Secure blocking to joists or beams with 3/8" diameter bolts at no more than 4'-0" oc. Where joist or beam spacing is greater than 4'-0", bolt blocking to a continuous steel angle secured to the structure at maximum spacing of 4'-0" o.c. welded to the structure. As an alternative method, blocking may be secured to the deck with two rows of #10 stainless steel screws at twenty-four (24) inches o.c. with 5/8 inch diameter stainless steel washers.

2. Roof blocking perpendicular to metal decking ribs: Secure blocking to the deck with two rows of #10 stainless steel screws at twenty-four (24) inches o.c. with 5/8 inch diameter stainless steel washers.
3. Roof blocking anchored to masonry: Secure blocking with 1/2 inch diameter bolts, spaced a maximum of four (4) feet o.c., staggered if the blocking is wider than six (6) inches. Within eight (8) feet of building corners, provide bolts at two (2) feet o.c. Bolts shall be embedded in grouted masonry cells a minimum depth of eight (8) inches.
4. For nailing layers of blocking to each other, provide nails in two (2) rows, staggered with spacing not to exceed 12 inches o.c. within the row. Nails to secure blocking to other blocking shall be galvanized and shall be long enough to penetrate 1-1/4 inch minimum.

B. All curbs and blocking related to mechanical equipment and other roof mounted accessories shall be installed level and plumb and shall not necessarily follow the pitch of the roof, unless specifically indicated on the Drawings.

C. All preservative treated wood blocking shall be separated from all metals (coated and uncoated) surfaces by use of isolation strips.

3.05 SITE APPLIED WOOD TREATMENT

A. Apply preservative treatment compatible with factory applied treatment at site-sawn cuts, complying with manufacturer's instructions.

B. Allow preservative to dry prior to erecting members.

END OF SECTION

SECTION 06 20 00
FINISH CARPENTRY

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Custom woodwork items including but not limited to:
   1. Adjustable wall shelving hardware.

B. Hardware and attachment accessories.

1.02 RELATED REQUIREMENTS

A. Section 06 10 54 - Wood Blocking and Curbing: blocking.

B. Section 12 32 00 - Wood Casework: Shop fabricated cabinet work.

C. Section 12 36 00 - Countertops: Countertops and Loose Shelving.

1.03 REFERENCE STANDARDS

A. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials; 2014.

B. ANSI/BHMA A156.9 - American National Standard for Cabinet Hardware; 2010.

1.04 SUBMITTALS

A. See Section 01 30 00 - Administrative Requirements for submittal procedures.

B. Product Data:
   1. Provide manufacturer's technical information for all factory fabricated products, hardware, and accessories specified herein.
   2. Provide instructions for attachment hardware and finish hardware.

C. Shop Drawings: Indicate materials, elevations, construction, clearances, component profiles, fastening methods, jointing details, finishes, hardware locations and accessories.
   1. Minimum Scale of Detail Drawings: 1-1/2 inch to 1 foot.

1.05 QUALITY ASSURANCE

A. Fabricator Qualifications: Company specializing in fabricating the products specified in this Section with minimum five years of documented experience.
   1. Company with at least one project in the past 5 years with value of woodwork within 20 percent of cost of woodwork for this Project.

1.06 DELIVERY, STORAGE, AND HANDLING

A. Protect hardware and accessories during transit, delivery, storage and handling to prevent moisture and other damage, soiling and deterioration.

PART 2 PRODUCTS

2.01 FASTENINGS

A. Adhesives: Suitable for the purpose; no urea formaldehyde or volatile organic compounds.

B. Fasteners: Nails, screws and other anchoring devices of size, material, finish and type to suit application to provide secure attachment, concealed where possible; stainless steel or hot-dipped galvanized finish, complying with ASTM A153 in exposed locations of high humidity and at all exterior locations.

C. Concealed Joint Fasteners: Threaded steel.

2.02 HARDWARE

A. Hardware: BHMA A156.9. Basis of Design products indicated. For substitutions see Section 01 60 00 - Product Requirements.

B. Shelf Standards & Brackets:
   1. Super-duty; standards: 7/8" wide x 11/16" high x 14 gage cold rolled steel, single tracks, 2" slot spacing, back supported style, anochrome finish; bracket lengths as indicated on the Drawings. Note: one (1) bracket at each connection to standard location.
      a. Product: 87 Standard and 186/187 Bracket by Knape & Vogt (KV).
   2. Furnish anochrome #154 shelf fasteners and shelf rests (center and end as applicable).

C. Counter Support Bracket: Sizes as required for counter depth (8" to 29"). Spacing as indicated on the Drawings, but in no case greater than 36" apart.
   1. Finish: Powder coat finish. Color as selected from manufacturer's standard range.
   2. Flush mount (vertical support leg secured directly to stud and concealed behind gypsum board.
   3. Product: EH-1800 Series by Rakks.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify adequacy of backing and support framing.

B. Verify mechanical, electrical, and building items affecting work of this Section are placed and ready to receive this work.

C. See Section 06 54 10 - Wood Blocking and Curbing, for installation of concealed wood blocking.

3.02 INSTALLATION

A. Set and secure materials and components in place, plumb and level.

B. Carefully scribe work abutting other components, with maximum gaps of 1/32 inch. Do not use additional overlay trim to conceal larger gaps.

C. Adjustable Shelf Standard and Brackets for millwork shelving: Install standards at locations indicated on the Drawings, but in no case greater than 36 inches o.c. and within 6” of the ends of shelves. Screwed standards securely to blocking in the wall at a spacing recommended by the manufacturer for the shelf depth and load anticipated. Install brackets in standards at each shelf location.

3.03 TOLERANCES

A. Maximum Variation from True Position: 1/16 inch.

B. Maximum Offset from True Alignment with Abutting Materials: 1/32 inch.

3.04 CLEANING AND PROTECTION OF WORK

A. Erect and maintain temporary protective barriers until such time as permanent construction is in place and all danger of damage or defacement is past.

B. Repair damaged and defective woodwork, where possible to eliminate functional and visual defects. Where not possible to repair, replace woodwork. Clean woodwork on exposed and semi-exposed surfaces. Touch up shop applied finishes to restore damaged or soiled areas.

END OF SECTION

SECTION 07 21 00
THERMAL INSULATION

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Acoustic insulation in interior partitions.

B. Foam insulation sealant.

C. Adhesives, stick clips, tape, spring clips, etc.

1.02 RELATED REQUIREMENTS

A. Section 07 84 00 - Firestopping: Safing insulation.

B. Section 09 21 16 - Gypsum Board Assemblies: Partitions for acoustic insulation.

1.03 REFERENCE STANDARDS

A. ASTM C665 - Standard Specification for Mineral-Fiber Blanket Thermal Insulation for Light Frame Construction and Manufactured Housing; 2012.

B. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials; 2014.

C. ASTM E136 - Standard Test Method for Behavior of Materials in a Vertical Tube Furnace at 750 Degrees C; 2012.

1.04 SUBMITTALS

A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.

B. Product Data: Provide data on product characteristics, performance criteria, and product limitations.

C. Samples: Upon request, submit samples of each type of materials to be used.

1.05 PROTECTION, HANDLING AND STORAGE

A. Protect plastic insulation from exposure to sunlight, except as necessary for period of installation and concealment. Protect plastic insulation against ignition at all times. Do not deliver plastic insulation materials before installation time. Complete installation and concealment of plastic materials as quickly as possible.

PART 2 PRODUCTS

2.01 BATT INSULATION MATERIALS

A. Glass Fiber Batt Insulation: ASTM C665; flexible preformed batt or blanket, friction fit; minimum 25% recycled content.
   1. Flame Spread Index, ASTM E84: 25 or less.
   2. Smoke Developed Index, ASTM E84: 450 or less.
   3. Combustibility: Non-combustible, when tested in accordance with ASTM E136.
   4. Formaldehyde Content: Zero.
   5. Thickness for acoustic insulation: 6 inches.
   6. Facing for acoustic: Unfaced.
   7. Product for acoustic insulation:
      a. Sound Shield Free by Johns Manville.
      b. EcoBatt by Knauf.
   8. Substitutions: See Section 01 60 00 - Product Requirements.

2.02 FOAM INSULATION

A. Foam Insulation Sealant: Expanding, low VOC, HCFC-free, urethane foam sealant
   1. Products:

a. Pur Fil IG 750 Foam by Todol Products, Inc.
b. Great-stuff Pro by Dow Chemical Co.
c. Substitutions: See Section 01 60 00 - Product Requirements.

2.03 ACCESSORIES

A. Fasteners and Adhesive: As recommended by the insulation manufactures and as approved by Factory Mutual, material manufacturers, and related codes where applicable. In general, adhesives and fasteners shall be "Construction Grade", corrosion resistant stainless steel or galvanized, as suitable for damp locations.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify that substrate, adjacent materials, and insulation materials are dry and that substrates are ready to receive insulation.

B. Verify substrate surfaces are flat, free of honeycomb, fins, irregularities, or materials or substances that may impede adhesive bond.

3.02 ACOUSTIC BATT INSTALLATION

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

B. Install acoustic insulation between studs and other materials. Friction fit to prevent sliding and sagging. Provide additional clips and fasteners as required.

C. Trim insulation neatly to fit spaces. Insulate miscellaneous gaps and voids.

D. Fit insulation tightly in cavities and tightly behind mechanical and electrical services within the plane of the insulation.

E. All batt insulation shall be isolated from occupiable building spaces by a sealed fire retardant vapor barrier, gypsum board or other approved finish. Exposed insulation shall not be permitted in habitable areas.

3.03 FOAM INSULATION INSTALLATION

A. Install foam insulation continuously to completely fill all gaps and voids at insulation boards, at voids in deck flutes, at voids around window and door frames, and at locations as indicated on the Drawings.

B. Install foam insulation following manufacturer's instructions and recommendations. Exercise caution not to overfill voids. Insulation shall be permitted to expand without causing the deflection of adjacent materials. Use non-expanding foam at perimeters of doors and windows.

3.04 PROTECTION

A. Do not permit installed insulation to be damaged prior to their concealment. Provide temporary coverings, or enclosures where insulation is subject to abuse and cannot be concealed and protected by permanent construction immediately after installation.

END OF SECTION

SECTION 07 62 00
SHEET METAL FLASHING AND TRIM

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Fabricated sheet metal items, including flashings and counterflashings required for the re-use of existing roof curbs and penetrations.

B. Reglets and accessories.

1.02 RELATED REQUIREMENTS

A. Section 06 10 54 - Wood Blocking and Curbing: Wood blocking for metal flashings.

1.03 REFERENCE STANDARDS

A. AAMA 2603 - Voluntary Specification, Performance Requirements and Test Procedures for Pigmented Organic Coatings on Aluminum Extrusions and Panels; 2013.

B. AAMA 2605 - Voluntary Specification, Performance Requirements and Test Procedures for Superior Performing Organic Coatings on Aluminum Extrusions and Panels; 2013.

C. ASTM B209 - Standard Specification for Aluminum and Aluminum-Alloy Sheet and Plate; 2010.

D. ASTM B209M - Standard Specification for Aluminum and Aluminum-Alloy Sheet and Plate [Metric]; 2010.

E. SMACNA - Architectural Sheet Metal Manual; 2012.

1.04 ADMINISTRATIVE REQUIREMENTS

A. Preinstallation Meeting: Convene at least two weeks before starting work of this Section.

1.05 PERFORMANCE REQUIREMENTS

A. General: Install flashings that are watertight; will not permit the passage of liquid water; and will withstand wind loads, thermally induced movement, and exposure to weather without failure.

B. Material Compatibility: Provide roofing materials that are compatible with one another under conditions of service and application required, as demonstrated by roofing system manufacturer based on testing and field experience.

1.06 SUBMITTALS

A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.

B. Shop Drawings: Indicate material profile, jointing pattern, jointing details, fastening methods, flashings, terminations, and installation details. Key into roof plan shop drawing, see roofing Section.

C. Samples:
   1. Submit samples each 4x4 inch in size, illustrating metal materials, thickness, and colors.

1.07 QUALITY ASSURANCE

A. Perform work in accordance with SMACNA 1793 and CDA CA4050 requirements and standard details, except as otherwise indicated.

B. Fabricator and Installer Qualifications: Company specializing in sheet metal work with ten years of documented experience.

1.08 DELIVERY, STORAGE, AND HANDLING

A. Stack material to prevent twisting, bending, and abrasion, and to provide ventilation. Slope metal sheets to ensure drainage.

B. Prevent contact with materials that could cause discoloration or staining.

1.09 WARRANTY

A. The flashing and roofing subcontractor hereby guarantees that roof metalwork, flashings, roofing, roof insulation and roof accessories will be free from defective materials and workmanship for a period of two (2) years from the date of Substantial Completion. Upon notification of any such defects within said guarantee period the roofing and flashing subcontractor shall promptly make all necessary repairs and replacements at no cost or expense to the Owner. This warranty shall be signed and countersigned by the installer (Roofer) and the Contractor.

B. Metal Flashings Warranty under Roofing Manufacturer's Total System Warranty: Conform to existing roof system warranty requirements. Prior to start of work and upon completion of work the contractor shall engage an authorized manufacturer representative of the existing roof system to confirm, inspect and verify all work to be in compliance with existing warrantees. Submit manufacturer field reports and guarantees by the existing roof system manufacturer that all such scope of work including but not limited to installation, materials and design meet current manufacturer warranty requirements.

C. Pre-finished Aluminum: Finish shall be warranted against premature failure for twenty (20) years.

PART 2 PRODUCTS

2.01 MATERIALS

A. Pre-Finished Aluminum: ASTM B209; 0.032 inch thickness or as otherwise indicated; plain finish shop pre-coated with fluoropolymer coating.
   1. Fluoropolymer Coating: High Performance Organic Finish, AAMA 2604; multiple coat, thermally cured fluoropolymer finish system; Kynar or Duranar by PPG.
   2. Color: As selected by Architect from manufacturer's standard colors.
   3. For Total System Warranty projects, metalwork shall be as approved by the membrane roofing manufacturer.

2.02 ACCESSORIES

A. Primer: Zinc chromate type.

B. Protective Backing Paint: Zinc molybdate alkyd.

C. Reglets: Surface mounted type, galvanized steel; face and ends covered with plastic tape.

D. Fasteners for Aluminum: Stainless steel ring nails; 12 gage with 1/4" diameter, flat head, annular threaded, needle point, length as required to obtain 1-1/4" embedment into blocking/framing and full depth into plywood.

E. Anchors for Flashing to Concrete or Masonry: 1/4" diameter, lengths as required to obtain 1-1/2" penetration into masonry backup. Unless otherwise indicated, provide 3 inch edge distance.
   1. Product: Nylon Nail-in with stainless steel drive pin manufactured by Powers Fasteners Inc.

F. Sealant: Silicone specified in Section 07 90 05. Use for aluminum flashing joint seal.

G. Plastic Cement: ASTM D 4586, Type I.

2.03 FABRICATION

A. Form sections true to shape, accurate in size, square, and free from distortion or defects. Form on a bending brake. Perform shaping, trimming, and hand seaming in the shop to the maximum extent possible.

B. Form pieces in longest possible lengths.

C. Hem exposed edges on underside 1/2 inch; miter and seam corners.

D. Form material with flat lock seams, except where otherwise indicated. At moving joints, use sealed lapped, bayonet-type or interlocking hooked seams. Form metal with full regard for

expansion and contraction to avoid buckling or other deformation in service. All lines and arrisses shall be straight and crisp except where thickness of metal dictates radius bend.

E. Fabricate corners from one piece with minimum 18 inch long legs; seam for rigidity, seal with sealant.

F. Fabricate vertical faces with bottom edge formed outward 1/4 inch and hemmed to form drip.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify roof openings, curbs, pipes, sleeves, ducts, and vents through roof are solidly set, reglets in place, and nailing strips located.

B. Verify roofing termination and base flashings are in place, sealed, and secure.

3.02 PREPARATION

A. Install starter and edge strips, and cleats before starting installation.

B. Install surface mounted reglets true to lines and levels. Seal top of reglets with sealant.

C. Back paint concealed metal surfaces with protective backing paint to a minimum dry film thickness of 15 mil.

3.03 GENERAL REQUIREMENTS FOR METAL FLASHING

A. Install sheet metal flashing and trim to withstand wind loads, structural movement, thermally induced movement, and exposure to weather, without failing. Fabricate and install flashings and roof edges to fully comply with the recommendations of Factory Mutual (FM) Loss Prevention Data Sheet 1-49 for the applicable wind zone.

B. Schedule and coordinate sheet metal installations with the work of other trades where it is integral or continuous therewith. Materials furnished under this Section that are to be built-in by other trades shall be delivered to the site in sufficient time to avoid delays to construction progress. Instruct other trades concerning the location and placement of reglets, wood nailers, and cleats.

C. Surfaces to which roofing and sheet metal are to be applied shall be even, smooth, sound, thoroughly clean and dry and free from projecting nail heads or other defects that would affect the application. Report in writing any unsatisfactory surfaces to the Contractor.

D. Where flashing abuts or members into adjacent dissimilar metals, the juncture shall be executed in a manner that will facilitate drainage and thus minimize the possibility of galvanic action. Note: All metalwork shall be isolated from contact with pressure treated wood products, using roofing membrane, felts, or approved coatings.

E. All accessories or other items essential to the completeness of the sheet metal installation, though not specifically shown or specified, shall be provided. All such items, unless otherwise indicated on Drawings or specified, shall be of the same kind of material as the item to which applied and the gauges shall conform to recognized industry standards of sheet metal practice.

F. Fabricate and install sheet metal with lines, arises, and angles sharp and true and plane surfaces free from objectionable wave, warp, or buckle. Exposed edges of sheet metal shall be folded back to form a 1/2" wide hem on the side concealed from water leakage under all weather conditions. The workmanship and methods employed for framing, anchoring, cleating, and the expansion and contraction of sheet metal work shall conform to applicable details and description as indicated in current edition of the following publications unless other methods are indicated on project Drawings or specified herein.

1. Architectural Sheet Metal Manual as published by the Sheet Metal and Air Conditioning Contractors National Association, Inc., and hereinafter referred to as "The SMACNA Manual".

G. All ferrous metal work shall be zinc coated and finished as specified elsewhere herein. Touch-up all field cuts and minor scratches with approved zinc rich primer and finish coat to match adjacent finishes.

H. All metal work terminating on roofing shall be provided with flanges for nailing. Wood nailers shall be provided beneath flanges and roofing for nailing of the metal flanges.

I. Flash intersections of roofs with vertical surfaces as detailed and indicated on the Drawings, or otherwise required to provide watertight construction and to suit job conditions.

J. Seams shall always be made in direction of flow.

3.04 INSTALLATION

A. Conform to drawing details. Installations shall conform to SMACNA Architectural Sheet Metal Manual recommendations and National Roofing Association Manual recommendations.

B. Insert flashings into reglets to form tight fit. Secure in place with lead wedges. Pack remaining spaces with lead wool. Seal flashings into reglets with sealant.

C. Secure flashings in place using concealed fasteners. Use exposed fasteners only where permitted.

D. Apply plastic cement compound between metal flashings and felt flashings.

E. Fit flashings tight in place. Make corners square, surfaces true and straight in planes, and lines accurate to profiles.

F. Seal metal joints watertight.

3.05 FIELD QUALITY CONTROL

A. See Section 01 40 00 - Quality Requirements, for field inspection requirements.

B. Inspection will involve surveillance of work during installation to ascertain compliance with specified requirements.

3.06 CLEANING AND PROTECTION

A. Clean all metalwork to remove all fingerprints, oils, etc.

B. Remove from roof surfaces all scraps and metal debris immediately. Extreme care shall be exercised to prevent sharp metal scraps or waste nails from coming into contact with membrane materials.

END OF SECTION

SECTION 07 81 00
APPLIED FIREPROOFING

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Patch & repair of existing fireproofing of interior structural steel.

1.02 REFERENCE STANDARDS

A. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials; 2014.

B. ASTM E605 - Standard Test Methods for Thickness and Density of Sprayed Fire-Resistive Material (SFRM) Applied to Structural Members; 1993 (Reapproved 2011).

C. ASTM E736 - Standard Test Method For Cohesion/Adhesion of Sprayed Fire-Resistive Materials Applied to Structural Members; 2000 (Reapproved 2011).

D. ASTM E759 - Standard Test Method for Effect of Deflection on Sprayed Fire-Resistive Material Applied to Structural Members; 1992 (Reapproved 2011).

E. ASTM E760 - Standard Test Method for Effect of Impact on Bonding of Sprayed Fire-Resistive Material Applied to Structural Members; 1992 (Reapproved 2011).

F. ASTM E937 - Standard Test Method for Corrosion of Steel by Sprayed Fire-Resistive Material (SFRM) Applied to Structural Members; 1993 (Reapproved 2011).

G. ASTM G21 - Standard Practice for Determining Resistance of Synthetic Polymeric Materials to Fungi; 2009.

H. UL - Fire Resistance Directory; Underwriters Laboratories Inc.; current edition.

1.03 ADMINISTRATIVE REQUIREMENTS

A. Coordinate with placement of ceiling hanger tabs, mechanical component hangers, and electrical components.

B. Pre-installation Meeting: Convene one week before starting work of this Section.

1.04 SUBMITTALS

A. See Section 01 30 00 - Administrative Requirements, for submittals procedures.

B. Product Data: Provide data indicating product characteristics.

C. Test Reports: Independent testing agency reports for proposed products, indicating compliance with specified criteria, conducted under conditions similar to those on project, for:
   1. Bond Strength.
   2. Bond Impact.
   3. Compressive Strength.
   4. Fire tests using substrate materials similar those on Project.

D. Manufacturer's Installation Instructions: Indicate special procedures.

E. Manufacturer's Certificate: Certify that sprayed-on fireproofing products meet or exceed requirements of contract documents.

F. Manufacturer's Field Reports: Indicate environmental conditions under which fireproofing materials were installed. Certify each fireproofing product is fully compatible with existing fireproofing, adhesives, primers, and other surface coatings on substrates intended to receive fireproofing.

1.05 QUALITY ASSURANCE

A. Manufacturer Qualifications: Company specializing in manufacturing products specified in this Section, with not less than ten years of documented experience.

B. Installer Qualifications: Company specializing in performing work of the type specified in this section, and:
   1. Having minimum five years of documented experience.
   2. Approved by manufacturer.

1.06 REGULATORY REQUIREMENTS

A. Environmental Compliance: Provide fireproofing products containing no detectable asbestos as determined according to the method specified in 40 CFR Part 763, Subpart F, Appendix A, Section 1, Polarized Light Microscopy.

1.07 DELIVERY, STORAGE AND PROTECTION

A. Delivery: Materials shall be delivered in original sealed containers, clearly marked with suppliers name, brand name and type of material, and bearing U.L. label.

B. Storage and Handling: Materials shall be stored off the ground and protected from the weather, in strict compliance with the manufacturer's recommendations.

1.08 FIELD CONDITIONS

A. Do not apply spray fireproofing when temperature of substrate material and surrounding air is below 40 degrees F or when temperature is predicted to be below said temperature for 24 hours after application.

B. Provide ventilation in areas to receive fireproofing during application and 24 hours afterward, to dry applied material.

C. Provide temporary enclosure to prevent spray from contaminating air.

1.09 WARRANTY

A. See Section 01 78 00 - Closeout Submittals, for additional warranty requirements.

B. Correct defective Work within a five year period after Date of Substantial Completion.
   1. Include coverage for fireproofing to remain free from cracking, checking, dusting, flaking, spalling, separation, and blistering.
   2. Reinstall or repair failures that occur within warranty period.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Sprayed-On Fireproofing:
   1. Carboline Company
   2. Grace Construction Products
   3. Isolatek International Inc
   4. Substitutions: See Section 01 60 00 - Product Requirements.

2.02 FIREPROOFING ASSEMBLIES

A. Provide fire-resistance ratings equivalent to existing assemblies as required for completion of scope of work.

2.03 MATERIALS

A. Sprayed Fire-Resistive Material for Interior Applications: Manufacturer's standard factory mixed material, which when combined with water is capable of providing the indicated fire resistance.
   1. Bond Strength, ASTM E736: 150 psf, minimum, when set and dry.
   2. Effect of Impact on Bonding, ASTM E760: No cracking, spalling or delamination.
   3. Corrosivity, ASTM E937: No evidence of corrosion.
   4. Surface Burning Characteristics, ASTM E84: Maximum flame spread of 0 and maximum smoke developed of 0.
   5. Effect of Deflection, ASTM E759: No cracking, spalling, or delamination'
   6. Fungal Resistance: No growth after 28 days when tested according to ASTM G21.
   7. Products:

a. Provide any product, as recommended by the approved manufacturer's, compatible with the existing spray fire-resistive materials and substrates meeting the required assembly ratings in the field.
b. Substitutions: See Section 01 60 00 - Product Requirements.

2.04 ACCESSORIES

A. Primer Adhesive: Of type recommended by fireproofing manufacturer.

B. Water: Clean, potable.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify that surfaces are ready to receive fireproofing.

B. Verify that clips, hangers, supports, sleeves, and other items required to penetrate fireproofing are in place.

C. Verify that ducts, piping, equipment, or other items that would interfere with application of fireproofing have not been installed.

D. Verify that voids and cracks in substrate have been filled. Verify that projections have been removed where fireproofing will be exposed to view as a finish material.

3.02 PREPARATION

A. Perform tests as recommended by fireproofing manufacturer in situations where adhesion of fireproofing to substrate is in question.

B. Remove incompatible materials that could affect bond by scraping, brushing, scrubbing, or sandblasting.

C. Prepare substrates to receive fireproofing in strict accordance with instructions of fireproofing manufacturer.

D. Apply fireproofing manufacturer's recommended bonding agent on primed steel.

E. Protect surfaces not scheduled for fireproofing and equipment from damage by overspray, fall-out, and dusting.

F. Close off and seal duct work in areas where fireproofing is being applied.

3.03 APPLICATION

A. Apply primer adhesive in accordance with manufacturer's instructions.

B. Apply fireproofing in thickness and density necessary to achieve required ratings, with uniform density and texture.

3.04 FIELD QUALITY CONTROL

A. The Owner' s testing and inspection agency shall test and inspect fireproofing after application and curing, prior to its concealment.

B. Testing agency shall report test results promptly and in writing to the Contractor, Owner, and Architect.

C. Repair or replace fireproofing within areas where test results indicate fireproofing does not comply with requirements.

D. Apply additional fireproofing per manufacturer's directions where test results indicate that the thickness does not comply with specified requirements.

E. Where fireproofing is removed and replaced or repaired, additional testing will be performed to determine compliance with specified requirements. Any re-tests for areas not in compliance shall be paid for by the Contractor.

3.05 CLEANING

A. Remove excess material, overspray, droppings, and debris.

B. Remove fireproofing from materials and surfaces not required to be fireproofed.

C. At exposed fireproofing, clean surfaces that have become soiled or stained, using manufacturer's recommended procedures.

D. Remove overspray from piping, electrical devices, ductwork, etc. All floor areas shall be broom cleaned.

END OF SECTION

SECTION 07 84 00
FIRESTOPPING

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Firestopping systems.

B. Firestopping of all penetrations and interruptions to fire rated assemblies, smoke barriers, non-fire rated floor assemblies, whether indicated on drawings or not, and other openings indicated.

C. Identification signage.

1.02 RELATED REQUIREMENTS

A. Section 09 21 16 - Gypsum Board Assemblies: Gypsum wallboard fireproofing.

B. Division 21 - Fire Protection: Firestopping of fire protection work.

C. Division 22 - Plumbing: Firestopping of plumbing work.

D. Division 23 - HVAC: Firestopping of heating, ventilating and air conditioning work.

E. Division 26 - Electrical: Firestopping of electrical work.

1.03 REFERENCE STANDARDS

A. ASTM E119 - Standard Test Methods for Fire Tests of Building Construction and Materials; 2012.

B. ASTM E814 - Standard Test Method for Fire Tests of Penetration Firestop Systems; 2013a.

C. ASTM E1966 - Standard Test Method for Fire Resistive Joint Systems; 2007 (Reapproved 2011).

D. ASTM G21 - Standard Practice for Determining Resistance of Synthetic Polymeric Materials to Fungi; 2009.

E. ITS - Directory of Listed Products; Intertek Testing Services NA, Inc.; current edition.

F. FM P7825 - Approval Guide; Factory Mutual Research Corporation; current edition.

G. SCAQMD 1168 - South Coast Air Quality Management District Rule No.1168; current edition; www.aqmd.gov.

H. UL - Fire Resistance Directory; current edition.

1.04 DEFINITIONS

A. Annular Space is the opening around an item (pipe, duct, etc.) penetrating a construction assembly.

B. Fire-resistance is the property of materials or their assemblies that prevents or retards the passage of excessive heat, hot gases, or flames under conditions of use.

C. Fire-resistive joint system is the assemblage of specific materials or products that are designed, tested and fire-resistance rated in accordance with ASTM E-119 to resist for a prescribed period of time the spread of fire through joints in or between fire-resistance rated assemblies.

D. Firestopping is a specific assembly of materials or products fill openings and annular spaces around penetrating items (such as cables, cable trays, conduits, ducts, pipes) and their means of support through the wall, floor, ceiling or roof to prevent spread of fire and includes fire-resistive joint systems and through-penetration firestop systems.

E. Through-penetration is an opening that passes entirely through a fire-resistance rated assembly.

F. Through-penetration firestop system is a specific assembly of materials that are designed, tested and installed to prevent the spread of fire through openings in fire-resistive rated floors

and walls to accommodate through-penetrations of electrical, mechanical, plumbing, and communications systems.

G. "F" rating indicates the period of time that the through-penetration firestop system is capable of preventing the passage of flame to the unexposed (non-fire) side of the assembly in conjunction with an acceptable hose stream test performance.

H. "T" rating indicates the period of time that the through-penetration firestop system is capable of preventing the passage of flame and temperature rise of 325 degrees F. above ambient temperature on the unexposed (non-fire) side of the assembly in conjunction with an acceptable hose stream test performance.

1.05 SUBMITTALS

A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.

B. Schedule of Firestopping: List each type of penetration, fire rating of the penetrated assembly, and firestopping test or design number.

C. Shop Drawings: Submit manufacturer's illustrated test assembly shop drawings detailing materials, installation methods, and relationships to adjoining construction for each through-penetration firestop system and fire-resistant joint system, each construction condition and type of penetration or joint. Include firestop design designation from the approved testing agency (UL, for example).

1. For those firestop applications for which no tested system is available from the manufacturer, the manufacturer's engineering judgment derived from similar tested system designs or other tests shall be submitted to the Authority Having Jurisdiction for their review and approval prior to installation.

D. Product Data: Provide data on product characteristics, performance ratings, and limitations.

E. Manufacturer's Installation Instructions: Indicate preparation and installation instructions.

1.06 QUALITY ASSURANCE

A. Single Source: If the Contractor determines that individual trades (i.e. mechanical, plumbing, fire protection, electrical) shall be responsible for firestopping their penetrations, instead of all firestopping provided by a single contractor, products used shall be coordinated among the various trades by the Contractor so that multiple products or manufacturers are NOT used for the same type of application.

B. Fire Testing: Provide firestopping assemblies of designs that provide the scheduled fire ratings when tested in accordance with methods indicated.

1. Listing in the current-year classification or certification books of UL, FM, or ITS (Warnock Hersey) will be considered as constituting an acceptable test report.
2. Valid evaluation report published by ICC Evaluation Service, Inc. (ICC-ES) at www.icc-es.org will be considered as constituting an acceptable test report.
3. For those firestop applications that exist for which no approved tested system is available through a manufacturer, an engineered judgment derived from similar system designs or other approved tests shall be submitted to the local Authority Having Jurisdiction for review and approval prior to installation. Engineering judgment drawings shall follow requirements set forth by the International Firestop Council.

C. Manufacturer Qualifications: Company specializing in manufacturing the products specified in this Section with minimum ten years documented experience.

D. Installer Qualifications: Company or personnel specializing in performing the work of this Section, trained by the manufacturer(s) and with a minimum of 3 years documented experience installing work of this type.

1.07 FIELD CONDITIONS

A. Comply with firestopping manufacturer's recommendations for temperature and conditions during and after installation. Maintain minimum temperature before, during, and for 3 days after installation of materials.

B. Provide ventilation in areas where solvent-cured materials are being installed.

PART 2 PRODUCTS

2.01 FIRESTOPPING - GENERAL REQUIREMENTS

A. Firestop: All products shall be by one of the following acceptable manufacturers and shall be specific for each construction condition, fire-resistance requirement, and annular size. Multiple products shall not be used for the same application. Products shall include intumescent latex sealant, intumescent spray-applied coatings, fire-resistive elastomeric sealants, intumescent putty, intumescent wrap strips, job-mixed fire-resistive vinyl compound, mortar, and heat expanding pillows/bags.

B. Provide firestopping composed of components that are compatible with each other, the substrates forming openings, and the items, if any, penetrating the firestopping under conditions of service and application, as demonstrated by the firestopping manufacturer based on testing and field experience.

C. Manufacturers:
   1. 3M Fire Protection Products.
   2. Hilti, Inc.
   3. Tremco.
   4. BioShield.
   5. Metacaulk - RectorSeal Corp
   6. Substitutions: See Section 01 60 00 - Product Requirements.

D. Firestopping Materials with Volatile Content: Provide only products having lower volatile organic compound (VOC) content than required by South Coast Air Quality Management District Rule No.1168.

E. Mold Resistance: Provide firestoppping materials with mold and mildew resistance rating of 0 as determined by ASTM G21.

F. Primers, Sleeves, Forms, Insulation, Packing, Stuffing, and Accessories: Type required for tested assembly design.

G. Fire Ratings: See Drawings for required systems and ratings.

2.02 FIRESTOPPING SYSTEMS

A. Firestopping: Any material meeting requirements.
   1. Fire Ratings: Use any system listed by UL or tested in accordance with ASTM E 814 or ASTM E 119 that has F Rating equal to fire rating of penetrated assembly and minimum T Rating of 20 and that meets all other specified requirements.
   2. Fire Ratings: See Drawings for required assembly fire ratings.

2.03 RELATED MATERIALS

A. Elastomeric Silicone Firestopping: Multiple component silicone elastomeric compound and compatible silicone sealant; joint movement anticipated; conforming to the following:
   1. Elongation: +/- 40 percent of joint width.
   2. Products:
      a. Fire Barrier Silicone 2000 by 3M Fire Protection Products.
      b. CP601S by Hilti, Inc.
      c. Biotherm 100 by BioFireshield.
      d. Metacaulk 835+ by RectorSeal Inc.

B. Spray-on Firestopping: Single component, water-based coating for sprayed-on applications, primarily head of wall joints, conforming to the following:
   1. Elongation: +/- 25 percent.
   2. Products:
      a. FireDam Spray by 3M Fire Protection Products.
      b. CP 672 by Hilti, Inc.

c. Metacaulk 1100 by RectorSeal Inc.
d. Biostop 700 by BioFireshield.

C. Foam Firestopping: Single component foam compound; conforming to the following:
1. Products:
a. RTV Foam by 3M Fire Protection Products
b. CP620 by Hilti, Inc

D. Fibered Compound Firestopping: Formulated compound mixed with incombustible non-asbestos fibers; field mixed with water; conforming to the following:
1. Products:
a. CP636 Firestop Mortar by Hilti, Inc.
b. Fire Barrier Mortar by 3M.
c. Metacaulk Fire Rated Mortar by RectorSeal.
d. Bioshield K-10+ Mortar by BioFireshield.

E. Fiber Firestopping Insulation (Safing Insulation): Mineral fiber batt, unfaced insulation used in conjunction with elastomeric surface sealer forming airtight bond to opening; conforming to ASTM C 665 Type 1.
1. Density, ASTM D 1622: 4 lb/cu ft min.
2. Max. Water Absorption, ASTM C 272: 0.1% by volume.
3. Durability and Longevity: Permanent.
4. Fire Resistance, ASTM E84: Flame spread: 15; Smoke Developed: 0.
5. Manufacturer's "Z" impaling clips as required
6. Products:
a. Thermafiber by United States Gypsum Co.
b. Safing Insulation / MW by Owens Corning Insulation.
c. FBX Safing Insulation by Fibrex Insulations, Inc.
d. Safe by Roxul Inc.

F. Firestop Devices - Wrap Type: Mechanical device with incombustible filler, intended to be installed after penetrating item has been installed; conforming to the following:
1. Products:
a. Duct Wrap, Collars, Plenum Wrap by 3M Fire Protection Products
b. Fire Barrier Cast-in Device by 3M Fire Protection Products

G. Intumescent Putty: Compound that expands on exposure to surface heat gain; conforming to the following:
1. Products:
a. Moldable Putty by 3M Fire Protection Products.
b. Biostop Fire Rated Putty by BioFireshield.

H. Reusable Firestopping: Removable intumescent compressible shapes, pillows, or blocks specifically tested in removable configuration; conforming to the following:
1. Products:
a. CP651 Cushions, CP657 Brick, CP658 Plugs by Hilti, Inc.
b. Metacaulk Pillows by RectorSeal.
c. Bio Firestop Pillows by BioFireshield.
d. 3M Fire Protection Products; Product Fie Barrier Pillows.

I. Sleeves for through-penetrations shall be of non-combustible materials and securely fastened to the assembly penetrated.

J. Identification Signage: Pressure sensitive self-adhesive, preprinted vinyl labels; including the following information on labels:
1. "Warning - Through Penetration Firestop System - Do Not Disturb. Notify Building Management of Any Damage."
2. Contractor's name, address, phone number.
3. Firestop system designation of applicable testing and inspecting agency (UL or WH).
4. Date of installation.

5. Firestop system manufacturer's name.
6. Installer's name.

PART 3 EXECUTION

3.01 CONDITIONS REQUIRING FIRESTOP MATERIALS

A. General:
   1. Provide firestopping for conditions specified whether or not firestopping is indicated on the Drawings. It is intended that firestopping shall be provided at all fire-resistive assemblies and at all floor assemblies as required by applicable laws and codes.
   2. Insulation types specified in other Sections other than fiber firestopping insulation, shall not be installed in lieu of firestopping material specified herein, unless specified as a component of a tested fire-resistive joint assembly or a through-penetration firestop assembly.

B. Building Exterior Perimeters:
   1. Where exterior facing construction passes continuously by the structural floor system creating a void between, provide firestopping equal to a minimum of one hour or the fire-resistance rating of the ceiling/floor assembly, whichever is greater per the firestopping manufacturer's tested assembly.
   2. Firestopping shall be provided whether or not there are any continuous or discontinuous clips, angles, plates, or other members bridging or interconnecting the facing and floor systems.
   3. Firestopping shall be provided at all joints and openings in and through-penetrations at exterior fire-resistive wall construction.
   4. Firestopping shall be provided where an exterior wall passes by perimeter structural members and the finish on the interior face of the wall does not continue up to close to the underside of the structural floor deck above, thus interrupting the fire-resistive integrity of the wall system. The space between the interior face of the wall and lower edge of the structural member shall be firestopped to continuously fill such open space.

C. Interior Walls and Partitions:
   1. Provide firestopping at all voids between floor assemblies and walls or partitions extending continuously past the floor assembly (shafts, stairwells, etc.). Provide firestopping whether or not there are any clips, angles, plates or other members bridging or interconnecting the wall and floor systems, and whether or not such items are continuous.
   2. Provide firestopping at all voids where the top edge of a fire-resistant wall abuts decking.
   3. Provide firestopping at all construction joints, cracks, structural member penetrations, mechanical or electrical equipment penetrations, and any other openings in fire-resistant construction.

D. Penetrations:
   1. Penetrations include sleeves, conduits, cables, wires, piping, ducts, expansion joints, structural members, or other elements that pass through one or both outer surfaces of fire-resistive floors, roofs, partitions, or walls, and all floor assemblies.

E. Floors:
   1. Except for concrete slabs-on-grade, firestop all penetrations through floors in accordance with tested assemblies.
   2. Through-penetration firestop systems shall have "F" and "T" ratings of not less than 1-hour except that "T" ratings are not required at floor penetrations contained within a wall cavity and where such penetrations are not in contact with combustible materials.
   3. Provide firestopping to fill miscellaneous voids and openings in fire-resistant construction in a manner essentially the same as specified above.

3.02 EXAMINATION

A. Verify openings are ready to receive the work of this Section.

3.03 PREPARATION

A. Clean substrate surfaces of dirt, dust, grease, oil, loose material, or other matter that could adversely affect bond of firestopping material.

B. Remove incompatible materials that could adversely affect bond.

3.04 INSTALLATION

A. Install materials in manner described in fire test report and in accordance with manufacturer's instructions, completely closing openings.

B. Coordinate with mechanical, fire protection, electrical, and other trades to assure that all pipes, conduits, cable trays, cables, ducts, and other items that penetrate fire-resistant construction are properly firestopped.

C. Install dams where recommended or required by tested fire-resistive joint assemblies and through-penetration firestop systems. Combustible damming material and other accessories not indicated as permanent components of firestop systems shall be removed after appropriate curing.

D. Install firestopping materials in conjunction with fiber firestopping insulation (firesafing insulation) as required by tested assemblies.

E. Where cable trays penetrate fire-resistant wall assemblies, provide pillow type firestop product. All cabling /wiring sleeves whether empty or utilized for wiring through fire-resistant assemblies shall be firestopped.

F. Fire-resistive joint systems for control and expansion joints shall be capable of withstanding 50 percent movement in joint width existing at time of installation for both extension and compression.

G. Do not cover installed firestopping until inspected by Authority Having Jurisdiction.

3.05 CLEANING

A. Clean adjacent surfaces of firestopping materials.

3.06 IDENTIFICATION

A. Identify all firestop system locations with pressure sensitive self-adhesive, preprinted vinyl labels.
   1. Attach labels permanently to both sides of penetrated construction surfaces and joints in fire-rated construction.
   2. Labels shall be visible to anyone seeking to disturb or remove penetrating items or firestop system. Where possible, labels shall be installed above finished ceilings. Where installed in exposed locations, labels shall be neatly located.
   3. Labels for horizontal joints shall be installed at a maximum spacing of twenty (20) feet.

3.07 FIELD QUALITY CONTROL

A. Prepare and install firestopping systems in accordance with manufacturer's shop drawings, tested assemblies and instructions
   1. Follow safety procedures recommended in Material Safety Data Sheets.
   2. Finish all firestopping surfaces that are to remain exposed in the completed Work to a uniform and level condition.

B. Firestopping materials and installations at joints and penetrations in fire-resistance rated assemblies and smoke barrier assemblies shall not be concealed from view until inspected and approved by the authority having jurisdiction. Such inspections shall not relieve the Contractor of responsibility for providing his own inspections and quality control in compliance with specified requirements.

C. Inspections shall be performed as required by the building code, the Contract Documents or as otherwise directed by the Architect.

D. The Contractor shall cooperate with individuals conducting such inspections. The Contractor shall notify inspectors at least five (5) days in advance of requested inspection date. All

identification labeling, firestopping and smoke sealing work shall be completed prior to inspection.

E. Any non-compliant materials shall be removed and replaced. Any locations missing required protection shall be corrected by the Contractor and re-inspected prior to concealing such areas with other construction. Any material or workmanship that is rejected shall be replaced promptly by the Contractor to the satisfaction of the inspector and/or Architect, and at no additional cost to the Owner.

3.08 PROTECTION

A. Clean adjacent surfaces of firestopping materials. Leave work in a neat and clean condition.

B. Protect adjacent surfaces from damage by material installation.

END OF SECTION

SECTION 07 90 05
JOINT SEALERS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Sealants and joint backing.

B. Compressible fillers.

1.02 RELATED REQUIREMENTS

A. Section 07 21 00 - Thermal Insulation: Firestop insulation.

B. Section 07 84 00 - Firestopping: Firestopping sealants.

C. Section 09 21 16 - Gypsum Board Assemblies: Acoustic construction.

1.03 REFERENCE STANDARDS

A. ASTM C834 - Standard Specification for Latex Sealants; 2010.

B. ASTM C919 - Standard Practice for Use of Sealants in Acoustical Applications; 2012.

C. ASTM C920 - Standard Specification for Elastomeric Joint Sealants; 2014.

D. ASTM C1193 - Standard Guide for Use of Joint Sealants; 2013.

E. SCAQMD 1168 - South Coast Air Quality Management District Rule No.1168; current edition; www.aqmd.gov.

1.04 ADMINISTRATIVE REQUIREMENTS

A. Coordinate the work with other Sections referencing this Section.

1.05 SUBMITTALS

A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.

B. Product Data: Provide data indicating sealant chemical characteristics.

C. Samples: Submit samples 2 inch in size illustrating sealant colors for selection.

D. Manufacturer's Installation Instructions: Indicate special procedures.

1.06 QUALITY ASSURANCE

A. Maintain one copy of each referenced document covering installation requirements on site.

B. Applicator Qualifications: Company specializing in performing the work of this Section with minimum five years experience. Where applicable, applicators shall be approved by their respective material manufacturers as licensed applicators. All applicators shall be skilled personnel who are thoroughly trained and experienced in the necessary skills, completely familiar with the specific requirements of the Work.

1.07 FIELD CONDITIONS

A. Maintain temperature and humidity recommended by the sealant manufacturer during and after installation.

B. Do not proceed with application of materials when surface or air temperatures are less than 40 degrees F or likely to drop to below 40 degrees F in the following 24 hours after sealant installation.

C. Do not apply materials unless surface to receive coating is clean and dry, or if precipitation is imminent.

D. Coordination: It shall be the responsibility of the Contractor to properly coordinate the Work of this Section with that of all other trades in order to ensure the providing of complete and continuous sealing and consistent use of products specified herein.

1.08 WARRANTY

A. Warrantees:
   1. Include coverage for installed sealants and accessories which fail to achieve watertight seal, exhibit loss of adhesion or cohesion, or do not cure.
      a. Silicone Sealants: Twenty years, unless otherwise indicated with product description.
   2. Provide manufacturer's non-stain warranty.

B. The installer shall provide an installation warranty that all Sealing shall be free of defects of materials and workmanship for two (2) years; and shall repair and/or replace such defective work, during the warranty term, without extra cost to the Owner.
   1. The following types of sealing failures will be considered defective Work: Leakage, loosening, loss of bond, hardening, cracking, crumbling, melting, shrinking, running, sagging, improper tooling, discoloration, or staining of adjacent work.

PART 2 PRODUCTS

2.01 SEALANTS

A. Sealants and Primers - General: Provide only products having lower volatile organic compound (VOC) content than required by South Coast Air Quality Management District Rule No.1168.

B. General Purpose Interior Sealant: Acrylic emulsion latex; ASTM C834, Type OP, Grade NF single component, paintable.
   1. Color: To be selected by Architect from manufacturer's standard range.
   2. Applications: For minimal movement.
      a. Interior wall and ceiling control joints.
      b. Joints between door and window frames and wall surfaces, where minimal movement is expected and will receive field painting.
      c. Interior sound sealing, non-fire rated smoke sealing where little movement is anticipated.
      d. Other interior joints for which no other type of sealant is indicated.
   3. Note: Compatibility with materials sealant shall be in contact with shall be verified prior to use.
   4. Limitations: Not for use at joints subject to dynamic movement, submerged in water and as otherwise limited by the manufacturer.
   5. Products:
      a. Basis of Design: Acrylic Latex 834 by Tremco Inc.
      b. by Pecora Corp.
      c. Sherwin-Williams Company
      d. Substitutions: See Section 01 60 00 - Product Requirements.

C. Interior Silicone Sealant: Silicone; ASTM C920, Uses I, M and A; single component, mildew resistant.
   1. Color: As selected from the manufacturer's full color range.
   2. Applications: Sanitary
      a. Joints between plumbing fixtures and floor and wall surfaces.
      b. Joints between all countertops to splashes to wall surfaces.
   3. Note: Compatibility with materials sealant shall be in contact with shall be verified prior to use.
   4. Limitations: Not for use at joints submerged in water, at porous materials like masonry, and as otherwise limited by the manufacturer.
   5. Products:
      a. Basis of Design: Tremsil 200 by Tremco Global Sealants.
      b. Pecora Corporation.
      c. Dow Corning.
      d. Substitutions: See Section 01 60 00 - Product Requirements.

D. General Purpose Exterior Sealant: Silicone, ASTM C920, Grade NS, Class 100/50, Uses T, NT, A, G, M, O; single component, neutral curing, non-sagging, non-staining, non-bleeding, ultra-low-modulus.
   1. Color: To be selected by Architect from manufacturer's standard range.
   2. Shore A Hardness Range: 15.
   3. Applications: High movement joints.
      a. Joints between metal frames and other materials.
      b. Joints between dissimilar materials and building construction.
      c. Other exterior joints for which no other sealant is indicated.
   4. Note: Compatibility with materials sealant shall be in contact with shall be verified prior to use.
   5. Limitations: Not for use in structural applications, below grade or to materials that outgas, on brass, copper, or materials that can corrode, at joints continuously immersed in water, interior firestop sealing, at materials that bleed oils, plasticizers, or solvents, in confined spaces, to surfaces that will be painted, to surfaces in contact with food, to wet surfaces, to architectural finishes without prior testing, and as otherwise limited by the manufacturer.
   6. Products:
      a. Basis of Design: 756 by Dow Cornng Corp.
      b. Pecora Corporation.
      c. Tremco Global Sealants.
      d. Substitutions: See Section 01 60 00 - Product Requirements.

2.02 ACCESSORIES

A. Primer: Required, non-staining type, recommended by sealant manufacturer to suit application.

B. Joint Cleaner: Non-corrosive and non-staining type, recommended by sealant manufacturer; compatible with joint forming materials.

C. Joint Backing (Exterior): Closed-cell polyethylene, non-bleeding neoprene or butyl rod, diameter approximately 30% greater than width of the joint, as recommended by the sealant manufacturer.

D. Joint Backing (Interior): Open-cell polyurethane foam rod, diameter approximately 30% greater than width of the joint, as recommended by the sealant manufacturer.

E. Bond Breaker: Pressure sensitive tape recommended by sealant manufacturer to suit application.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify that substrate surfaces are ready to receive work.

B. Notify the Contractor of conditions detrimental to the proper and timely completion of the Work. Do not proceed until unsatisfactory conditions have been corrected by the Contractor to meet acceptable industry standards in a manner acceptable to the Architect.

C. Verify that joint backing and release tapes are compatible with sealant.

3.02 PREPARATION

A. Remove loose materials and foreign matter that could impair adhesion of sealant.

B. Clean and prime joints in accordance with manufacturer's instructions.

C. Perform preparation in accordance with manufacturer's instructions and ASTM C1193.

D. Protect elements surrounding the work of this section from damage or disfigurement. Mask off adjoining surfaces as needed to prevent surface damage.

3.03 INSTALLATION

A. Perform work in accordance with sealant manufacturer's requirements for preparation of surfaces and material installation instructions.

B. Perform installation in accordance with ASTM C1193.

C. Perform acoustical sealant application work in accordance with ASTM C919.

D. Sealing at Acoustical Construction: At construction designated "Acoustical Construction" seal around all joints and pipe, conduit, structural member, duct, and electrical box openings to gypsum wallboard or masonry as applicable. Seal bottom of gypsum wallboard partitions to floor slabs. Seal tops of masonry and gypsum wallboard partitions to decks (including voids at fluted decks), and seal sides of partitions to abutting construction. Note: Sealing related to installation of partition framing members and gypsum wallboard is specified under Section 09 21 16 - Gypsum Board Assemblies.

E. Non-Fire Rated Smoke Sealing: At building assemblies identified as non-fire rated smoke barriers, seal all joints and pipe, conduit, structural member, duct and electrical box openings. Openings above finish ceilings or other concealed locations may be sealed on one side only. All openings and annular spaces shall be backed with fire safing insulation prior to installation of sealant.

F. Measure joint dimensions and size joint backers to achieve width-to-depth ratio, neck dimension, and surface bond area as recommended by manufacturer.

G. Do not leave gaps between ends of joint backers. Do not twist, stretch or tear backers.

H. Install bond breaker where joint backing is not used. Back rods shall be 25% wider than the joint width.

I. Application of Sealant: Sealant shall be gun-applied through a nozzle opening of such diameter so that the full bead of sealant is gunned into the joint, filling the joint completely. A superficial or skin bead will not be acceptable.
   1. Sealant geometry (depth to width ratios) shall be as recommended by the manufacturer for each specific application.
   2. Beads shall be tooled immediately after application to ensure firm, full contact with the inner faces of the joint. Excess material shall be struck off with a tooling stick or knife.
   3. The finished bead shall be smooth, properly contoured and flush with the adjacent surface, or as otherwise indicated.
   4. Remove all excess materials and smears adjacent to the joint as work progresses. All materials shall be used in accordance with the manufacturer's printed instructions.

J. Install sealant free of air pockets, foreign embedded matter, ridges, and sags.

K. Apply sealant when joint is cool to minimize chances of delamination and wrinkles.

L. Tool joints concave.

M. Fillers: Avoid joints except at ends, corners, and intersections; seal all joints with adhesive; install with face 1/8 to 1/4 inch below adjoining surface.

3.04 FIELD QUALITY CONTROL

A. Perform stain tests in accord with manufacturer's instructions and ASTM C1248 on mock-up joints prior to start of job installation.

B. Perform adhesion tests in accord with manufacturer’s instructions and ASTM C1193, Method A, Field Applied Sealant Joints Hand Pull Test.
   1. Perform tests on mock-up joints prior to start of job installation.
   2. Perform a minimum of 1 test for every 200 linear feet of applied sealant and one (1) test per floor per building elevation minimum.
   3. For sealant applied to dissimilar materials, test both sides of the joint.

C. Sealant failing test shall be removed, surfaces cleaned, resealed and retested.

D. Maintain a test log and submit report to the Architect indicating tests, locations, dates, results and remedial action.

3.05 CLEANING

A. Clean adjacent soiled surfaces.

3.06 PROTECTION

A. Protect sealants until cured.

END OF SECTION

SECTION 07 95 13
EXPANSION JOINT COVER ASSEMBLIES

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Expansion joint assemblies for floor, wall, soffit surfaces.

1.02 RELATED REQUIREMENTS

A. Section 09 21 16 - GYPSUM BOARD ASSEMBLIES: Control joints in gypsum board walls and ceilings.

B. Section 09 51 00 - Acoustical Ceilings: Ceiling grid expansion devices.

1.03 SUBMITTALS

A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.

B. Product Data: Provide joint assembly profiles, profile dimensions, anchorage devices, available colors and finish.

C. Shop Drawings: Indicate joint and splice locations, miters, layout of the work, affected adjacent construction, anchorage locations.

D. Samples: Submit two samples 6 inch long, illustrating profile, dimension, color, and finish selected.

E. Manufacturer's Installation Instructions: Indicate rough-in sizes; provide templates for cast-in or placed frames or anchors; required tolerances for item placement.

PART 2 PRODUCTS

2.01 EXPANSION JOINT COVER ASSEMBLIES

A. Expansion Joint Cover Assemblies - General: Factory-fabricated and assembled; designed to completely fill joint openings, sealed to prevent passage of air, dust, water, smoke; suitable for traffic expected.
   1. Joint Dimensions and Configurations: As indicated on drawings.
   2. Joint Cover Sizes: Selected to suit joint width and configuration, based on manufacturer's published recommendations and limitations.
   3. Joint Movement Capability: If not indicated, provide minimum plus/minus 25 percent joint movement capability.
   4. Lengths: Provide covers in full lengths required; avoid splicing wherever possible.
   5. Anchors, Fasteners, and Fittings: Provided by cover manufacturer.

B. Floor Joint Covers: Coordinate with indicated floor coverings.
   1. If floor covering is not indicated, obtain instructions from Architect before proceeding.

C. Covers In Gypsum Board Assemblies: Provide style with anchoring wings that can be completely covered by joint compound.

D. Covers In Fire Rated Assemblies: Provide cover assembly having fire rating equivalent to that of assembly into which it is installed.
   1. Acceptable Evaluation Agencies: UL, ULC, and Intertek.

2.02 MATERIALS

A. Type 1: Interior Walls and Gypsum Soffits / Ceilings; 2" joint for 1" movement.
   1. Product: FWS-200 and FWSC-200 as manufactured by CS Group.
   2. Where indicated on the Drawings, seal at back-up construction with compressible filler.
   3. Finish: Color as selected by the Architect from manufacturer's full range.

B. Type 2: Floor; 2" joint for 1" movement.
   1. Product: SJPF-200 as manufactured by CS Group.

2. Finish: Mill finish aluminum.

2.03 FABRICATION

A. Back paint components in contact with cementitious materials.

B. Galvanize embedded ferrous metal anchors and fastening devices.

C. Shop assemble components and package with anchors and fittings.

D. Provide joint components in single length wherever practical. Minimize site splicing.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify that joint preparation and dimensions are acceptable and in accordance with manufacturer's requirements.

3.02 INSTALLATION

A. Install components and accessories in accordance with manufacturer's instructions.

B. Align work plumb and level, flush with adjacent surfaces.

C. Rigidly anchor to substrate to prevent misalignment.

3.03 PROTECTION

A. Do not permit traffic over unprotected floor joint surfaces.

B. Provide strippable coating to protect finish surface.

END OF SECTION

SECTION 08 11 13
HOLLOW METAL FRAMES

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Steel frames for wood doors.

B. Accessories.

1.02 RELATED REQUIREMENTS

A. Section 08 14 16 - Flush Wood Door.

B. Section 08 71 00 - Door Hardware.

C. Section 08 80 00 - Glazing: Glass for doors and borrowed lites.

D. Section 09 90 00 - Painting and Coating: Field painting.

1.03 REFERENCE STANDARDS

A. ADA Standards - Americans with Disabilities Act (ADA) Standards for Accessible Design; 2010.

B. ANSI/ICC A117.1 - American National Standard for Accessible and Usable Buildings and Facilities; International Code Council; 2009.

C. ANSI A250.8 - SDI-100 Recommended Specifications for Standard Steel Doors and Frames; 2003 (R2008).

D. ANSI A250.10 - Test Procedure and Acceptance Criteria for Prime Painted Steel Surfaces for Steel Doors and Frames; 1998 (R2011).

E. ASTM A653 - Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process; 2011.

F. BHMA A156.115 - Hardware Preparation in Steel Doors and Steel Frames; 2006.

G. NAAMM HMMA 840 - Guide Specifications for Installation and Storage of Hollow Metal Doors and Frames; The National Association of Architectural Metal Manufacturers; 2007.

H. NAAMM HMMA 861 - Guide Specifications for Commercial Hollow Metal Doors and Frames; The National Association of Architectural Metal Manufacturers; 2006.

I. UL 1784 - Standard for Air Leakage Tests of Door Assemblies; Current Edition, Including All Revisions.

J. SDI 117: Manufacturing Tolerances for Standard Steel Doors and Frames.

1.04 SUBMITTALS

A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.

B. Product Data: Materials and details of design and construction, hardware locations, reinforcement type and locations, cores, sound ratings, profiles, anchorage and fastening methods, and finishes.

C. Shop Drawings: Details of each opening, showing elevations, fire-ratings, glazing, frame profiles, anchors, and identifying location of different finishes, if any.

1.05 QUALITY ASSURANCE

A. Manufacturer Qualifications: Company specializing in manufacturing the products specified in this Section with minimum ten years documented experience.

B. Maintain at the project site a copy of all reference standards dealing with installation.

1.06 DELIVERY, STORAGE, AND HANDLING

A. Store in accordance with NAAMM HMMA 840. Store all materials upright, in a protected dry area, at least 1" or more off the ground or floor and at least 1/4" between individual pieces. Materials shall not be permitted to rust or corrode.

B. Protect with resilient packaging; avoid humidity build-up under coverings; prevent corrosion.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Steel Door Frames and Vision Lites: (shall be a member of the Steel Door Institute)
   1. Ceco.
   2. Republic Doors
   3. Steelcraft.
   4. Curries Door Co.
   5. Substitutions: See Section 01 60 00 - Product Requirements.

2.02 DOOR FRAMES AND VISION LITES

A. Requirements for All Door Frames and Vision Lites:
   1. Accessibility: Comply with ICC A117.1 and ADA Standards.
   2. Glazed Lights: Non-removable stops on secure side; sizes and configurations as indicated on Drawings.
   3. Hardware Preparation: In accordance with DHI A115 Series, with reinforcement welded in place, in addition to other requirements specified in door grade standard.
   4. Hardware Preparation for New Doors at New Frames: Hardware mounting heights shall match similar existing conditions, subject to modifications during shop drawing review.
   5. Galvanizing for ALL Units: Components hot-dipped zinc-iron alloy-coated (galvannealed) in accordance with ASTM A653, with manufacturer's standard coating thickness
   6. Finish: Factory primed, for field finishing.

B. Combined Requirements: If a particular frame unit is indicated to comply with more than one type of requirement, comply with all the specified requirements for each type; where two requirements conflict, comply with the most stringent.

2.03 STEEL FRAMES

A. General:
   1. Frames for Wood Doors:
      a. Interior Opening 42 inches and less: 16 gage frames.
      b. Interior Openings exceeding 42 inches wide: 14 gage frames.
   2. Finish: Factory primed, for field finishing.
   3. Provide minimum 16 gage mortar guard boxes at hardware cut-outs in frames for masonry walls and at strike reinforcement in frames for stud partitions.
   4. Frames in Masonry Walls: Size to suit masonry coursing with head member 4 inches high to fill opening without cutting masonry units, unless detailed otherwise.

B. Interior Door Frames, Non-Fire-Rated: Fully welded type.

C. Interior Frames for Glazing (Borrowed Lites): Construction and face dimensions to match door frames, and as indicated on Drawings.

D. It is the intent of this contract that the configuration and detail of new frames, where indicated, match similar existing frame conditions.

E. Corner joints shall be die mitered and have all contact edges closed tight and continuously welded.

F. Frame, trim and profiles shall be as scheduled by the Architect and verified by the Contractor. All frame depths shall be coordinated with partition type depths by the Contractor. Frames for drywall partitions shall have 1/2 inch backbends with hooked profile.

G. Minimum depth of stops shall be 5/8". Use 3/4" only where required for fire rating or security.

H. When shipping limitations so dictate, frames for large openings shall be fabricated in sections designed for splicing in the field. All splicing locations and details shall be clearly identified on shop drawings.

I. Frames shall be provided with supplemental internal concealed steel reinforcement, as engineered by the manufacturer.

J. Floor Anchors: Shall be securely welded inside each jamb, with 2 holes provided at each jamb for floor anchorage. Where required adjustable floor anchors, providing not less than 2" height adjustment, shall be provided. Minimum thickness of floor anchors shall be 14 gage, zinc coated per ASTM A-591.

K. Masonry Jamb Anchors: Frames for installation in masonry walls shall be provided with adjustable jamb anchors of the T-strap type, 16 gage minimum, zinc coated per ASTM A-591. Provide 3 anchors for frames up to 7'-6" high, 4 anchors for frames up to 8'-0" high and 1 additional anchor for each 2'-0" of height over 8'-0".

L. Stud Partition Jamb Anchors: Shall be steel anchors, compatible with the actual stud used, minimum 18 gage thickness, zinc coated per ASTM A-591 Provide 4 anchors for frames up to 7'-6" high, 5 anchors for frames up to 8'-0" high and 1 additional anchor for each 2'-0" of height over 8'-0".

M. Frames may be anchored to previously placed concrete, masonry or structural steel only with the prior approval of the Architect. Such frames shall be provided with anchors and fasteners of suitable design. Provide a minimum of 4 anchors per jamb plus additional anchors in quantities as scheduled above for frames in stud partitions.

2.04 ACCESSORY MATERIALS

A. Glazing: As specified in Section 08 80 00 - Glazing, field installed.

B. Removable Stops: Rectangular, flush set, 18 gage galvanized, primed steel, butted corners; prepared for countersink style tamper proof screws.

C. Fixed Stops: Custom full-flush with no apparent seams on the face of the door at the outside of spaces to be secured.

D. Grout for Frames: Portland cement grout of maximum 4-inch slump for hand troweling; thinner pumpable grout is prohibited.

E. Silencers: Resilient rubber, fitted into drilled hole; 3 on strike side of single door, 3 on center mullion of pairs, and 2 on head of pairs without center mullions.

F. Temporary Frame Spreaders: Provide for all factory or shop-assembled frames.

2.05 FINISH MATERIALS

A. Primer: Factory applied, rust-inhibiting, complying with ANSI A250.10, door manufacturer's standard.

B. After fabrication, all tool marks and surface imperfections shall be dressed, permanently filled and sanded as required to make all faces and vertical edges smooth, level and free of all irregularities. Doors shall be primed to ensure maximum paint adhesion, on all exposed surfaces with a rust-inhibitive primer in accordance with ANSI A250 - Test Procedure and Acceptance Criteria for Primed Painted Steel Surfaces.

PART 3 EXECUTION

3.01 EXAMINATION

A. The Contractor shall take all measurements, make all investigations, and in general, provide field work and coordination as required to ensure the proper fit of all Work specified herein. Frames shall be sized, positioned, and installed in accordance with the design intent represented on the Drawings. The design intent shall not be modified due to the Contractor's failure to provide coordination or obtain properly fabricated materials. Such coordination shall be provided sufficiently in advance so as to avoid delays in the construction schedule.

B. Verify that opening sizes and tolerances are acceptable. It shall be the responsibility of the Contractor to coordinate frame thicknesses with each wall and partition type to ensure proper fit.

3.02 PREPARATION

A. Coat inside of frames to be installed in masonry or to be grouted, with bituminous coating, prior to installation.

3.03 INSTALLATION

A. Install in accordance with the requirements of the specified door grade standard and NAAMM HMMA 840.

B. Coordinate frame anchor placement with wall construction. Wherever possible, leave frame spreader bars intact until frames are set perfectly square and plumb, and anchors are securely attached. Verify that frames are square and plumb following removal of temporary spreaders.

C. Grout frames in masonry construction, using hand trowel methods; brace frames so that pressure of grout before setting will not deform frames.

D. Coordinate installation of hardware in accordance with hardware manufacturer's templates and instructions. Doors and frames fabricated with hardware cutouts and reinforcing which will not properly accommodate finish hardware shall be rejected and replaced at no additional cost to the Owner.

E. Coordinate installation of glazing.

F. Immediately after erection, areas where prime coat or galvanizing has been damaged shall be sanded smooth and touch up with same primer or zinc rich rust-inhibitor primer as applied at the factory. Remove rust before touch-up is applied.

3.04 TOLERANCES

A. Clearances Between Door and Frame:
   1. Between steel doors and frame, at head and jambs: 1/8", with maximum 1/16" +/- variation.
   2. Between wood doors and frame, at head and jambs: 1/8" maximum.
   3. At door bottoms: 3/4" maximum
   4. At smoke-rated door bottoms: 3/8" maximum.
   5. Between meeting edges of pairs of doors: 1/8" maximum.
   6. Between face of door and stop: 1/8".
   7. Note: Door sills, except at fire-rated doors, may be undercut greater than the clearances indicated above if so scheduled on the Drawings and/or on the Door & Frame Schedule. Note sound-rated doors may require under-cuts less than maximums indicated above.

B. Maximum Diagonal Distortion: 1/16 in measured with straight edge, corner to corner.

3.05 ADJUSTING

A. Adjust for smooth and balanced door movement.

B. Protect installed doors, frames and accessories against damage from other construction work. Any damage prior to acceptance shall be repaired or replaced, if such action complies with the requirements and shows no evidence of repair or refinishing.

3.06 SCHEDULE

A. Refer to Door and Frame Schedule on the Drawings.

END OF SECTION

SECTION 08 14 16
FLUSH WOOD DOORS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Flush wood doors; flush and flush glazed configuration; non-rated.

B. Factory finishing of wood doors.

1.02 RELATED REQUIREMENTS

A. Section 08 11 13 - Hollow Metal Frames.

B. Section 08 71 00 - Door Hardware.

C. Section 08 80 00 - Glazing: Site glazing of doors.

1.03 REFERENCE STANDARDS

A. ADA Standards - Americans with Disabilities Act (ADA) Standards for Accessible Design; 2010.

B. ANSI/ICC A117.1 - American National Standard for Accessible and Usable Buildings and Facilities; International Code Council; 2009.

C. AWI/AWMAC/WI (AWS) - Architectural Woodwork Standards; 2009.

D. UL 1784 - Standard for Air Leakage Tests of Door Assemblies; Current Edition, Including All Revisions.

E. WDMA I.S.1-A - Architectural Wood Flush Doors; Window and Door Manufacturers Association; 2011.

1.04 SUBMITTALS

A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.

B. Product Data: Indicate door core materials and construction; veneer species, type and characteristics. Submit manufacturer's certification of compliance with quality standards.

C. Shop Drawings: Show doors and frames, elevations, sizes, types, swings, undercuts, beveling, blocking for hardware, factory machining, factory finishing, cutouts for glazing and other details.
   1. Provide the information required by AWI/AWMAC/WI (AWS).

D. Specimen warranty.

E. Samples:
   1. Upon request, submit one sample of door construction, 8x8 inch in size cut from top corner of door and samples of lite frame section.
   2. Submit one full set of manufacturer's standard stain colors on specified veneer for selection.
   3. Submit two samples of door veneer, 6x6 inch in size illustrating selected wood grain, stain color, and sheen.
   4. Samples submitted and accepted shall serve to reflect the entire range of (color, texture, grain and sapwood/heartwood variation and shall be used as the standard for acceptance or rejection of installed materials.

F. Manufacturer's certification that products are manufactured in the United States.

G. Manufacturer's Installation Instructions: Indicate special installation instructions.

1.05 QUALITY ASSURANCE

A. Manufacturer Qualifications: Company specializing in manufacturing the products specified in this Section with minimum ten years of documented experience.

1.06 DELIVERY, STORAGE, AND HANDLING

A. Protect materials during transit, storage, and handling to prevent deterioration, damage and soiling. Package each door at the factory in a separate heavy sealed poly bag. Mark each bag at top and bottom of doors for location to correspond with opening number on the Drawings.

B. Accept doors on site in manufacturer's packaging. Inspect for damage. In the event of damage, immediately make all repairs and replacements necessary for approval of the Architect and at no additional cost to the Owner.

C. Protect doors with resilient packaging. Do not store in damp or wet areas; or in areas where sunlight might bleach veneer. Seal top and bottom edges with tinted sealer if stored more than one week. Break seal on site to permit ventilation. Deliver door to job site only when building is dry and has reached average prevailing relative humidity of locality.

D. Coordinate the work with door opening construction, door frame and door hardware installation. The Contractor shall take all measurements, make all investigations, and in general provide field work and coordination as required to ensure the proper fit of all Work specified herein. Doors and frames shall be sized, positioned and installed in accordance with the design intent represented on the Drawings. The design intent shall not be modified due to the Contractor's failure to provide coordination or obtain properly fabricated materials. Such coordination shall be provided sufficiently in advance so as to avoid delays in the construction schedule.

1.07 WARRANTY

A. See Section 01 78 10 - Warranties for additional warranty requirements.

B. Interior Doors: Provide a special manufacturer's warranty, signed by both the manufacturer, installer and Contractor, for the life of the installation.

C. Include coverage for delamination of veneer, defective materials, telegraphing core construction, and warping. Unsatisfactory warpage shall be more than 1/4" in a 42" x 84" section and telegraphed core construction shall be defined as exceeding 0.01 inch in a 3 inch span. The warranty shall also include refinishing and reinstalling which may be required due to repair or replacement of defective doors.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Wood Veneer Faced Doors:
   1. Graham Wood Doors.
   2. Eggers Industries.
   3. Marshfield Door Systems, Inc.
   4. Buell Door Co.
   5. Algoma Hardwoods Inc.
   6. VT Industries.
   7. Mohawk Flush Doors.
   8. Substitutions: See Section 01 60 00 - Product Requirements.

2.02 DOORS

A. All Doors.
   1. Quality Level: Premium Grade, in accordance with AWI/AWMAC/WI Architectural Woodwork Standards, latest edition.
   2. Wood Veneer Faced Doors: 5-ply unless otherwise indicated.

B. Interior Doors: 1-3/4 inches thick unless otherwise indicated; flush construction.
   1. Provide solid core doors at all locations.
   2. Smoke and Draft Control Doors: All door assemblies shall be tested in accordance with UL 1784 with maximum air leakage of 3.0 cfm per sq ft of door opening at 0.10 inch w.g. pressure at both ambient and elevated temperatures; if necessary, provide additional gasketing or edge sealing.

3. Wood veneer facing with factory transparent finish.

2.03 DOOR AND PANEL CORES

A. Non-Rated Solid Core and 20 Minute Rated Doors: Type particleboard core (PC), plies and faces as indicated.

B. Doors scheduled to receive closers and /or exit devices shall have solid lumber rails, without compromising labeling or listing requirements. Thru-bolting of finish hardware shall not be permitted, unless specifically noted elsewhere in the Contract Documents.

2.04 DOOR FACINGS

A. Veneer Facing for Transparent Finish: Red oak, veneer grade in accordance with quality standard indicated, plain sliced (flat cut), with book match between leaves of veneer, running match of spliced veneer leaves assembled on door or panel face.
   1. Vertical Edges: Same species as face veneer.
   2. "Pair Match" each pair of doors; "Set Match" pairs of doors within 10 feet of each other when doors are closed.

B. Facing Adhesive: Type I - waterproof.

2.05 ACCESSORIES

A. Glazing Stops: Wood, of same species as door facing, mitered corners; prepared for concealed tamper proof fasteners at wood and countersunk oval head screws at metal frames. Fill fastener holes with color matching filler in the field.
   1. Note: The bottom edge of all lites shall be at least 10 inches above the floor and not more than 43 inches above the floor.

2.06 DOOR CONSTRUCTION

A. Fabricate doors in accordance with door quality standard specified.

B. Cores Constructed with stiles and rails:
   1. Provide solid blocks at lock edge for hardware reinforcement.
   2. Provide solid blocking for other throughbolted hardware.

C. Glazed Openings: Non-removable stops on non-secure side; sizes and configurations as indicated on drawings.

D. Factory machine doors for hardware other than surface-mounted hardware, in accordance with hardware requirements and dimensions.

E. Factory machine doors for hardware to match existing conditions at existing door frames, subject to modifications during shop drawing review.

F. Factory fit doors for frame opening dimensions identified on shop drawings, with edge clearances in accordance with specified quality standard.

G. Provide edge clearances in accordance with the quality standard specified.

2.07 FACTORY FINISHING - WOOD VENEER DOORS

A. Finish work in accordance with WDMA I.S.1-A for Grade specified and as follows:
   1. Transparent:
      a. System - TR-6, Catalyzed Polyurethane.
      b. Sheen: To match existing.

B. Factory finish doors in accordance with approved sample.

C. Seal door top edge with color sealer to match door facing.

PART 3 EXECUTION

3.01 EXAMINATION

A. Examine all doors before hanging and reject doors with defects.

B. Verify existing conditions before starting work.

C. Verify that opening sizes and tolerances are acceptable.

D. Do not install doors in frame openings that are not plumb or are out-of-tolerance for size or alignment. Proceed with installation only after unsatisfactory conditions have been corrected.

3.02 INSTALLATION

A. Install doors in accordance with manufacturer's instructions and specified quality standard.

B. Factory-Finished Doors: Do not field cut or trim; if fit or clearance is not correct, replace door.

C. Use machine tools to cut or drill for hardware.

D. Coordinate installation of doors with installation of frames and hardware.

E. Coordinate installation of glazing.

3.03 TOLERANCES

A. Conform to specified quality standard for fit and clearance tolerances.

B. Conform to specified quality standard for telegraphing, warp, and squareness.

C. Edge Clearances shall be provided as follows:
   1. Between wood doors and steel frames at heads and jambs: 1/8" maximum.
   2. At door bottoms: 3/4" maximum.
   3. At smoke-rated door bottoms: 3/8" max.
   4. Between meeting edges of pairs of doors: 1/8" max.
   5. Note: Doors that are not fire or smoke rated may be undercut greater than the clearances indicated above if so indicated on the Drawings and/or Door Schedule. Undercutting shall be performed as part of factory fabrication process to prevent excessive removal of bottom rail. Doors with sound-ratings may required undercut less than maximum indicated above.

3.04 ADJUSTING

A. Adjust doors for smooth and balanced door movement.

B. Adjust closers for full closure.

C. Align in frames for uniform clearance at each edge. Restore finish before installation if on-site fitting or machining is required. Replace or re-hang any doors which do not swing or operate freely, or are warped or twisted. Pre-finished doors damaged prior to acceptance shall be repaired or replaced. Doors may be prepared or refinished if work complies with requirements and show no evidence of repair or refinishing.

3.05 SCHEDULE

A. Refer to Door and Frame Schedule on the Drawings.

END OF SECTION

SECTION 08 31 00
ACCESS DOORS AND PANELS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Wall access door and frame units.

B. It is not intended that the Drawings or Specifications identify specific access door sizes or locations. Subcontractors whose work requires access panels in wall, floor, and ceiling assemblies shall thoroughly examine all Contract Documents and provide suitable access to all equipment, hardware, accessories and all other items that may require adjustment, observation or maintenance. Note: Access doors located in mechanical equipment or ductwork are provided as part of the work of Division 23 - HVAC.

1.02 RELATED REQUIREMENTS

A. Section 09 90 00 - Painting and Coating: Field paint finish.

B. Division 22 - Plumbing

C. Division 23 - HVAC

D. Division 26 - Electrical

1.03 REFERENCE STANDARDS

A. ITS (DIR) - Directory of Listed Products; Intertek Testing Services NA, Inc.; current edition.

B. UL (FRD) - Fire Resistance Directory; Underwriters Laboratories Inc.; current edition.

1.04 SUBMITTALS

A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.

B. Product Data: Provide materials, construction, profiles, types, finishes, hardware, locking provisions, and details of adjoining work.

C. Shop Drawings: Indicate exact position of all access door units. Locations to be noted on MEP-FP Coordination Drawings.

PART 2 PRODUCTS

2.01 WALL AND CEILING UNITS

A. Manufacturers:
   1. Karp Associates, Inc
   2. Milcor.
   3. Nystrom Products.
   4. Larsens Manufacturing Co.
   5. Substitutions: See Section 01 60 00 - Product Requirements.

B. Access Doors: Factory fabricated door and frame units, fully assembled units with corner joints welded, filled, and ground flush; square and without rack or warp; coordinate requirements with assemblies units are to be installed in.
   1. Material: Steel.
   2. Style: Exposed frame with door surface flush with frame surface.
      a. In Gypsum Board: Use drywall bead type frame.
      b. In Masonry: Provide adjustable metal masonry anchors.
   3. Door Style: Single thickness with rolled or turned in edges.
   4. Door Style for separating heated from non-heated areas: Double wall with integral non-combustible insulation filler.
   5. Door Style for Fire-rated locations: double wall with integral non-combustible insulation filler.

6. Frames: 16 gage, 0.0598 inch, minimum.
7. Single Thickness Steel Door Panels: 0.070 inch, minimum.
8. Double-Skinned Hollow Steel Door Panels: 16 gage, 0.059 inch, minimum, on both sides and all edges.
9. Units in Fire Rated Assemblies: Fire rating as required by applicable code for the fire rated assembly in which they are to be installed.
    a. Provide products listed and labeled by UL or ITS (Warnock Hersey) as suitable for the purpose specified and indicated (labeled for horizontal or vertical installation).
    b. All doors located in proximity to combustibles shall be labeled to indicate a maximum surface temperature rise of 250 degrees F.
10. Steel Finish: Primed.
11. Finish: Factory prime painted for field finish painting.
12. Size(s): As required for each condition, minimum size 8" x 8".
13. Hardware:
    a. Hardware for Fire Rated Units: As required for listing.
    b. Hinges for Non-Fire-Rated Units: Concealed, constant force closure spring type.
    c. Latch/Lock: Tamperproof tool-operated cam latch.
    d. Inside Latch Release: For all doors intended to allow a person to fully pass through, provide Mechanism that allows the panel to be opened from the inside without the use of a tool or key
    e. Gasketing: For all doors that separate heated and unheated space. Extruded neoprene, around the perimeter of the door panel.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify that rough openings for door and frame are correctly sized and located.

B. Door locations that may physically or visually conflict with adjacent construction or building features shall be brought to the attention of the Architect prior to 'roughing-in'. Doors installed in locations objectionable to the Architect shall be removed, patched, and relocated at no additional cost to the Owner.

3.02 INSTALLATION

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

B. Install frames plumb and level in openings. Secure rigidly in place.

C. Position units to provide convenient access to the concealed work requiring access.

D. Adjust hardware and panels after installation for proper operation.

E. Door lock keys shall be labeled and turned over to the Owner per Project Close-out requirements.

END OF SECTION

SECTION 08 43 13
ALUMINUM STOREFRONTS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Aluminum doors and frames.

B. Weatherstripping.

C. Perimeter sealant.

1.02 RELATED REQUIREMENTS

A. Section 07 90 05 - Joint Sealers: Perimeter sealant and back-up materials.

B. Section 08 71 00 - Door Hardware: Hardware items other than specified in this section.

C. Section 08 80 00 - Glazing: Glass and glazing accessories.

1.03 REFERENCE STANDARDS

A. AAMA CW-10 - Care and Handling of Architectural Aluminum From Shop to Site; American Architectural Manufacturers Association; 2012.

B. AAMA 501.2 - Field Check of Metal Storefronts, Curtain Walls, and Sloped Glazing Systems for Water Leakage; American Architectural Manufacturers Association; 2009 (part of AAMA 501).

C. AAMA 2604 - Voluntary Specification, Performance Requirements and Test Procedures for High Performance Organic Coatings on Aluminum Extrusions and Panels; 2013.

D. ASCE 7 - Minimum Design Loads for Buildings and Other Structures; American Society of Civil Engineers; 2011.

E. ASTM A36 - Standard Specification for Carbon Structural Steel; 2008.

F. ASTM A123 - Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products; 2012.

G. ASTM B209 - Standard Specification for Aluminum and Aluminum-Alloy Sheet and Plate; 2010.

H. ASTM B221 - Standard Specification for Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes; 2013.

I. ASTM E283 - Standard Test Method for Determining the Rate of Air Leakage Through Exterior Windows, Curtain Walls, and Doors Under Specified Pressure Differences Across the Specimen; 2004 (Reapproved 2012).

J. ASTM E330/E330M - Standard Test Method for Structural Performance of Exterior Windows, Doors, Skylights and Curtain Walls by Uniform Static Air Pressure Difference; 2014.

K. ASTM E331 - Standard Test Method for Water Penetration of Exterior Windows, Skylights, Doors, and Curtain Walls by Uniform Static Air Pressure Difference; 2000 (Reapproved 2009).

L. SSPC-Paint 20 - Zinc-Rich Primers (Type I, "Inorganic," and Type II, "Organic"); Society for Protective Coatings; 2002 (Ed. 2004).

1.04 ADMINISTRATIVE REQUIREMENTS

A. Coordinate with installation of other components that comprise the exterior enclosure.

1.05 SUBMITTALS

A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.

B. Product Data: Provide component dimensions, describe components within assembly, anchorage and fasteners, glass and infill, door hardware, internal drainage details and manufacturer's test data.

C. Shop Drawings: Indicate system dimensions, framed opening requirements and tolerances, affected related Work, expansion and contraction joint location and details, and field welding required.

D. Design Data: Provide framing member structural and physical characteristics, engineering calculations, and dimensional limitations.

E. Hardware Schedule: Complete itemization of each item of hardware to be provided for each door, cross-referenced to door identification numbers in Contract Documents.

F. Report of field testing for water leakage.

1.06 QUALITY ASSURANCE

A. Designer Qualifications: Design structural support framing components under direct supervision of a Professional Structural Engineer experienced in design of this Work and licensed at the State in which the Project is located.

B. Manufacturer and Installer Qualifications: Company specializing in manufacturing aluminum glazing systems with minimum three years of documented experience.

C. Installer's Qualifications: Company specializing in the installation and fabrication of aluminum glazing systems with a minimum of ten years of documented experience and approved by the manufacturer.

1.07 DELIVERY, STORAGE, AND HANDLING

A. Handle products of this section in accordance with AAMA CW-10.

B. Protect finished aluminum surfaces with wrapping. Do not use adhesive papers or sprayed coatings that bond to aluminum when exposed to sunlight or weather.

1.08 FIELD CONDITIONS

A. Do not install sealants when ambient temperature is less than 40 degrees F. Maintain this minimum temperature during and 48 hours after installation.

1.09 WARRANTY

A. See Section 01 78 00 - Project Close-out, for additional warranty requirements.

B. Provide ten year manufacturer warranty against failure of glass seal on insulating glass units, including interpane dusting or misting. Include provision for replacement of failed units.

C. Provide ten year manufacturer warranty against excessive degradation of exterior finish. Include provision for replacement of units with excessive fading, chalking, or flaking.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Acceptable Manufacturers:
   1. C.R. Laurence Co., Inc; U.S. Aluminum.
   2. EFCO Corporation.
   3. Kawneer North America
   4. Substitutions: See Section 01 60 00 - Product Requirements.

2.02 STOREFRONT

A. Aluminum-Framed Storefront: Factory fabricated, factory finished aluminum framing members with infill, and related flashings, anchorage and attachment devices.
   1. Glazing Position: Centered (front to back).
   2. Vertical Mullion Dimensions: 2 inches wide by 4-1/2 inches deep.
   3. Finish: Pigmented organic coatings.
      a. Factory finish all surfaces that will be exposed in completed assemblies.
      b. Touch-up surfaces cut during fabrication so that no natural aluminum is visible in completed assemblies, including joint edges.

c. Coat concealed metal surfaces that will be in contact with cementitious materials or dissimilar metals with bituminous paint.

4. Finish Color: As selected from manufacturer's standards.
5. Fabrication: Joints and corners flush, hairline, and weatherproof, accurately fitted and secured; prepared to receive anchors and hardware; fasteners and attachments concealed from view; reinforced as required for imposed loads.
6. Construction: Eliminate noises caused by wind and thermal movement, prevent vibration harmonics, and prevent "stack effect" in internal spaces.
7. System Internal Drainage: Drain to the exterior by means of a weep drainage network any water entering joints, condensation occurring in glazing channel, and migrating moisture occurring within system.
8. Expansion/Contraction: Provide for expansion and contraction within system components caused by cycling temperature range of 170 degrees F over a 12 hour period without causing detrimental effect to system components, anchorages, and other building elements.
9. Movement: Allow for movement between storefront and adjacent construction, without damage to components or deterioration of seals.
10. Perimeter Clearance: Minimize space between framing members and adjacent construction while allowing expected movement.

B. Performance Requirements:
1. Wind Loads: Design and size components to withstand the specified load requirements without damage or permanent set, when tested in accordance with ASTM E330/E330M, using loads 1.5 times the design wind loads and 10 second duration of maximum load.
a. Design Wind Loads: Comply with requirements of applicable code.
b. Member Deflection: Limit member deflection to flexure limit of glass in any direction, with full recovery of glazing materials.
2. Water Penetration Resistance: No uncontrolled water on interior face, when tested in accordance with ASTM E331 at pressure differential of 8.00 lbf/sq ft.
3. Air Leakage: Maximum of 0.06 cu ft/min/sq ft of wall area, when tested in accordance with ASTM E283 at 6.27 pounds per square foot pressure differential across assembly.
4. Movement: Accommodate movement between storefront and perimeter framing and deflection of lintel, without damage to components or deterioration of seals.
5. Air Infiltration (Entrance Doors), ASTM E283: Limit air infiltration through assembly to 1.0 cu ft/min/linear ft of crack length, measured at 1.56 psf differential pressure across assembly.

2.03 COMPONENTS

A. Aluminum Framing Members: Tubular aluminum sections, thermally broken with interior section insulated from exterior, drainage holes and internal weep drainage system.
1. Cross-Section: As indicated on drawings.

B. Doors: Glazed aluminum.
1. Thickness: 2-1/4 inches.
2. Top Rail: 2-1/2 inches wide.
3. Vertical Stiles: 2-1/2 inches wide.
4. Bottom Rail: 10 inches wide. (ADA Compliant)
5. Glazing Stops: Square.
6. Finish: Same as storefront.
7. Products:
a. (Basis of Design) Series 650-T HighPerformance Narrow Stile by C.R. Lawrence Co. Inc.
b. Substitutions: See Section 01 60 00 - Product Requirements.

2.04 MATERIALS

A. Extruded Aluminum: ASTM B221.

B. Sheet Aluminum: ASTM B209.

C. Structural Steel Sections: ASTM A36; galvanized in accordance with requirements of ASTM A123.

D. Structural Supporting Anchors Attached to Structural Steel: Design for bolted attachment.

E. Fasteners: Stainless steel.

F. Sealant for Setting Thresholds: Non-curing butyl type.

G. Perimeter Sealant: Type specified in Section 07 90 05.

H. Glass: As specified in Section 08 80 00.
   1. Glass in Exterior Framing: Type IG-1, 1" thickness.

I. Glazing Gaskets: Type to suit application to achieve weather, moisture, and air infiltration requirements.

J. Touch-Up Primer for Galvanized Steel Surfaces: SSPC-Paint 20, zinc rich.

2.05 FINISHES

A. High Performance Organic Coatings: AAMA 2604; multiple coats, thermally cured fluoropolymer system.

B. Color: To be selected by Architect from manufacturer's standard range.

2.06 HARDWARE

A. Other Door Hardware: As specified in Section 08 71 00.

B. Weatherstripping: Wool pile, continuous and replaceable; provide on all doors.

C. Sill Sweep Strips: Resilient seal type, retracting, of neoprene; provide on all doors.

D. Threshold: Extruded aluminum, one piece per door opening, ribbed surface; provide on all exterior doors.

E. Hinges: Continuous gear type, Roton by Hagar.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify dimensions, tolerances, and method of attachment with other work.

B. Verify that wall openings and adjoining air and vapor seal materials are ready to receive work of this section.

3.02 INSTALLATION

A. Install wall system in accordance with manufacturer's instructions.

B. Attach to structure to permit sufficient adjustment to accommodate construction tolerances and other irregularities.

C. Provide alignment attachments and shims to permanently fasten system to building structure.

D. Align assembly plumb and level, free of warp or twist. Maintain assembly dimensional tolerances, aligning with adjacent work.

E. Provide thermal isolation where components penetrate or disrupt building insulation.

F. Install sill flashings. Turn up ends and edges; seal to adjacent work to form water tight dam.

G. Where fasteners penetrate sill flashings, make watertight by seating and sealing fastener heads to sill flashing.

H. Coordinate attachment and seal of perimeter air and vapor barrier materials.

I. Pack fibrous insulation in shim spaces at perimeter of assembly to maintain continuity of thermal barrier.

J. Set thresholds in bed of mastic and secure.

K. Install hardware using templates provided.
   1. See Section 08 71 00 for hardware installation requirements.

L. Install glass and infill panels in accordance with Section 08 80 00, using glazing method required to achieve performance criteria.

M. Install perimeter sealant in accordance with Section 07 90 05.

N. Touch-up minor damage to factory applied finish; replace components that cannot be satisfactorily repaired.

3.03 TOLERANCES

A. Maximum Variation from Plumb: 0.06 inches every 3 ft non-cumulative or 1/16 inches per 10 ft, whichever is less.

B. Maximum Misalignment of Two Adjoining Members Abutting in Plane: 1/32 inch.

3.04 FIELD QUALITY CONTROL

A. See Section 01 40 00 - Quality Requirements, for independent testing and inspection requirements. Inspection will monitor quality of installation and glazing.

B. Test installed storefront for water leakage in accordance with AAMA 501.2.

3.05 ADJUSTING

A. Adjust operating hardware for smooth operation and to be weathertight when closed and locked. Hardware and parts shall be lubricated as necessary.

3.06 CLEANING

A. Remove protective material from pre-finished aluminum surfaces.

B. Wash down surfaces with a solution of mild detergent in warm water, applied with soft, clean wiping cloths. Take care to remove dirt from corners. Wipe surfaces clean.

C. Remove excess sealant by method acceptable to sealant manufacturer.

3.07 PROTECTION

A. Protect installed products from damage during subsequent construction.

END OF SECTION

SECTION 08 71 00
DOOR HARDWARE

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Hardware for wood doors.

B. Verify compatibility of new hardware scheduled to be installed on existing doors prior to submitting proposals for this phase of the Work. No claims for extras due to hardware compatibility will be accepted after bids are submitted.

C. Removal of existing hardware, patching and/or concealment hardware of door and frame hardware prep recesses and cut-outs not used by new hardware.

1.02 RELATED REQUIREMENTS

A. Section 08 11 13 - Hollow Metal Frames.

B. Section 08 14 16 - Flush Wood Doors.

1.03 REFERENCE STANDARDS

A. ANSI/ICC A117.1 - American National Standard for Accessible and Usable Buildings and Facilities; International Code Council; 2003.

B. ANSI/BHMA A156 Series - Certified Product Standards, most current edition.

C. 36 CFR 1191 - Americans with Disabilities Act Accessibility Guidelines for Buildings and Facilities, 2011; current edition

D. DHI WDHS.3 - Recommended Locations for Architectural Hardware for Flush Wood Doors; Door and Hardware Institute; 1993; also in WDHS-1/WDHS-5 Series, 1996.

E. NFPA 80 - Standard for Fire Doors and Other Opening Protectives; 2010.

F. NFPA 101 - Life Safety Code.

G. NFPA 105 - Smoke and Draft Control Door Assemblies, latest edition.

H. UL 10B - Fire Tests of Door Assemblies.

I. UL 305 - Panic Hardware.

1.04 ADMINISTRATIVE REQUIREMENTS

A. Coordinate the manufacture, fabrication, and installation of products onto which door hardware will be installed.

B. Furnish templates for door and frame preparation to manufacturers and fabricators of products requiring internal reinforcement for door hardware.

C. Convey Owner's keying requirements to manufacturers.

D. Pre-installation Meeting: Convene a pre-installation meeting one week prior to commencing work of this Section; require attendance by all affected installers.

E. Sequence installation to ensure utility connections are achieved in an orderly and expeditious manner.

1.05 SUBMITTALS

A. See Section 01 30 00 - Administrative Requirements.

B. Product Data: Manufacturer's catalog literature for each type of hardware, marked to clearly show products to be furnished for this project.
   1. Name and manufacturer of each item, type, style, function, size and finish for each item.
   2. Door and frame sizes, thicknesses, materials, hand, degrees of opening for doors, with closers and/or overhead holders, and labeling.

3. Explanation of all abbreviations, symbols, and codes used on schedules, and any other relevant information.
4. The schedule shall be reviewed prior to submission by a certified Architectural Hardware Consultant (AHC).
5. Submit within one week of final review of the hardware schedule, manufacturer's templates to any suppliers and or subcontractors who may require them.

C. Samples:
1. Upon request, submit 1 sample of hinge, latchset, and lockset illustrating style, color, and finish.
2. Approved samples will be incorporated into the Work. Rejected samples will be returned to the contractor and shall be re-submitted.

D. Hardware Schedule: Detailed listing of each item of hardware to be installed on each door. Use door numbering scheme as included in the Contract Documents. Identify electrically operated items and include power requirements.

E. Keying Schedule: It shall be the responsibility of the hardware supplier to meet with the Owner to determine and coordinate keying with door hardware for the Project. Submit separate detailed schedule, indicating clearly how the Owner's final instructions on keying of locks has been fulfilled.
1. Function of door, flow of traffic, degree of security required, lockset function and future expansion plans.
2. Preliminary key system schematic diagram.
3. Requirements for key control system.
4. Address for delivery of keys.

F. Manufacturer's Installation Instructions: Indicate special procedures, perimeter conditions requiring special attention.

G. Close-out Documents:
1. Project Record Documents: Record actual locations of concealed equipment, services, and conduit.
2. Maintenance Data: Include data on operating hardware, lubrication requirements, and inspection procedures related to preventative maintenance.
3. Bitting List: List of combinations as furnished.
4. Catalog pages for each product, contact information for local representative for each manufacturer.
5. As-installed hardware schedule and final keying schedule.

H. Keys: Deliver with identifying tags to Owner by security shipment direct from hardware supplier.

I. Warranty: Submit manufacturer's warranty and ensure that forms have been completed in Owner's name and registered with manufacturer.

J. Maintenance Materials and Tools: Furnish the following for Owner's use in maintenance of project.
1. See Section 01 60 00 - Product Requirements, for additional provisions.
2. Extra Lock Cylinders: One for each master keyed group.
3. Tools: One set of all special wrenches or tools applicable to each different or special hardware component, whether supplied by the hardware component manufacturer or not.

1.06 QUALITY ASSURANCE

A. Manufacturer Qualifications: Company specializing in manufacturing the products specified in this section with minimum twenty years of documented experience.

B. Hardware Supplier Qualifications: Company specializing in supplying commercial door hardware with ten years of experience.

C. Hardware Supplier Personnel: Employ an Architectural Hardware Consultant (AHC) to assist in the work of this section.

D. Quantities: Furnish appropriate hardware for all doors in the Project. Approval of incomplete hardware schedule or acceptance of incorrect quantities at the job site will not alter this requirement. It is the intent of the hardware sets, indicated on the Drawings, to accurately list the hardware required for each door on this Project. However, should any doors have been inadvertently omitted from the sets it will be the hardware supplier's responsibility to furnish hardware for these doors that is of the same quality, type, size, function, and finish as that specified for similar doors on the Project.

1.07 DELIVERY, STORAGE, AND HANDLING

A. All hardware shall be brought to the job site in the manufacturer's original packaging, with each hardware item individually labeled and identified with door opening code to match hardware schedule.

1.08 WARRANTY

A. See Section 01 78 10 - Warranties, for additional warranty requirements.

B. All finish hardware shall be warranted against manufacturing defects and faulty workmanship for a period of two years from the date of Substantial Completion, except for the following:
   1. Hinges shall be warranted for the life of the building.
   2. Mortised locks and latches shall be warranted for ten years.

C. The hardware supplier, at his expense, shall adjust, repair, or replace, including labor for installation, any finish hardware supplied under this Section, which is found to be malfunctioning or defective during the above warrantee periods, except due to abuse.

PART 2 PRODUCTS

2.01 DOOR HARDWARE - GENERAL

A. Provide all hardware specified or required to make doors fully functional, compliant with applicable codes, and secure to the extent indicated.

B. Provide all items of a single type of the same model by the same manufacturer.

C. Provide products that comply with the following:
   1. Applicable provisions of federal, state, and local codes.
   2. ANSI/ICC A117.1, American National Standard for Accessible and Usable Buildings and Facilities.
   3. Hardware for Smoke and Draft Control Doors: Provide hardware that enables door assembly to comply with air leakage requirements of the applicable code.

D. Finishes: All door hardware the same finish unless otherwise indicated.
   1. In general, all hardware shall be US26D (satin chromium), unless noted otherwise.

E. Fasteners:
   1. All hardware shall be installed with fasteners provided by the hardware manufacturer. Exposed fasteners shall be finished to match the hardware finish. Generally, fasteners for hardware shall be concealed when the door is closed.
   2. Concrete and Masonry Substrates: Stainless steel machine screws and lead expansion shields.

F. Acceptable Manufacturers: Only hardware manufactured by one of the companies indicated below shall be accepted for use in the Project, and acceptance is limited only to the category of hardware for which the manufacturer is specified or listed as an acceptable equal.

2.02 HINGES

A. Hinges: Provide hinges on every swinging door.
   1. Provide five-knuckle full mortise butt hinges unless otherwise indicated.
   2. Provide ball-bearing hinges at all doors.
   3. Hinge pins shall be steel non-rising at interior doors.
   4. Provide hinges in the quantities indicated.

5. Provide non-removable pins on outswinging interior doors at Chemistry Lab 305 and Prep 305A.
6. Comply with BHMA A156.1 and A156.7; standard weight, 4-1/2" high, for doors up to 3 feet wide; heavy weight, 5" high, for doors over 3 feet wide.
7. Provide hinge width of 4" or as required to clear surrounding trim. Provide long throw or clear swing hinges where frames are recessed in the wall and where greater than 110 degree swing is required.
8. Materials: Interior hinges shall be steel.

B. Quantity of Hinges Per Door:
1. Doors From 60 inches High up to 90 inches High: Three hinges.

C. Basis of Design:
1. Ives 5BB1 (up to 3 feet wide).
2. Stanley FBB179 (up to 3 feet wide).
3. McKinney TB2714 (up to 3 feet wide).

D. Acceptable Manufacturers:
1. Assa Abloy McKinney
2. Stanley Hardware.
3. Ives.

2.03 KEYING

A. General:
1. The hardware supplier shall make himself available early in the submittal process for a meeting with the Owner to review lock functions and keying requirements for this Project.
2. When providing keying information, comply with DHI Handbook - Keying Systems and Nomenclature

B. Lock Cylinders:
1. Lock Cylinders: Manufacturer’s standard tumbler type, six-pin interchangeable core.
2. Provide cams and/or tailpieces as required for locking devices required.
3. Cylinder parts shall be constructed of brass, bronze, stainless steel or nickel silver. Keys shall be made from nickel silver.
4. Cylinders and keys shall be provided by the Owner.

C. Keying: Grand master keyed.
1. Key to existing keying system for USM/Payson Smith Hall, Portland Camus. Coordinate with Owner.
2. Construction Keying with Removable Core Cylinders: Include removal of construction cores and replacement with permanent key removable masterkeyed cores.
3. All doors shall be construction keyed.
4. Supply keys in the following quantities:
   a. 3 change keys for each lock.
5. Factory key all cylinders with the manufacturer retaining permanent keying records. One bitting list sent registered mail, confidential, shall be furnished for the Owner's use.
6. All keys shall be stamped with their respective key set number. Master keys shall be stamped with their respective master key set letters. Do not stamp any keys with the factory key change number. Do not stamp any cores with the key set on the face (front) of the core. Stamp identification on back or side of the cores.

D. Acceptable Manufacturers - Security Cylinders:
1. Schlage Primus.
2. Medeco.
3. Assa.

2.04 MORTISED LOCKSETS

A. Mortised Locksets: ANSI A156.13, Grade 1, with case and parts manufactured from heavy gauge steel, zinc plated for corrosion resistance, with brass, bronze, or stainless steel armor plate.
   1. Standard 2-3/4" backset with a full 3/4" throw, stainless steel latchbolt. Deadbolts shall be stainless steel with hardened steel rollers and shall have a full 1" throw.
   2. Lever trim shall be cast or forged with wrought roses. Levers shall be thru-bolted for proper alignment.
   3. All doors opening into or from hazardous areas (Prep 305A) shall have knurled or roughened levers for tactile warning to the visually impaired.
   4. Provide wrought boxes and strikes with proper lip length to protect trim but not to project more than 1/8 inch beyond trim, frame or inactive leaf.
   5. All lock functions shall be reviewed with the Owner during the keying meeting prior to ordering.

B. Basis of Design:
   1. Schlage L Series, 06 lever design.
   2. Sargent 8200-LNB Series; function as scheduled.

C. Acceptable Manufacturers:
   1. Assa Abloy Sargent.
   2. Schlage.

2.05 CLOSERS

A. Closers: Comply with BHMA A156.4. Fully hydraulic rack and pinion action with a high strength cast iron 1-1/2" diameter cylinder and full cover. Hydraulic fluid shall not require seasonal closer adjustment for temperatures ranging from 120 to -30 degrees F. Hydraulic regulation shall be by tamper proof, non-critical valves.
   1. Provide surface-mounted, door-mounted closers unless otherwise indicated.
   2. At corridors, locate door-mounted closer on room side of door.
   3. Sizing of closers: Unless otherwise indicated, comply with the manufacturer's closer sizing recommendations for door size, exposure to weather, and anticipated frequency of use.
   4. Closer Adjustment: Separate adjustment for latch speed, general speed, and backcheck; spring power shall be continuously adjustable over the full range of closer sizes and shall provide for reduced opening force for the physically challenged.
   5. The Contractor shall adjust closing and latching speeds of all closers as required to provide smooth, continuous closing action.
   6. Delayed Action: Provide ADA compliant delayed action option for all closers.

B. Arms: Solid forged steel main arms and fore arms. All door closers shall be furnished with PARALLEL ARMS wherever possible and unless specified otherwise. In general, door closers shall be mounted on the "room" side of doors and shall not be visible in corridors, lobbies and other public spaces unless necessary.
   1. Attachment Accessories: As required to properly attach the closerr to the door and frame; including, but not limited to: drop plates, spacers, brackets and special arms.

C. Basis of Design:
   1. Sargent 1430 Series.
   2. LCN 1460 Series

2.06 STOPS

A. Stops: Comply with BHMA A156.8; provide a stop for every swinging door, unless otherwise indicated.
   1. Provide wall stops, unless otherwise indicated or if field conditions do not allow for a wall stop. Concealed blocking for attachment to walls shall be provided under Section 06 10 54.

2. If wall stops are not practical, due to configuration of room or furnishings, review with Architect to determine if an overhead stop or floor stop shall be provided. It shall be the responsibility of the Contractor to properly coordinate stops to suit specific job conditions.

B. Basis of Design:
1. Stops: Ives WS407, FS436, or FS438 as suited to job conditions.
2. Overhead Stop: 90S by Glynn-Johnson.

C. Acceptable Manufacturers:
1. Assa Abloy Rixson or Sargent.
2. Rockwood.
3. Glynn-Johnson.

2.07 ARCHITECTURAL TRIM

A. Silencers: Grey rubber plug-in type, not adhesive applied; 3 for each single frame. All doors not scheduled to receive door stripping shall receive silencers.

B. Basis of Design:
1. Silencers: Ives.

2.08 CLEANING

A. Clean adjacent surfaces soiled by hardware installation. Clean finished hardware per manufacturer's instructions after final adjustments has been made. Replace items that cannot be cleaned to manufacturer's level of finish quality at no additional cost.

2.09 PREPARATION

A. For steel frames: Comply with DHI "Recommended Locations for Architectural Hardware for Steel Doors and Frames."
1. For steel door frames: See Section 08 11 13.

B. Install hardware in accordance with manufacturer's instructions and applicable codes.

C. Hardware shall only be installed by experienced finish hardware installers. Set units level, plumb and true to line and locations.

PART 3 EXECUTION

3.01 TEMPLATES

A. Use templates provided by hardware item manufacturer.

B. Do not install surface mounted items until finishes applied to substrate are complete.

C. For wood doors: Comply with DHI "Recommended Locations for Architectural Hardware for Wood Flush Doors."

3.02 ADJUSTING AND INSPECTION

A. Provide an Architectural Hardware Consultant to inspect installation and certify that hardware and installation has been furnished and installed in accordance with manufacturer's instructions and as specified.

B. Adjust and check each item of hardware and each door, to ensure proper operation or function of every unit. Replace units that cannot be adjusted to operate freely and smoothly as intended for the application.

C. After the hardware has been installed, the hardware supplier shall inspect the Project and ascertain that all items of hardware have been properly installed, fastened, and are functioning as required. Any discrepancies shall be called to the attention of the Contractor, who shall be responsible for correcting them.

D. Clean adjacent surfaces soiled by hardware installation. All hardware shall be protected from dents and scratches. Hardware that is damaged prior to building completion shall be replaced at no cost to the Owner.

3.03 HARDWARE SETS

A. Refer to the Drawings.

END OF SECTION

SECTION 08 80 00
GLAZING

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Glass.

B. Glazing compounds and accessories.

1.02 RELATED REQUIREMENTS

A. Section 07 90 05 - Joint Sealers: Sealant and back-up material.

B. Section 08 11 13 - Hollow Metal Doors and Frames: Glazed doors and borrowed lites.

C. Section 08 14 16 - Flush Wood Doors: Glazed doors.

D. Section 08 43 13 - Aluminum-Framed Storefronts: Glazed framing and entrance doors.

1.03 REFERENCE STANDARDS

A. 16 CFR 1201 - Safety Standard for Architectural Glazing Materials; current edition.

B. ANSI Z97.1 - Safety Glazing Materials Used in Buildings, Safety Performance Specifications and Methods of Test; 2010.

C. ASTM C864 - Standard Specification for Dense Elastomeric Compression Seal Gaskets, Setting Blocks, and Spacers; 2005 (Reapproved 2011).

D. ASTM C1036 - Standard Specification for Flat Glass; 2011e1.

E. ASTM C1048 - Standard Specification for Heat-Strengthened and Fully Tempered Flat Glass; 2012.

F. ASTM C1172 - Standard Specification for Laminated Architectural Flat Glass; 2014.

G. ASTM C1193 - Standard Guide for Use of Joint Sealants; 2013.

H. ASTM E1300 - Standard Practice for Determining Load Resistance of Glass in Buildings; 2012a.

I. ASTM E2190 - Standard Specification for Insulating Glass Unit Performance and Evaluation; 2010.

J. GANA - GANA Glazing Manual; Glass Association of North America; 2009.

K. GANA - GANA Sealant Manual; Glass Association of North America; 2008.

L. SIGMA TM-3000 - Glazing Guidelines for Sealed Insulating Glass Units; 2004.

1.04 ADMINISTRATIVE REQUIREMENTS

A. Pre-installation Meeting: Convene a pre-installation meeting one week before starting work of this Section; require attendance by all affected installers.

1.05 SUBMITTALS

A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.

B. Product Data on Glass Types: Provide structural, physical and environmental characteristics, size limitations, special handling or installation requirements.

C. Samples: Submit samples 8x8 inch in size of glass units.

D. Certificates: Certify that products meet or exceed specified requirements.

1.06 QUALITY ASSURANCE

A. Perform Work in accordance with GANA Glazing Manual and FGMA Sealant Manual for glazing installation methods.

B. Installer Qualifications: Company specializing in performing the work of this Section with minimum five years documented experience.

C. All heat strengthened, tempered and laminated glass shall be permanently labeled by such means as etching, sandblasting, firing of ceramic materials on the glass, or by other suitable means so as to be easily visible and legible. The label shall identify the nominal thickness, glass type and compliance with requirements of ANSI Z97.1 and with a certification label of the Safety Glazing Certification Council (SGCC) or other certifying agency acceptable to the Authority Having Jurisdiction.

1.07 FIELD CONDITIONS

A. Do not install glazing when ambient temperature is less than 50 degrees F.

B. Maintain minimum ambient temperature before, during and 24 hours after installation of glazing compounds.

1.08 WARRANTY

A. See Section 01 78 00 - Project Close-out, for additional warranty requirements.

B. Sealed Glass Units: Provide a ten (10) year warranty to include coverage for sealed glass units from seal failure, interpane dusting or misting, and replacement of same. The warranty shall ensure that coatings will not crack, flake, peel or otherwise fail or degrade.

C. Laminated Glass: Provide a ten (10) year warranty to include coverage for delamination, including replacement of failed units.

PART 2 PRODUCTS

2.01 INSULATING GLASS UNITS

A. Type IG-1 - Sealed Insulating Glass Units: Vision glass, double glazed.
   1. Application: All exterior glazing unless otherwise indicated.
   2. Outboard Lite: Heat-strengthened float glass, or tempered glass where required by code or where indicated, 1/4 inch thick, minimum.
      a. Tint: Clear.
      b. Coating: Low-E (passive type), on #2 surface.
   3. Inboard Lite: Annealed float glass or tempered glass where required by code or where indicated, 1/4 inch thick, minimum.
      a. Tint: Clear.
   4. Total Thickness: 1 inch.
   5. Tempered Glass Applications: Provide this type of glazing in the following locations:
      a. Glazed lites in exterior doors.
      b. Glazed sidelights and panels next to doors.
      c. Other locations required by applicable federal, State, and local codes and regulations.
      d. Other locations indicated on the Drawings.
   6. Performance Requirements:
      a. Visible Light Transmittance (VLT): 70%, nominal.
      b. Winter U Value: 0.25 max.
      c. Summer U Value: 0.25 max.
      d. Light to Solar Gain Ratio (LSG): 1.85
      e. Solar Heat Gain Coefficient (SHGC): 0.38 percent, nominal.

B. Type S-1 - Single Vision Glazing: Non-fire-rated, fully tempered.
   1. Applications: All non-fire-rated interior glazing unless otherwise indicated.
   2. Types: Fully tempered.
   3. Tint: Clear.
   4. Thickness: 1/4 inch.

2.02 EXTERIOR GLAZING ASSEMBLIES

A. Structural Design Criteria: Select type and thickness to withstand dead loads and wind loads acting normal to plane of glass at design pressures calculated in accordance with International Building code, 2009 edition.
   1. Design Pressure: Calculated in accordance with applicable codes.
   2. Design Wind Speed: See Structural Drawings.
   3. Use the procedure specified in ASTM E1300 to determine glass type and thickness.
   4. Limit glass deflection to 1/200 or flexure limit of glass, whichever is less, with full recovery of glazing materials.
   5. Glass thicknesses listed are minimum.

B. Thermal and Optical Performance: Provide glass products with performance properties specified above. Performance properties shall be manufacturer's published data as determined according to the following procedures:
   1. Center of glass U-Value: NFRC 100 methodology using LBNL WINDOW 5.2 computer program.
   2. Center of glass solar heat gain coefficient: NFRC 200 methodology using LBNL-35298 WINDOW 5.2 computer program.
   3. Solar optical properties: NFRC 300.

C. Insulating Glass shall comply with ASTM D 2190 Standard Specification for Insulating Glass Unit Performance and Evaluation. Unit shall be certified for compliance by the IGCC.

D. Unit Overall Thickness Tolerance: - 1/16" / + 1/132".

E. Comply with ASTM E546 Standard Test Method for Frost Point of Sealed Insulating Glass Units and ASTM E576 for insulating glass units in the vertical position.

F. Insulating glass units shall be double sealed with a primary seal of polyisobutylene and a secondary seal of silicone.
   1. Minimum thickness of secondary seal: 1/16".
   2. Target width of primary seal: 5/32".
   3. No primary seal voids or skips allowed.
   4. Gaps or skips between the primary and secondary sealants are permitted to a maximum width of 1/16" by maximum length of 2" with gaps separated by at least 18". Continuous contact between the primary seal and the secondary seal shall be provided.
   5. Primary and secondary sealant adhesion shall exhibit continuous, tenacious adhesion to both glass and spacer contact areas.

G. Edge Seal Construction: Structural aluminum with formulated polyurethane thermal barrier, for no direct heat flow path. Warm Edge IG Spacer as manufactured by Technoform., or equal.

H. Air and Vapor Seals: Provide completed assemblies that maintain continuity of building enclosure vapor retarder and air barrier:
   1. In conjunction with vapor retarder and joint sealer materials described in other Sections.
   2. To maintain a continuous air barrier and vapor retarder throughout the glazed assembly from glass pane to heel bead of glazing sealant.

2.03 GLASS MATERIALS

A. Float Glass Manufacturers:
   1. AGC Flat Glass North America, Inc.
   2. Guardian Industries Corp.
   3. Pilkington North America Inc.
   4. PPG Industries, Inc.
   5. Substitutions: Refer to Section 01 60 00 - Product Requirements.

B. Float Glass: All glazing shall be float glass unless otherwise indicated.
   1. Annealed Type: ASTM C1036, Type I, transparent flat, Class 1 clear, Quality Q3 (glazing select).
   2. Heat-Strengthened and Fully Tempered Types: ASTM C1048.

3. Tinted Types: Color and performance characteristics as indicated.
4. Thicknesses: As indicated; for exterior glazing comply with specified requirements for wind load design regardless of specified thickness.

2.04 SEALED INSULATING GLASS UNITS

A. Manufacturers:
   1. Any of the manufacturers specified for float glass.
   2. Basis of Design: SunGuard SuperNeutral 68 by Guardian Industries Corp.
   3. Substitutions: Refer to Section 01 60 00 - Product Requirements.

B. Sealed Insulating Glass Units: Types as indicated.
   1. Application: Exterior, except as otherwise indicated.
   2. Durability: Certified by an independent testing agency to comply with ASTM E2190.
   3. Edge Spacers: Aluminum, bent and soldered corners.
   4. Edge Seal: Glass to elastomer with supplementary silicone sealant.
   5. Purge interpane space with dry hermetic air.

2.05 PLASTIC FILMS

A. Plastic Film: 2-mil/2-ply, scratch resistant, decorative plastic film for application on glass; Class A fire-rated; pattern as indicated on the Finish Legend.
   1. Roll Width: 60 inches.
   2. Color: Selected by Architect from manufacturer’s full range.
   3. Warranty: Manufacturer 5 Year Limited Warranty.
   4. Products: (Basis of Design) SXP Series by SOLYX
   5. Substitutions: Refer to Section 01 60 00 - Product Requirements.

2.06 GLAZING ACCESSORIES

A. Glazing Materials: Select glazing compounds, sealants, tapes, gaskets and additional glazing materials of proven compatibility with other materials they will contact, including glass products, seals of insulating glass units and glazing channel substrates, under conditions of installation and service, as demonstrated by testing and field experience.

2.07 MISCELLANEOUS ACCESSORIES

A. Miscellaneous Hardware: Provide all hardware required for intended glass applications.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify that openings for glazing are correctly sized and within tolerance. Glass sizes indicated on the Drawings are approximate only.

B. Verify that surfaces of glazing channels or recesses are clean, free of obstructions that may impede moisture movement, weeps are clear, and ready to receive glazing.

3.02 PREPARATION

A. Clean contact surfaces with solvent and wipe dry.

B. All frames shall be checked prior to glazing to make certain openings are square, plumb and secure in order that uniform face and edge clearances are maintained.

C. Seal porous glazing channels or recesses with substrate compatible primer or sealer.

D. Prime surfaces scheduled to receive sealant.

E. Install sealants in accordance with ASTM C1193 and GANA Sealant Manual.

F. Install sealants in accordance with manufacturer's instructions.

3.03 GLAZING METHODS

A. All glazing shall be performed in accordance with standards of FGMA, AAMA and SIGMA, latest editions. Glass clearance dimensions shall be based on the type and thickness of the glass as determined by the FGMA Glazing Manual, or as hereinafter specified.

B. No glass shall be installed where it may be damaged unless it is properly protected at all times. Any damaged or defective glass shall be removed and replaced with new perfect glass at no additional cost to the Owner.

3.04 INSTALLATION – PLASTIC FILM

A. Clean application surfaces thoroughly prior to installation. Install in accordance with film manufacturer's instructions.

B. Cut film edges neatly and square at a uniform distance of 1/8 inch to 1/16 inch from window sealant. Spray slip solution on glass and adhesive to facilitate proper positioning of film. Squeegee from top to bottom of window. Spray slip solution to film and squeegee a second time.

C. Place without air bubbles, creases or visible distortion.

D. Upon completion of film application, allow 30 days for moisture from film installation to dry thoroughly and to allow film to dry flat with no moisture dimples when viewed under normal viewing conditions.

3.05 CLEANING

A. Remove glazing materials from finish surfaces.

B. Remove labels after Work is complete.

C. Clean glass and adjacent surfaces.

END OF SECTION

SECTION 09 21 16
GYPSUM BOARD ASSEMBLIES

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Performance criteria for gypsum board assemblies.

B. Note: Existing metal stud partitions indicated to receive new cabinet, countertop or other special loading, shall be investigated to determine stud thickness, size, spacing and top support conditions. An engineering analysis shall be conducted for accommodation of new loads, and to determine what, if any, structural improvements are required.

C. Interior metal stud wall framing.

D. Metal channel ceiling and soffit framing.

E. Miscellaneous framing.

F. Acoustic Construction, including installation of acoustic insulation and sealing of joints at framing and gypsum board.

G. Installation of fire safing insulation at all tops of all stud walls and partitions and as specified herein.

H. Gypsum wallboard.

I. Joint treatment, expansion and control joints, special shapes and accessories.

1.02 RELATED REQUIREMENTS

A. Section 01 71 00 - Cutting and Patching.

B. Section 06 10 54 - Wood Blocking and Curbing: Wood blocking for support of wall-mounted equipment.

C. Section 07 21 00 - Thermal Insulation: Acoustic insulation.

D. Section 07 84 00 - Firestopping: Top-of-wall assemblies at fire rated walls.

E. Section 07 90 05 - Joint Sealers: Acoustic sealant.

1.03 REFERENCE STANDARDS

A. AISI S100- North American Specification for the Design of Cold-Formed Steel Structural Members; American Iron and Steel Institute; 2001 with 2004 supplement. Current edition.

B. ANSI S200 - North American Standard for Cold-Formed Steel Framing - General Provisions.

C. ASTM A653 - Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process; 2011.

D. ASTM A1003 - Standard Specification for Steel Sheet, Carbon, Metallic-Coated and Nonmetallic-Coated for Cold-Formed Framing Members; 2005.

E. ASTM C475 - Standard Specification for Joint Compound and Joint Tape for Finishing Gypsum Board; 2002 (Reapproved 2007).

F. ASTM C 645 - Standard Specification for Nonstructural Steel Framing Members; 2008.

G. ASTM C754 - Standard Specification for Installation of Steel Framing Members to Receive Screw-Attached Gypsum Panel Products; 2011.

H. ASTM C840 - Standard Specification for Application and Finishing of Gypsum Board; 2013.

I. ASTM C954 - Standard Specification for Steel Drill Screws for the Application of Gypsum Panel Products or Metal Plaster Bases to Steel Studs From 0.033 in. (0.84 mm) to 0.112 in. (2.84 mm) in Thickness; 2011.

J. ASTM C1002 - Standard Specification for Steel Self-Piercing Tapping Screws for the Application of Gypsum Panel Products or Metal Plaster Bases to Wood Studs or Steel Studs; 2007 (Reapproved 2013).

K. ASTM C1047 - Standard Specification for Accessories for Gypsum Wallboard and Gypsum Veneer Base; 2010a.

L. ASTM C1396- Standard Specification for Gypsum Board; 2011.

M. ASTM D3273 - Standard Test Method for Resistance to Growth of Mold on the Surface of Interior Coatings in an Environmental Chamber; 2012.

N. ASTM E90 - Standard Test Method for Laboratory Measurement of Airborne Sound Transmission Loss of Building Partitions and Elements; 2009.

O. ASTM E413 - Classification for Rating Sound Insulation; 2010.

P. GA-216 - Application and Finishing of Gypsum Board; Gypsum Association; 2013.

Q. GA-600 - Fire Resistance Design Manual; Gypsum Association; 2012.

R. ICC (IBC) - International Building Code; 2009.

S. UL (FRD) - Fire Resistance Directory; Underwriters Laboratories Inc.; current edition.

1.04 SUBMITTALS

A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.

B. Shop Drawings:
   1. Submit details associated with fireproofing and acoustic seals.
   2. Submit fully engineered shop drawings of all new partitions and existing partitions with special loading conditions including but not limited to: wall mounted cabinets, shelving, and counters specified herein. Submit design criteria, calculations, size and thickness designations, type, location, spacing, connection to building structure, supplemental bracing or accessories, fasteners and details required for proper installation. Shop drawings shall bear the license seal of a professional structural engineer licensed to practice in the State of Maine.
   3. Submit color coded floor plans with partition colors keyed to stud manufacturer's color coding system indicating extents of each stud / partition assembly type.

C. Product Data:
   1. Provide data on metal framing runners, head tracks, metal framing, gypsum board, accessories, and joint finishing system.
   2. Provide manufacturer's data on partition head to structure connectors, showing compliance with requirements.

D. Test Reports: For all stud framing products that do not comply with ASTM C645 or C754, provide independent laboratory reports showing maximum stud heights at required spacings and deflections.

E. Samples:
   1. Upon request, submit samples of all materials and accessories.

1.05 QUALITY ASSURANCE

A. All procedures and workmanship shall be in accordance with Gypsum Association GA-216 "Application and Finishing of Gypsum Board" and Gypsum Association Specifications for the Installation of Screw-Type Steel Framing Members to Receive Gypsum Board.

B. Panel Products and Finishing Manufacturer: Unless otherwise indicated, gypsum board and other panel products, accessories and finishing materials shall be from a single manufacturer.

C. Metal Framing Manufacturer: Unless otherwise indicated, steel framing for gypsum board assemblies shall be from a single manufacturer.

D. Installer Qualifications: Company specializing in performing gypsum board application and finishing, with minimum 5 years of documented experience.

E. Framing components and assemblies required to be engineered and detailed on shop drawings shall include proper accommodations for all live and dead loads, differential building movement, etc. Provide industry standard safety factors as suited to specific job conditions. To the extent that component types and sizes are indicated in the Contract Documents, they shall be considered minimum requirements to be verified and increased (but not decreased) as determined to be necessary by the metal stud contractor's engineer. Framing member depths indicated on the Drawings shall not be altered without the Architect's prior written authorization.

1.06 PRE-INSTALLATION MEETING

A. At least 3 weeks prior to start of installation of metal framing systems, meet at the project site with installers of other work including door and window frames, mechanical and electrical work. Review areas of potential interference and conflicts, coordinate layout, and support provisions for interfacing work.

1.07 DELIVERY, STORAGE AND HANDLING

A. All materials shall be delivered to the job site in their original unopened containers or bundles, stored flat under conditions providing adequate protection from damage and exposure to elements and adequately protected from foul weather conditions.

B. Steel framing and related accessories shall be stored and handled in accordance with AISI Code of Standard Practice.

C. All fire-rated materials shall bear testing agency labels and required classification numbers.

PART 2 PRODUCTS

2.01 GYPSUM BOARD ASSEMBLIES

A. Provide completed assemblies complying with ASTM C840 and GA-216.
   1. See PART 3 for finishing requirements.

B. Interior Partitions Indicated as Acoustic: Provide completed assemblies with the following characteristics:
   1. Acoustic Attenuation: STC as indicated on the Drawings, calculated in accordance with ASTM E413 by a qualified independent testing agency, based on tests conducted in accordance with ASTM E90.

C. Fire Rated Assemblies: Provide completed assemblies as indicated on the Drawings. Materials and construction shall be identical to assemblies whose fire resistance rating has been determined per ASTM E119 by a testing and inspection service acceptable to the Authority Having Jurisdiction. Materials provided shall meet or exceed flame, fuel and smoke requirements of ASTM E84 surface burning characteristics for finish materials.
   1. Gypsum Association File Numbers: Comply with requirements of GA-600 for the particular assembly.
   2. UL Assembly Numbers: Comply with requirements listed for each particular assembly in the current UL Fire Resistance Directory.

D. Design Requirements:
   1. Steel partition stud maximum spacing: 16 inches on center.
   2. Steel partition stud lateral deflections:
      a. Typical gypsum board faced partitions: L/240.
   3. Steel partition stud uniform lateral loads:
      a. Typical gypsum board faced partitions: 5 PSF.
   4. Steel partition stud special loads in addition to uniform lateral loads:
      a. Wall mounted cabinets: Minimum 60 PLF applied vertically 6" from the face of the wall (for a 12" deep cabinet).
      b. Wall mounted shelving: Minimum 20 PLF per shelf applied vertically 6" from the face of the wall for four shelves spaced 12" apart with top shelf at 6 feet AFF (for a 12" deep shelf).

c. Wall mounted counters: Minimum 100 PLF applied vertically 12" from the face of the wall (for a 24" deep counter) and applied vertically 15" from the face of the wall (for a 30" deep counter).
d. Wall mounted drying peg board: Minimum 60 PLF applied 6" from the face of the wall for a 3 feet by 3 feet area.

5. Steel soffit and ceiling framing studs lateral deflection: L/240.

2.02 METAL FRAMING MATERIALS

A. Manufacturers - Metal Framing, Connectors, and Accessories:
1. Dietrich Metal Framing.
2. Marino\Ware.
3. Substitutions: See Section 01 60 00 - Product Requirements.

B. Framing System Components: ASTM C 645, roll-formed steel.
1. Protective Coating: ASTM A653 minimum G60 (Z180) hot-dip galvanized corrosion resistant coating.
2. Sizes: Sizes and properties necessary to comply with ASTM C 754 and for the spacing, deflection and load conditions indicated, but in no case less than 33 mils (0.0329 inches) minimum thickness.
3. Studs: C shaped with flat or formed webs, 1-1/4" legs (flanges) with knurled faces; web depths as indicated on the Drawings.
4. Runners: U shaped, sized to match studs.
5. Slip-Type Head Track Options:
a. Single Long-Leg Runner System: ASTM C645 top runner with 2 inch deep flanges in thickness as required by engineering but not less than stud thickness, installed with studs friction fit into top runner and with continuous bridging located within 12 inches of the top of studs to provide lateral bracing.
b. Double-Runner System: ASTM C645 top runners, inside runner with 2 inch deep flanges in thickness as required by engineering and fastened to studs, and outer runner sized to friction fit inside runner and in thickness as required by engineering but not less than stud thickness.
c. Deflection Track: Steel sheet top runner to accommodated deflection of structure above; in thickness as required by engineering but not less than stud thickness and in width to accommodate depth of studs.
6. Ceiling Carrying Channels: C shaped, minimum 54 mils (0.0538 inches); minimum 1/2 inch wide flanges; depth 3/4", 1-1/2", 2", 2-1/2" and as indicated on the Drawings.
7. Channel Bridging and Bracing: U shaped; 54 mils thickness; minimum 0.5 inch wide flanges; depth as indicated or required.

C. Ceiling and Soffit Suspension Systems: Comply with ASTM C754.
1. Interior Ceilings and Soffits:
a. Carrying Channels, Furring Channels: See above.
b. Flat steel hangers: Zinc coated sheet steel; type and size as specified in ASTM C754 for spacing required; minimum size 1 inch x 3/16 inch by length required.
c. Wire Hangers: ASTM A641, Class 1 zinc coating, soft temper, sized for the specific application, but in no case less than 0.162 inch diameter.
d. Tie Wire: ASTM A641, Class 1 zinc coated, soft temper, sized for the specific application, but in no case less than 0.0625 inch or double strand of 0.0475 inch diameter wire.
e. Anchors: Fabricated from corrosion-resistant materials with holes or loops for attaching wire hangers and capable of sustaining, without failure, a load equal to 5 times that imposed by construction as determined by testing according to ASTM E488.

D. Partition Head to Structure Connections: Provide mechanical anchorage devices that accommodate deflection using slotted holes, screws and anti-friction bushings, preventing rotation of studs while maintaining structural performance of partition.

1. Structural Performance: Maintain lateral load resistance and vertical movement capacity required by applicable code, when evaluated in accordance with AISI North American Specification for the Design of Cold-Formed Steel Structural Members.
2. Material: ASTM A653/A653M steel sheet, SS Grade 50/340, with G60/Z180 hot dipped galvanized coating.

2.03 BOARD MATERIALS

A. Gypsum Wallboard: Type X paper-faced gypsum panels as defined in ASTM C 1396; sizes to minimize joints in place; ends square cut.
   1. Application: Use for vertical surfaces and ceilings, unless otherwise indicated.
   2. Mold Resistance, ASTM D3273: Score of 10.
      a. Mold-resistant board is required at Chemistry Lab 305 and Prep 305A.
   3. Thickness: 5/8 inch.
   4. Paper-Faced Products:
      a. CertainTeed Corp; ProRoc Brand Gypsum Board.
      b. Georgia-Pacific Gypsum; ToughRock Fireguard, and ToughRock FireGuard C.
      c. National Gypsum Co; Gold Bond Brand Gypsum Wallboard.
      d. USG Corp; Sheetrock Brand Gypsum Panels.
      e. Substitutions: See Section 01 60 00 - Product Requirements.
   5. Mold-Resistant Paper-Faced Products:
      a. CertainTeed Corp; ProRoc Brand Moisture & Mold Resistant Gypsum Board.
      b. Georgia-Pacific Gypsum; ToughRock Mold-Guard Type X Gypsum Wallboard.
      c. National Gypsum Co; Gold Bond Brand XP FireShield Gypsum Board with Sporgard.
      d. USG Corp; Sheetrock Brand Mold Tough Gypsum Panels.
      e. Substitutions: See Section 01 60 00 - Product Requirements.

2.04 ACCESSORIES

A. Acoustic and Firestop Insulation: As specified in Section 07 21 00.

B. Acoustic and Smoke Sealant: As specified in Section 07 90 05.

C. Fire-stop Sealant: As specified in Section 07 84 00.

D. Finishing Accessories for Wallboard: ASTM C 1047, galvanized steel or rolled zinc, not less than 26 gage, unless otherwise indicated.
   1. General Types: As detailed or required for finished appearance.
   2. "J" Beads: Channel shaped with a concealed wing not less than 1-1/8" wide and an exposed wing, equal to Type 400. "J" beads may be used only where specifically identified on the Drawings or otherwise approved by the Architect. All other edge trim shall be Casing Beads.
   3. Casing and Trim Beads: Channel and angle types as required, screwed into place and suitable for finishing with joint compound, equal to Type 200.
      a. Vinyl Rip Bead L Trim is acceptable.
   4. Corner Beads: Angle-shaped with 1-1/4" width wings, and perforated for screwing and joint treatment, equal to Type 103. Use Mult-Flex, steel reinforced, tape bead for corners less than or greater than ninety degrees.
   5. Edge Beads: (For use at perimeter of ceilings) Channel or angle-shaped with wings not less than 3/4" wide. Exposed wing edge shall be folded flat, with bead for taping and floating, equal to Type 200.
   6. Control Joints: Zinc extrusions equal to Type 093, or deep rigid PV extrusions equal to Type 093V by Trimtex for larger joints.
   7. Miscellaneous Shapes: In addition to conventional cornerbead and control joints, provide other configurations indicated or as otherwise required for a complete and proper job.

E. Joint Materials: ASTM C475 and as recommended by gypsum board manufacturer for project conditions.
   1. Tape: 2 inch wide, creased paper tape for joints and corners for all interior locations.
   2. Ready-mixed vinyl-based joint compound.

F. High Build Drywall Surfacer: Vinyl acrylic latex-based coating for spray application, designed to take the place of skim coating and separate paint primer in achieving Level 5 finish for semi-gloss painted surfaces.
   1. Product: Tuff-Hide manufactured by USG.

G. Screws for gypsum board attachment to Steel Members From 0.033 to 0.112 Inch in thickness: ASTM C 954; steel drill screws for application of gypsum board to loadbearing steel studs.
   1. Size, penetration and spacing shall be in strict accordance with the stud manufacturer's recommendations and the stud fabricator's engineering requirements. Penetration through joined steel materials shall not be less than 3 exposed threads or 3/8".
   2. Coatings:
      a. All interior areas: High performance polymer coating, complying with ASTM B117; salt spray test result of no rust or other base metal corrosion after a minimum of 800 hours.
         1) Products: Stahlgard by ELCO, Kwik-Cote by Hilti, or approved equal.

H. Anchorage to Substrate: Anchorage of tracks to the structure (size, penetration, type and spacing) shall be in strict accordance with the stud fabricator/installer's engineering requirements for the specific application and shall rigidly secure materials in place.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify that project conditions are appropriate for work of this Section to commence.

3.02 FRAMING INSTALLATION

A. Metal Framing: Comply with ASTM C 754, fabricator's engineering drawings and manufacturer's instructions.

B. Suspended Ceilings and Soffits: Space framing and furring members as indicated and in accordance with fabricator's engineering drawings. Suspend carrying channels from structure above at not more than 4 feet on center and within 6 inches of walls. Attach furring channels to the carrying channels at no more than 16 inches on center and within 2 inches of walls.
   1. Level ceiling system to a tolerance of 1/8" in 12'.
   2. Install hangers plumb and free of contact with other objects that are not part of the supporting system for the ceiling. Install supplemental suspension members where width of ducts or other construction interferes with hanger locations.
   3. Provide control and expansion joints as indicated on the Drawings, or otherwise required.
   4. Laterally brace entire suspension system. Reinforce openings in suspension system which interrupt main carrying channels or furring channels with lateral channel bracing. Extend bracing a minimum of 24 inches past each opening.
   5. Install bracing as required at exterior locations to resist wind uplift.
   6. NOTE: At the Contractor's option, drywall direct suspension systems may be used, in lieu of the carrying/furring channel system specified, subject to review and acceptance by the Architect. Direct suspension systems shall be complete with main beams, cross channels, wall angles, clips, and hangers, and shall be as recommended by the gypsum board manufacturer for the proposed installations. Systems shall be suitable for fire-rated installations as required.
   7. Fasteners for hanger wires shall be of types and sizes that will resist corrosion, and provide lasting anchorage without pullout or failure. Verify compatibility with structure to receive fasteners prior to proceeding. Do not attach hangers to steel roof deck or steel deck tabs.

C. Runner Tracks: Install continuous tracks sized to match stud, aligned accurately to layout at base and tops of studs. Secure tracks as recommended by stud manufacturer and engineered design for type of construction involved.

D. Studs: Space studs at 16 inches on center unless closer spacing is required by the fabricator's engineering. Spacing shall not exceed 16 inches without the Architect's prior written authorization.
   1. Extend partition framing to structure in all locations.
   2. Partitions Terminating at Structure: Provide deflection head track at all locations where metal framing is attached to or otherwise affected by the deflection of other structural building components. Secure the top of studs in such a way as to allow movement of the deflection head track with respect to the studs. Attach extended leg top runner to structure, maintain clearance between top of studs and structure, and brace both flanges of studs with continuous bridging, or as otherwise required by the fabricator's engineering drawings.
   3. Provide minimum clear space as indicated on the partition types on the Drawings for deflection.

E. Openings: Reinforce openings as required for weight of doors or operable panels, using not less than double studs at jambs of all window and door openings and shall be located not more than 2 inches from frames jambs. Two jamb studs shall be used for any opening larger than 2 feet square. Over door frames install a cut-to-length section of runner with flanges slit and web bent to allow flanges to overlap adjacent vertical studs and securely screw-attached to adjacent studs. A cut-to-length stud extending from door frame header to ceiling runner shall be positioned over the door frame.
   1. Provide additional framing as required by engineered design to reinforce headers for adequate stability.
   2. Unless otherwise indicated on the Drawings, partitions above and below door and window openings shall be the same construction as adjacent partitions.

F. Blocking: As part of the scope of Section 06 10 54 - Wood Blocking and Curbing, install wood blocking for support of:
   1. Framed openings.
   2. Wall mounted cabinets.
   3. Toilet accessories.
   4. Wall mounted door hardware.
   5. Wall mounted countertops

G. Supplemental Framing: Install supplementary framing, blocking and bracing in metal framing system wherever walls or partitions are indicated to support fixtures, equipment, services, casework, heavy trim and furnishings, and similar work requiring attachment to the walls or partitions. Where type of supplementary support is not otherwise indicated by the engineered design, comply with stud manufacturer's recommendations and industry standards in each case, considering weight or loading resulting from item supported, for firm and rigid construction.

H. Penetration and Opening Insulation: Install firesafing insulation as required to meet firestop product manufacturer's tested assemblies for all openings and penetrations in fire-rated construction, smoke partitions and at acoustic sealing. Openings shall include steel deck flutes, structural penetrations, mechanical, electrical, piping, etc. Provide any necessary extra studs, furring channels or stick-clips to ensure that insulation will remain in proper alignment and fit around items penetrating partitions.

I. Fire-resistive Wall and Ceiling Assemblies: Where fire-rated assemblies are required, provide materials and construction identical to the Underwriters Laboratories (U.L.) tested assemblies as referenced on the Drawings.

3.03 ACOUSTICAL CONSTRUCTION

A. The following requirements shall apply to all non-fire rated ceilings and partitions indicated on the Drawings to be "Acoustical Construction". Special attention shall be paid to the proper installation of acoustical construction components.

B. Acoustic Insulation: Place tightly within spaces, around cut openings, behind and around electrical and mechanical items within partitions, and tight to items passing through partitions.

Prior to installation of gypsum board, verify that acoustical insulation is in place and secure, completely filling all voids.

C. Acoustic Sealant (at non-fire-rated construction): Install in accordance with manufacturer's instructions. Seal all cracks, joints, deck flutes, piping, conduit, duct penetrations and voids in "Acoustical Construction" air tight with sound sealing products.
   1. Place one bead continuously on substrate before installation of perimeter framing members.
   2. Place continuous bead at perimeter of each layer of gypsum board.
   3. In non-fire-rated construction, seal around all penetrations by conduit, pipe, ducts, and rough-in boxes.

3.04 BOARD INSTALLATION

A. General: Inspect materials to which gypsum board is to be applied. Remedy all defects prior to installation of gypsum materials. Maintain a uniform room temperature between 55 and 65 degrees F during application and until completely dry or occupied. Provide adequate ventilation to carry off excess moisture.

B. Field verify the layout of all walls and partitions prior to proceeding with the Work, in order to avoid dimensional errors and confirm proper placement. Verify that all required insulations are properly in place prior to covering up.

C. Where the Drawings indicate multiple partition or wall types back-to-back, each scheduled type shall be complete. Inner layers of insulation or gypsum board shall not be omitted.

D. Comply with ASTM C 840 and manufacturer's instructions. Install to minimize butt end joints, especially in highly visible locations.
   1. Gypsum wallboard shall be cut by scoring and breaking, or by sawing, working from the face side. Scribe neatly to projecting surfaces and fit wallboard neatly around pipes, ducts and other penetrations.
   2. Apply wallboard first to soffits (ceilings) then to walls. Allow 1/4" maximum space between bottom of wall sheets and floor, unless otherwise noted. Apply wallboard at interior soffits with long dimensions of board perpendicular to axis of supports.
   3. At ductwork and piping provide a 1/2 inch gap between the drywall and the penetrating element to minimize any vibrational noise transmission to the partition. Void shall be acoustically sealed.

E. Single-Layer Non-Rated: Install gypsum board perpendicular to framing, with ends and edges occurring over firm bearing.

F. Fastening Gypsum Wall and Soffit Board: Wallboard shall be held in firm contact with the supports while the fasteners are being driven. Fasteners shall proceed form central portion of board towards ends and edges. Fasteners shall be driven home with the heads slightly below the surface of the board in a dimple formed by the driving tool. Care shall be taken to avoid breaking the paper face. Improperly driven fasteners shall be removed.
   1. In general, drywall screws shall be spaced not to exceed 16 inches o.c. At fire-resistive construction, space screws 12 inches o.c. in field and 8 inches o.c. at board perimeters, unless otherwise required by the applicable U. L. fire-rated assembly.

G. Fire-Rated Construction: Install gypsum board in strict compliance with requirements of assembly listing.

3.05 INSTALLATION OF TRIM AND ACCESSORIES

A. Control Joints: Place control joints consistent with lines of building spaces, as recommended by the gypsum board manufacturer, and as indicated. Locations not indicated on the Drawings shall be located by the Contractor subject to the Architect's prior approval. Provide control joints or expansion joints where partitions, walls, ceilings, or soffits cross construction or building joints in stud framing or other supporting materials.
   1. At building expansion joints,
   2. At intersections of dissimilar substrates or finish materials,
   3. At floor lines,

4. At ceiling and soffit intersections with a structural element or the vertical penetration,
5. At ceiling wings of "L", "U" and "T" shaped ceiling areas,
6. At openings more than 6 feet long,
7. Adjacent to corners and intersections of walls within a distance equal to half the general control joint spacing noted above.
8. At walls not more than 30 feet apart and ceilings over 30 feet long without relief,
9. At locations where concentrated stress or movement is anticipated,
10. At all locations identified on the Drawings,
11. At locations as recommended by the board manufacturer.

B. Control joint width shall be as required to accommodate anticipated movement.

C. Control joint in fire-rated construction shall meet requirements of the fire-resistive tested assemblies.

D. Wall boards shall be discontinuous at the joint, sealant shall fill the gap and control joint trim shall be fastened at both flanges along the entire length of the joint.

E. Corner Beads: Install with screws at external corners, using longest practical lengths.

F. Casing Beads: Install at locations where gypsum board abuts dissimilar materials and as indicated.

3.06 JOINT TREATMENT

A. Paper Faced Gypsum Board: Use paper joint tape, bedded with ready-mixed vinyl-based joint compound and finished with ready-mixed vinyl-based joint compound.

B. Finish gypsum board in accordance with levels defined in ASTM C840, as follows:
1. Level 5: Walls and ceilings.
2. Level 1: Wall areas above finished ceilings and in attics, whether or not accessible in the completed construction.
3. Level 0: Temporary partitions and surfaces indicated to be finished in later stage of project.

C. Tape, fill, and sand exposed joints, edges, and corners to produce smooth surface ready to receive finishes.
1. Feather coats of joint compound so that camber is maximum 1/32 inch.

D. All wallboard in fire-rated and smoke sealed construction shall be sealed when penetrated by pipes, conduits, wire, structure, etc.
1. Smoke sealed assemblies shall be sealed tight to abutting construction with sealant products.
2. Fire-rated assemblies shall be sealed tight to abutting construction with firestopping products in order to provide continuous, uninterrupted fire protection.

E. Where Level 5 finish is indicated, spray apply high build drywall surfacer over entire surface after joints have been properly treated; achieve a flat and tool mark-free finish.

3.07 MARKING OF FIRE AND SMOKE RESISTIVE CONSTRUCTION

A. Prepare stenciled signs for painted marking of all fire walls, fire barriers, fire partitions, smoke barriers and smoke partitions as identified on the Code Analysis Drawings, above accessible ceilings, in attics and in accessible concealed floor spaces, at intervals not exceeding ten (10) feet measured horizontally.
1. Lettering shall be 3 inches high, of contrasting color to the application surface.
2. Sign text shall be as follows, as applicable:
a. FIRE BARRIER - PROTECT ALL OPENINGS
b. FIRE AND SMOKE BARRIER - PROTECT ALL OPENINGS
c. SMOKE PARTITION - PROTECT ALL OPENINGS

3.08 TOLERANCES

A. Maximum Variation of Finished Gypsum Board Surface from True Flatness: 1/8 inch in 10 feet in any direction.

END OF SECTION

SECTION 09 51 00
ACOUSTICAL CEILINGS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Suspended metal grid ceiling system.

B. Acoustical tiles.

C. Salvage and re-installation of acoustical ceiling grid system at Existing Corridor C380. Replacement allowance of 25% to match existing.

D. Existing suspended ceiling tiles to be removed shall be recycled by the acoustic tile manufacturer. See Section 01 74 19 - Construction Waste Management and Disposal.

1.02 RELATED REQUIREMENTS

A. Section 09 21 16 - Gypsum Board Assemblies: Drywall soffits.

B. Division 21 - Fire Suppression.

C. Division 23 - HVAC.

D. Division 26 - Electrical.

1.03 REFERENCE STANDARDS

A. ASTM C635/C635M - Standard Specification for the Manufacture, Performance, and Testing of Metal Suspension Systems for Acoustical Tile and Lay-in Panel Ceilings; 2013a.

B. ASTM C636 - Standard Practice for Installation of Metal Ceiling Suspension Systems for Acoustical Tile and Lay-in Panels; 2008.

C. ASTM E580 - Standard Practice for Installation of Ceiling Suspension Systems for Acoustical Tile and Lay-in Panels in Areas Subject to Earthquake Ground Motions; 2011.

D. ASTM E1264 - Standard Classification for Acoustical Ceiling Products; 2008e1.

E. CAL - Low-Emitting Materials Product List; California Collaborative for High Performance Schools (CHPS); current edition at www.chps.net/.

F. UL - Fire Resistance Directory; Underwriters Laboratories Inc.; current edition.

1.04 ADMINISTRATIVE REQUIREMENTS

A. Sequence work to ensure acoustical ceilings are not installed until building is enclosed, sufficient heat is provided, dust generating activities have terminated, and overhead work is completed, tested, and approved.

B. Do not install acoustical tiles until after interior wet work is dry.

1.05 SUBMITTALS

A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.

B. Product Data: Provide data on suspension system components and acoustical units.

C. Samples:
   1. Submit samples 4x4 inch minimum in size, of selected acoustical tiles.
   2. Submit samples 8 inches minimum long, of suspension system main runner.

D. Manufacturer's Installation Instructions: Indicate special procedures.

E. Maintenance Materials: Furnish the following for Owner's use in maintenance of Project.
   1. See Section 01 60 00 - Product Requirements, for additional provisions.
   2. Extra Acoustical Tiles: Quantity equal to 5 percent of total installed.
   3. Extra stock shall match products installed and shall be packaged in protective covers for storage and identified with labels describing contents. Store as directed by the Owner. Send written notice to the Architect identifying the quantity and location of extra tile

furnished. The tile shall not be used by the Contractor for corrective work during the warranty period.

1.06 QUALITY ASSURANCE

A. Fire-Resistive Assemblies: Complete assembly listed and classified by UL for the fire resistance indicated.

B. Suspension System Manufacturer Qualifications: Company specializing in manufacturing the products specified in this section with minimum fifteen years documented experience.

C. Acoustical Tile Manufacturer Qualifications: Company specializing in manufacturing the products specified in this section with minimum fifteen years documented experience.

1.07 FIELD CONDITIONS

A. Maintain uniform temperature of minimum 60 degrees F, and maximum humidity of no more than 70 percent prior to, during, and after acoustical unit installation. Acoustic materials shall reach room temperature and moisture content prior to installation. Operate ventilation system for not less than 48 hours beginning acoustical panel ceiling installation.

PART 2 PRODUCTS

2.01 ACOUSTICAL TILES

A. Acoustical Tiles - General: ASTM E 1264, Class A.
   1. Tiles for Installation in Fire-Rated Suspension System: Listed and classified for the fire-resistive assembly the suspension system is a part of.

B. Acoustical Tile Type ACT-1: Painted mineral fiber, ASTM E 1264 Type III,
   1. VOC Content: Certified as Low Emission,
      a. Product listing in the CHPS Low-Emitting Materials Product List.
   2. Size: 24 x 24 inches.
   3. Size: As indicated on the Drawings.
   4. Thickness: 5/8 inches.
   5. Composition: Wet felted.
   6. Light Reflectance: not less than 0.80.
   7. NRC: not less than 0.60
   8. Ceiling Attenuation Class (CAC): not less than 40.
   9. Edge: Angled Tegular.
   10. Surface Color: White.
   11. Surface Pattern: Non-directional fissured.
   12. Products:
      a. Cortega 704 by Armstrong World Industries.
      b. Substitutions: See Section 01 60 00 - Product Requirements.

C. Acoustical Tile Type ACT-2: Rated highly scrubbable, Vinyl faced mineral fiber, ASTM E 1264 Type IV,
   1. Size: 24 x 24 inches.
   2. Thickness: 5/8 inches.
   3. Composition: Wet felted.
   4. Light Reflectance: not less than 0.80.
   5. NRC: 0 unless perforated.
   6. Ceiling Attenuation Class (CAC): not less than 40.
   7. Edge: Square.
   8. Surface Color: White.
   9. Surface Pattern: non-perforated, stippled.
   10. Products:
      a. Clean Room VL by Armstrong World Industries.
      b. Substitutions: See Section 01 60 00 - Product Requirements.

2.02 SUSPENSION SYSTEMS

A. Manufacturers:
   1. Same as for acoustical tiles.

B. Suspension Systems - General: Complying with ASTM C635; die cut and interlocking components, with stabilizer bars, clips, splices, perimeter moldings, and hold down clips as required.

C. Exposed Steel Suspension System Type 1: Formed steel, commercial quality cold rolled; heavy-duty.
   1. Profile: Tee; 15/16 inch wide face.
   2. Construction: Double web.
   3. Finish: White painted.
   4. Products:
      a. Prelude XL 15/16 by Armstrong World Industries, Inc..
      b. Substitutions: See Section 01 60 00 - Product Requirements.

2.03 ACCESSORIES

A. Support Channels and Hangers: Galvanized steel; size and type to suit application, seismic requirements, and ceiling system flatness requirement specified.
   1. Hanger wire: Galvanized soft temper, pre-stretched steel wire, per ASTM A641, with yield strength of at least 3 times design load, but not less than 12-gage diameter.

B. Perimeter Moldings: Same material and finish as grid, size suitable for suspension system and ceiling unit profile. Molding shall be suitable for use in fire-rated ceiling systems.
   1. At Exposed Grid for Seismic Category D, E & F: 2" L-shaped molding for mounting at same elevation as face of grid.

C. Hold-Down Clips: Corrosion resistant plated spring steel.

D. Other Accessories: As required, specifically designed for intended use with suspension components employed, in accordance with ASA specifications. Provide all special hardware required for fire-rated, sloped and vertical installations, as necessary to comply with applicable codes and standards of good practice.

E. Gasket For Perimeter Moldings: Closed cell rubber sponge tape.

F. Touch-up Paint: Type and color to match acoustical and grid units.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify existing conditions before starting work. Proceed with installation only after unsatisfactory conditions have been corrected.

B. Verify that layout of hangers will not interfere with other work.

C. Any questions or conflicts shall be brought to the attention of the Architect prior to proceeding with the Work.

3.02 INSTALLATION - SUSPENSION SYSTEM

A. Install suspension system in accordance with ASTM C 636/C 636M, ASTM E 580/E 580M, and manufacturer's instructions and as supplemented in this Section.

B. Rigidly secure system, including integral mechanical and electrical components, for maximum deflection of 1:360.

C. Locate system on room axis according to reflected plan.

D. Install after major above-ceiling work is complete. Coordinate the location of hangers with other work.

E. Provide hanger clips during steel deck erection. Do not support ceiling directly from steel roof deck or tabs. Provide additional hangers and inserts as required. Connect hanger wires directly

either to structure, or to inserts, eye screws or other devices that are secure and appropriate for the substrate. All hangers and supports shall be secured in such a way that will not deteriorate or otherwise fail due to age, corrosion, or elevated temperatures.

F. Hang suspension system independent of walls, columns, ducts, pipes and conduit. Install hangers plumb. Angle hangers only where required to miss obstructions. Any non-plumb hangers that result in horizontal forces shall be braced. Where carrying members are spliced, avoid visible displacement of face plane of adjacent members.

G. Secure wire hangers to ceiling suspension members and to supports above with a minimum of three (3) tight turns. Secure bracing wire to ceiling suspension members and to supports with a minimum of four (4) tight turns.

H. Where ducts or other equipment prevent the regular spacing of hangers, reinforce the nearest affected hangers and related carrying channels to span the extra distance. Alternatively, install supplemental suspension members and hangers in the form of trapeze or equivalent devices, sized to support ceiling loads.

I. Do not support components on main runners or cross runners if weight causes total dead load to exceed deflection capability.

J. Support fixture loads using supplementary hangers located within 6 inches of each corner, or support components independently.

K. Do not eccentrically load system or induce rotation of runners.

L. Perimeter Molding: Install at intersection of ceiling and vertical surfaces and at junctions with other interruptions.
   1. Use longest practical lengths.
   2. Overlap corners.

M. Provide additional hangers for the suspension system at each corner of light fixtures if independent support of fixtures is not required by Electrical documents. All light fixtures in excess of 56 lb shall be independently supported.

N. Provide additional hangers for air terminal units or services weighing more than 20 lb but less than 56 lb in addition to positively attaching them to the ceiling suspension system. Units weighing more than 56 lb shall be independently supported to the building structure.

O. Provide framing for recessed light fixtures, air outlets, diffusers, etc. See Architectural, Mechanical, and Electrical Drawings.

P. Where approved by the Architect and where field conditions require lowering a portion of a ceiling to conceal piping or ductwork, the ceiling contractor shall provide a ceiling height change and transition at no additional cost to the Owner.

3.03 INSTALLATION - SUSPENSION SYSTEM SEISMIC REQUIREMENTS

A. Provide suspension, bracing, and attachments in strict accordance with ASCE 7, current edition, ASTM C635, ASTM C636 and CISCA Recommendations For Direct-Hung Acoustical Tile and Lay-in Panel Ceilings, most recent edition. The requirements for seismic bracing shall generally include, but not be limited to the following features:
   1. For Seismic Design Categories A, B and C: CISCA requirements for Seismic Zones 0-2 and provisions in ASCE 7 Section 13.5.6.2.1.
      a. For spaces less than 144 sq. ft. in size, no seismic restraint is required.
      b. For spaces 144 sq. ft. and greater in size, in general provide:
         1) The total weight of the suspension system (grid), tiles, and other ceiling components (light fixtures, air terminals, etc) shall be no greater than 2.5 PSF, or other ceiling components shall be independently supported.
         2) The suspension system (grid) shall be designed, tested, and rated for ultimate load capacity as per ASCE 7.
         3) All sides of the space shall have tees cut back 3/8" at the perimeter to accommodate movement and shall not be attached to the perimeter molding. Perimeter moldings shall provide a minimum supporting ledge of 7/8" for tees or

all tees shall be independently supported within 8" of the perimeter. All ends of main runners and cross members shall be tied together or shall have stabilizer/spacer bars attached to members to prevent spreading. Permanent attachment (i.e. pop rivets) for grid alignment shall not be permitted.

4) Openings for sprinkler heads shall provide a minimum of ¼" clearance on all sides of the piping. All other ceiling penetrations shall provide a minimum of 3/8" clearance.

2. For Seismic Design Category D, E and F: CISCA requirements for Seismic Zones 3-4 and provisions in ASCE 7 Section 13.5.6.2.2:
   a. In addition to the requirements above, all grid members shall be hung with wire to building structure within 8 inch of perimeter wall molding. Ceiling areas over 1,000 sq ft shall have horizontal restraint wire or rigid bracing to the structural system.
   b. For ceiling areas exceeding 2,500 sq ft, a seismic separation joint or full height partition that breaks the ceiling up into areas not exceeding 2,500 sq ft unless structural analyses are performed of the ceiling bracing system for prescribed seismic forces.

3.04 INSTALLATION - ACOUSTICAL TILES

A. Owner's Inspection: All areas above suspended ceilings shall be inspected by the Owner prior to installation of ceiling tiles. The Contractor shall obtain written permission from the Owner to proceed with ceiling tile installation. Failure to follow this procedure shall result in removal and reinstallation of ceiling panels to facilitate inspection at no additional cost to the Owner.

B. Install acoustical tiles in accordance with manufacturer's instructions.

C. Fit acoustical tiles in place, free from damaged edges or other defects detrimental to appearance and function.

D. Lay directional patterned tiles with pattern parallel to longest room axis.

E. Fit border trim neatly against abutting surfaces.

F. Install tiles after above-ceiling work is complete. Do not install tile until mechanical and electrical systems are tested and complete and all firestopping and smoke seals have been inspected and accepted.

G. Install acoustical units level, in uniform plane, and free from twist, warp, and dents.

H. Cutting Acoustical Tile:
   1. Cut to fit irregular grid and perimeter edge trim.
   2. Make field cut edges of same profile as factory edges.
   3. Double cut and field paint exposed reveal edges.

I. Where round obstructions occur, provide preformed closures to match perimeter molding.

J. Install hold-down clips on each tile to retain panels tight to grid system.

3.05 TOLERANCES

A. Maximum Variation from Flat and Level Surface: 1/8 inch in 10 feet.

B. Maximum Variation from Plumb of Grid Members Caused by Eccentric Loads: 2 degrees.

3.06 CLEANING

A. Clean soiled exposed surfaces of acoustical panel ceilings, including trim, edge moldings, and suspension system members as recommended by the manufacturer. Remove and replace damaged ceiling components that cannot be successfully cleaned and repaired.

END OF SECTION

SECTION 09 65 00
RESILIENT FLOORING

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Resilient sheet flooring.

B. Resilient tile flooring.

C. Resilient base.

D. Substrate patching and leveling as required.

E. Installation accessories.

F. Note: See ID Drawings for flooring pattern layouts.

1.02 RELATED REQUIREMENTS

A. Section 01 23 00 - Alternates: Slab-on-grade sealer for excessive slab moisture vapor transmission.

B. Section 01 40 00 - Quality Requirements: Concrete slab moisture testing.

C. Section 03 54 00 - Cast Underlayment.

1.03 REFERENCE STANDARDS

A. ASTM E648 - Standard Test Method for Critical Radiant Flux of Floor-Covering Systems Using a Radiant Heat Energy Source; 2010e1.

B. ASTM F710 - Standard Practice for Preparing Concrete Floors to Receive Resilient Flooring; 2011.

C. ASTM F1344 - Standard Specification for Rubber Floor Tile; 2012.

D. ASTM F1861 - Standard Specification for Resilient Wall Base; 2008 (Reapproved 2012).

E. ASTM F1869 - Standard Test Method for Measuring Moisture Vapor Emission Rate of Concrete SubFloor Using Anhydrous Calcium Chloride, 2011

F. ASTM F 2170 - Standard Test method for Determining Relative Humidity of Concrete Slabs Using In-situ Probes.

G. BAAQMD 8-51 - Bay Area Air Quality Management District Regulation 8, Rule 51, Adhesive and Sealant Products; www.baaqmd.gov; 2002.

H. CAL (CHPS LEM) - Low-Emitting Materials Product List; California Collaborative for High Performance Schools (CHPS); current edition at www.chps.net/.

I. NFPA 253 - Standard Method of Test for Critical Radiant Flux of Floor Covering Systems Using a Radiant Heat Energy Source; National Fire Protection Association; 2011.

J. RFCI (RWP) - Recommended Work Practices for Removal of Resilient Floor Coverings; Resilient Floor Covering Institute; October 2011.

K. SCS (CPD) - SCS Certified Products; Scientific Certification Systems; current listings at www.scscertified.com.

1.04 SUBMITTALS

A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.

B. Product Data: Provide data on specified products, describing physical and performance characteristics; including sizes, patterns and colors available; and installation instructions.

C. Shop Drawings: Indicate seaming plan for all sheet goods. All proposed seams shall be indicated. Installation shall not begin prior to the Architect's review and acceptance.

D. Verification Samples: Submit samples, 6 x 6 inch in size illustrating colors and patterns for each resilient flooring product specified.

E. Concrete Testing:
   1. Substrate moisture testing shall be provided by the Owner. Flooring installation shall not begin until testing results are within flooring manufacturer's acceptable ranges.

F. Certification and Field Reports:
   1. Prior to installation of flooring, submit written certification by each flooring manufacturer that condition of sub-floor is acceptable.
   2. Submit copies of manufacturer's technical representative's field reports for each field visit.

G. Maintenance Data: Include maintenance procedures, recommended maintenance materials, and suggested schedule for cleaning, stripping, and re-waxing.

H. Maintenance Materials: Furnish the following for Owner's use in maintenance of project.
   1. See Section 01 60 00 - Product Requirements, and Section 01 78 00 - Project Close-out, for additional provisions.
   2. Extra Flooring Material: 40 square feet of each type and color.
   3. Extra Wall Base: 20 linear feet of each type and color.
   4. Materials shall be in provided in unbroken packaging when job is complete. Notify the Architect in writing of the quantity and location of materials furnished. These materials may not be used by the Contractor for corrective work during the warranty period.

1.05 QUALITY ASSURANCE

A. All resilient flooring shall comply with ASTM E84 Flame Spread Rating of Class II (75 or less) and ASTM E662 Smoke Developed (450 or less) unless otherwise indicated.

B. All vinyl composition products shall be by a single manufacturer. All rubber products shall be by a single manufacturer, and all linoleum shall be by a single manufacturer unless otherwise directed or approved by the Architect.

C. All colors shall match as directed by the Architect and shall be from the same "color run" or "dye lot".

D. All adhesives shall be as recommended by the flooring product manufacturer and shall be formulated asbestos-free.

1.06 MOCK-UPS

A. See Section 01 40 00 - Quality Requirements, for general requirements for mock-up.

B. Construct sheet flooring mock-ups where indicated on the Drawings, incorporating all components specified for the location.
   1. Minimum size of mock-up is indicated on the Drawings.
   2. Approved mock-ups may remain as part of the Work.

C. Construct mock-up for each type of flooring transition to include leveling and shimming products, flooring on both sides of the transition and transition strips. The Owner shall test each mock-up for ease of movement for wheeled equipment. Flooring transitions shall provide smooth, bump-free transitions to facilitate movement of wheeled equipment and minimize tripping hazards.
   1. Approved mock-ups may remain as part of the Work.

1.07 PRE-INSTALLATION MEETING

A. Convene a pre-installation meeting after the results of slab testing are available and at least two weeks before starting work of this Section; require attendance by the Contractor, a technical representative from each flooring manufacturer, flooring installer, Architect and Owner, to review slab moisture levels, floor surface conditions and preparation requirements, materials, installation procedures and coordination of related work.
   1. A field report summarizing the findings and recommendations from this meeting shall be issued by the technical representatives and copied to the Owner and Architect.
   2. Written certification from each flooring manufacturer that condition of sub-floor is acceptable for flooring installation shall be issued and copied to the Owner and Architect.

3. If a slab sealer or other remedial work is required to make the condition of the sub-floor acceptable for the flooring installation, slab preparation and slab sealer product installation shall be field reviewed by the manufacturer's technical representatives and application tested (thickness, adhesion, etc) to confirm compliance with product recommendations.

1.08 DELIVERY, STORAGE, AND PROTECTION

A. Protect roll materials from damage. Store roll material as directed by the manufacturer. All resilient flooring materials shall be stored in undamaged condition as packaged by the manufacturer, with manufacturer's seals and labels intact.

1.09 FIELD CONDITIONS

A. See Section 01 00 00 - General Requirements, for minimum indoor air quality improvement requirements.

B. Maintain temperature in storage area between 65 degrees F and 90 degrees F.

C. Store materials for not less than 48 hours prior to installation in area of installation at a temperature of 70 degrees F to achieve temperature stability. Thereafter, maintain conditions above 55 degrees F.

1.10 WARRANTY

A. See Section 01 78 00 - Project Close-out, for additional requirements.

B. Provide manufacturer's product warranty. See product listing for term.

PART 2 PRODUCTS

2.01 SHEET FLOORING

A. Rubber Sheet Flooring Type RF-1 & -2: 100% rubber composition, homogenous color and pattern.
   1. Critical Radiant Flux, ASTM E648: Class 1, minimum 0.45 watt per sq cm.
   2. Smoke Developed, ASTM E662: Pass, less than 450.
   3. VOC Content: Certified as Low Emission.
   4. Sheet Total Thickness: 3 mm.
   5. Sheet Width: 48 inches.
   6. Static Load Limit, ASTM F790: 800 lbs residual compression 0.005 inches.
   7. Colors: See Finish Legend.
   8. Welded seams.
   9. Integral base, coved with base cap trim, as scheduled.
   10. Warranty: 5 years.
   11. Products:
      a. Noraplan Degree by Nora.
      b. Substitutions: See Section 01 60 00 - Product Requirements.

B. Welding Rod: As recommended by flooring manufacturer for heat welding seams, rubber to rubber, in color matching field color.

2.02 TILE FLOORING

A. Vinyl Composition Tile Type VCT-1: ASTM F1066, Class 2.
   1. Critical Radiant Flux: Minimum 0.45 watt per sq cm per ASTM E 648.
   2. Smoke Developed, ASTM E662: Pass, 450 or less.
   3. Static Load Limit, ASTM F970: 75 psi min.
   4. Size: 12 x 12 inch.
   5. Thickness: 0.125 inch..
   6. Colors / Patterns: [See Finish Schedule].
   7. Products: (Basis of Design) Excelon Imperial by Armstrong World Industries, Inc
   8. Substitutions: See Section 01 60 00 - Product Requirements.

2.03 RESILIENT BASE

A. Resilient Base Type ICB-1: Rubber, integral to flooring.
   1. Size: 6" high.
   2. Colors: See Finish Legend.
   3. Welded seam to rubber flooring.
   4. Product: Same as flooring
   5. Substitutions: See Section 01 60 00 - Product Requirements.

B. Resilient Base Type RB-1: Type TP, rubber, thermoplastic; rubber coated PVC; field made outside corners.
   1. Provide cove base at resilient flooring.
   2. Fire Resistance, ASTM E84: Class A.
   3. Critical Radiant Flux, ASTM E648: Class 1; minimum 0.45 watt per sq cm.
   4. Height: 4 inches and as indicated in the Finish Legend.
   5. Thickness: 0.125 inch thick.
   6. Finish: Satin.
   7. Length: Roll.
   8. Colors: See Finish Legend.
   9. Warranty: Two years.
   10. Products: (Basis of Design) Traditional Rubber Wall Base by Johnsonite, Inc
   11. Substitutions: See Section 01 60 00 - Product Requirements.

2.04 ACCESSORIES

A. Subfloor Patching Compounds: Cementious type recommended by adhesive material manufacturer and flooring manufacturer. Calcium sulphate, plaster or gypsum based toppings, leveling and patching compounds are not acceptable.
   1. Slope / Build-up Product: SD-P by Ardex.

B. Self-Leveling Underlayment: Portland cement-based self-leveling underlayment.
   1. Substrate preparation and conditions shall be reviewed and confirmed with the manufacturer's technical representative prior to installation.
   2. Slab primer as recommended by the underlayment manufacturer.
   3. Self-leveling Underlayment Strength, ASTM C109: 4000 psi minimum, 28 days.
   4. Products:
      a. K-15 by Ardex.

C. Slab Moisture Barrier System: Epoxy slab coating for moisture vapor remediation and primer coat. System shall be surfaced with a self-leveling cementitious underlayment for resilient finish flooring.
   1. Moisture Vapor Control Coating: VOC regulation compliant; Low odor.
      a. VOC content <10 g/l
   2. Substrate preparation and conditions shall be reviewed and confirmed with the manufacturer's technical representative prior to installation.
   3. Warranty:
      a. Koster; 15 years.
   4. Products: As recommended by each flooring manufacturer for each flooring product.
   5. Products:
      a. VAP I 2000 coating, VAP I 06 primer by Koster.
      b. Defender coating, MP Primer by Chapco, a division of H.B. Fuller.
      c. AquArmor MCS by General Polymers - Sherwin Williams.
      d. Moisture Limiter by Forbo.

D. Scribing Felt: As recommended by the flooring manufacturer.

E. Primers, Adhesives, and Seaming Materials: Waterproof; low VOC types recommended by flooring manufacturers.

1. Provide only products having lower volatile organic compound (VOC) content than required by the more stringent of the South Coast Air Quality Management District Rule No.1168 and the Bay Area Air Quality Management District Regulation 8, Rule 51.

F. Flooring Transitions:
   1. At resilient flooring to resilient flooring transition: No transition strip. Use scribing felt at unequal thickness products.

G. Cap for Integral Base: SCC-XX-A by Johnsonite.

H. Filler for Coved Base: Plastic.

PART 3 EXECUTION

3.01 GENERAL

A. Base shall be continuous as scheduled unless otherwise approved by the Architect. Base shall return to door or window frames at all openings.

B. Unless otherwise approved by the Architect, flooring materials shall extend below fixed casework and millwork to cover the entire floor areas. Where integral base is provided, it shall extend behind casework to form a watertight base.

C. Work shall not be started until work of other trades, which goes through resilient flooring, has been completed.

D. Thoroughly clean the flooring substrate.

3.02 EXAMINATION AND FIELD TESTING

A. Verify that surfaces are flat to tolerances acceptable to flooring manufacturer, free of cracks that might telegraph through flooring, clean, dry, and free of curing compounds, surface hardeners, and other chemicals that might interfere with bonding of flooring to substrate.
   1. Concrete Slabs: Verify substrate conforms to ASTM F710. Perform adhesive bond tests and water absorption tests.

B. Verify that wall surfaces are smooth and flat within the tolerances specified for that type of work, are dust-free, and are ready to receive resilient base.

C. Substrate surface pitch shall be confirmed with a laser level for conformance to pitch requirements. Report results to Architect and Owner.

D. Cementitious Subfloor Surfaces: Verify that substrate conforms to ASTM F710.
   1. Obtain instructions if test results are not within limits recommended by resilient flooring manufacturer and adhesive materials manufacturer.

E. Owner's testing agency shall test concrete slab surfaces prior to installation of any flooring. Test results shall be made available to the contractor for determination of acceptability by the flooring and adhesives manufacturers. Contractor shall obtain instructions from flooring manufacturers if test results are not within their recommendation limits. Testing shall include:
   1. Internal relative humidity rates per ASTM F2170
   2. Alkalinity, pH rates per ASTM 710.

F. If remedial work is recommended by the flooring and adhesive manufacturers, the preparation for and installation of moisture control coatings shall be inspected by the product manufacturer's technical representative and tested for adequacy by the Owner's testing agency prior to resumption of the flooring installation.

G. Any conditions that could adversely affect the flooring installation shall be corrected, prior to proceeding with the Work. Commencement of the installation of flooring shall be considered acceptance of the concrete slab as being suitable for the intended application. Any conditions that could adversely affect the flooring installation shall be brought to the Contractor's attention, for resolution, prior to proceeding with the Work.

3.03 PREPARATION

A. Remove existing resilient flooring and flooring adhesives; follow the recommendations of RFCI Recommended Work Practices for Removal of Resilient Floor Coverings.

B. Prepare subfloor surfaces as recommended by flooring and adhesive manufacturers.

C. Remove subfloor ridges and bumps. Fill minor low spots, cracks, joints, holes, and other defects with subfloor patching compound to achieve smooth, flat, hard surface. Provide transition strips directly over construction joints between new and existing floor slabs where applicable.

D. Resilient flooring shall not be installed over floors that have been treated with chemical compounds. Remove coatings, including curing compounds, and other substances that are incompatible with flooring adhesives and that contain soap, wax, oil, or silicone, using mechanical methods recommended by the manufacturer. Do not use solvents.

E. Subfloor surfaces shall not vary more than plus or minus 1/8" in any 10' dimension. Neither shall they vary at a rate greater than 1/16" per running foot. Leveling compound shall be used for larger areas.
   1. For subfloor surfaces intended to slope to floor drains, build-up product shall be installed precisely to create proper pitch. Floor pitch shall be laser verified with results submitted to the Architect and Owner.

F. Flooring work shall not be started until the work of other trades, which penetrates flooring area, has been completed.

G. All flooring surface transitions shall be as smooth and level as possible. Resilient flooring shall be laid flush with all adjacent flooring materials. Fill edge of subfloor adjacent to higher flooring with approved crack and leveling filler as required to provide a smooth transition. Filler shall be feathered back to subfloor a minimum of one foot for each 1/16" of thickness.

H. Prohibit traffic until filler is cured.

I. Clean substrate.

3.04 INSTALLATION

A. Starting installation constitutes acceptance of sub-floor conditions.

B. Install in accordance with manufacturer's instructions.

C. Spread only enough adhesive to permit installation of materials before initial set.

D. Fit joints tightly.

E. Set flooring in place, press with heavy roller to attain full adhesion.

F. Where type of floor finish, pattern, or color are different on opposite sides of door, terminate flooring under centerline of door.

G. Install terminations as identified above. In general, flooring substrates shall be shimmed to provide a level transition between flooring surfaces without transition strips.

H. Install edge strips at unprotected or exposed edges, where flooring terminates, and where indicated.

I. Scribe flooring to walls, columns and other appurtenances to produce tight joints.

3.05 SHEET FLOORING

A. Lay flooring in accordance with accepted seaming shop drawings.

B. Flooring shall be laid continuously wall-to-wall, without joints, unless specifically accepted by the Architect prior to installation.

C. In general, lay flooring with seams parallel to longer room dimensions, to produce minimum number of seams. Lay out seams to avoid widths less than 1/3 of roll width; match patterns carefully at seams.

D. Double cut sheet at seams.

E. Lay flooring with tightly butted seams, without any seam sealer unless otherwise indicated.

F. Finish sheet flooring seams by heat welding.

G. Coved Base: Install as detailed on drawings, using coved base filler as backing at floor to wall junction. Extend sheet flooring vertically to height indicated and cover top edge with cap strip.

3.06 TILE FLOORING

A. Mix tile from container to ensure shade variations are consistent when tile is placed, unless manufacturer's instructions say otherwise. Lay tile in pattern and grain direction as directed by the Architect.

B. Lay flooring with joints and seams parallel to building lines to produce symmetrical tile pattern.

3.07 RESILIENT BASE

A. Fit joints tightly and make vertical. Maintain minimum dimension of 18 inches between joints. Install wall base in lengths as long as without gaps at seams and with tops of adjacent pieces aligned. Tightly adhere wall base to substrate throughout length of each piece, with base in continuous contact with horizontal and vertical substrates.

B. Miter internal corners. At external corners, 'V' cut back of base strip to 2/3 of its thickness and fold. Special attention shall be paid to firmly securing base around bull nose corners.

C. Install base on solid backing. Bond tightly to wall and floor surfaces.

D. Scribe and fit to door frames and other interruptions. Install base on all built-in cabinets, locker bases, etc., unless specifically indicated otherwise. Base shall extend around all sides of cabinetwork.

3.08 FIELD QUALITY CONTROL

A. See Section 01 40 00 - Quality Requirements, for general requirements for field quality control and inspection.

B. Manufacturer's Inspections: Following the requirements for pre-installation field meeting and sub-floor preparations for the flooring installation, inspections shall be made by technical representatives of each flooring system manufacturer at the following points in the flooring installation:

1. First, early in the installation process to ascertain that flooring procedures and details discussed at the pre-construction meeting are being followed.
2. Second, at the completion of the installation, to review the completed installation. Manufacturer's technical representative's field reports for each site visit shall be copied to the Owner and Architect.

3.09 CLEANING

A. Immediately after installation, remove excess adhesive and other blemishes from floor, base, and wall surfaces without damage.

B. Clean in accordance with manufacturer's instructions.

C. Promptly correct work rejected by the Architect. Any tiles that require replacement shall be waxed.

3.10 PROTECTION

A. Prohibit traffic on resilient flooring for 48 hours after installation. Protect flooring against marks and damage from construction operations utilizing methods recommended by the flooring manufacturer. Cover tiles with undyed building paper until inspection for Substantial Completion.

END OF SECTION

SECTION 09 90 00
PAINTING AND COATING

PART 1 GENERAL

1.01 SECTION INCLUDES

A. All necessary surface preparation.

B. Field application of paints.

C. Scope: Finish all interior surfaces exposed to view, unless fully factory-finished. And unless otherwise indicated, including the following:
   1. Both sides and edges of plywood backboards for electrical and telecom equipment before installing equipment.
   2. Exposed surfaces of steel lintels and ledge angles.
   3. Mechanical and Electrical:
      a. Paint interior surfaces of air ducts that are visible through grilles and louvers with one coat of flat black paint to visible surfaces.

D. Do Not Paint or Finish the Following Items:
   1. Items fully factory-finished unless specifically so indicated; materials and products having factory-applied primers are not considered factory finished.
   2. Items indicated to receive other finishes.
   3. Items indicated to remain unfinished.
   4. Fire rating labels, equipment serial number and capacity labels, and operating parts of equipment.
   5. Roofing and flashing.
   6. Floors, unless specifically so indicated.
   7. Glass.
   8. Acoustical materials, unless specifically so indicated.
   9. Concealed pipes, ducts, and conduits.

E. Surface preparation, patching and repainting of existing interior walls, partitions, and ceilings disturbed by the Work, as indicated on the Drawings or as otherwise required.

F. Field testing for substrate moisture content and alkalinity.

G. Field testing compatibility of new paint with shop-applied primers, existing paint or finishes to be covered.

H. Verification of compatibility of shop primers (mechanical equipment, structural steel, steel fabrications, etc.) with finish coatings specified herein.

I. The painting subcontractor shall examine all the Sections of the Specifications and shall thoroughly familiarize himself with all their provisions regarding painting and finishing.
   1. All surfaces that are primed or left unfinished by the requirements of other Sections of the Specifications shall be painted or finished as a part of this Section, unless specifically indicated otherwise.
   2. Areas of new patches in existing construction shall be painted or finished, and where not scheduled, shall match the existing finish.

J. Finish Schedule: Refer to the Interior Design Drawings, Finish Legend and Schedule for color selections and product types.

1.02 RELATED REQUIREMENTS

A. Section 05 50 00 - Metal Fabrications: Shop-primed items.

1.03 DEFINITIONS

A. Conform to ASTM D 16 for interpretation of terms used in this Section.

1.04 REFERENCE STANDARDS

A. 40 CFR 59, Subpart D - National Volatile Organic Compound Emission Standards for Architectural Coatings; U.S. Environmental Protection Agency; current edition.

B. ASTM D16 - Standard Terminology for Paint, Related Coatings, Materials, and Applications; 2012.

C. ASTM D4442 - Standard Test Methods for Direct Moisture Content Measurement of Wood and Wood-Base Materials; 2007.

D. GreenSeal GS-11 - Paints; 2013.

E. SSPC - Good Painting Practice: SSPC Painting Manual, Vol. 1; Society for Protective Coatings; Fourth Edition.

1.05 SUBMITTALS

A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.

B. Product Data: Submit data on all finishing products, including VOC content. List each product and cross-reference it to the specification's Part 2, Products.

C. Samples: Submit two of each confirmation paint samples of each color and texture. Submit on paper card, 11x17 inch in size, minimum. Prior to ordering paint quantities, provide in-place mock-up of each color for final review and acceptance by Architect.

D. Certification: By manufacturer that all paints and coatings comply with VOC limits specified.

E. Manufacturer's Instructions: Indicate special surface preparation procedures.

F. Maintenance Manual: Provide a paint and coatings maintenance manual including area summary with finish schedule, area detail designating location where each product, color, finish was used, product data pages, MSDS sheets, care and cleaning instructions, touch-up procedures, and color samples of each color and finish used.

1.06 QUALITY ASSURANCE

A. Applicator Qualifications: Company specializing in performing the work of this Section with minimum five years experience and shall have completed similar painting system applications with a record of successful in-service performance.

B. Material Data Sheet product information for all painting products shall be kept on file on the job site before work begins.

C. All materials shall be thoroughly stirred. No materials shall be reduced or changed in any way. Any tinting or matching of colors shall be done to the satisfaction of the Architect. In all cases a sample shall be applied on the job and Architect must approve before work is actually begun. Execute work in accordance with manufacturer's printed instructions.

1.07 REGULATORY REQUIREMENTS

A. All field applied paints and coatings shall meet Federal and State VOC standards.

1.08 MOCK-UP

A. See Section 01 40 00 - Quality Requirements, for general requirements for mock-up.

B. Provide a finished sample room, complete or in part, with all finish items completed in accordance with the Specification and in selected colors. Items not accepted shall be re-finished. When accepted, they shall serve as a standard for workmanship, appearance and materials for similar areas throughout this Project.

C. Accepted mock-ups may remain as part of the Work.

1.09 PRE-INSTALLATION MEETING

A. A pre-installation meeting shall be held at the jobsite, including: Contractor, painting subcontractor, paint manufacturer's technical representative, Owner's representative and Architect. The purpose of the meeting shall be to review existing conditions. The paint manufacturer's technical representative shall perform an on-site inspection to confirm

compatibility and suitability of specified materials, following which he shall provide written certification that all materials specified are entirely suitable for their proposed applications.

1.10 DELIVERY, STORAGE, AND HANDLING

A. Deliver products to site in manufacturer's sealed and labeled containers; inspect to verify acceptability.

B. Container Label: Include manufacturer's name, type of paint, brand name, lot number, brand code, coverage, surface preparation, drying time, cleanup requirements, color designation, and instructions for mixing and reducing.

C. Paint Materials: Store at minimum ambient temperature of 45 degrees F and a maximum of 90 degrees F, in ventilated area, and as required by manufacturer's instructions.

D. Store all materials used on the job in a single place. Keep storage place neat, dry and clean. All soiled or used rags, waste and trash must be removed from the building every night, and every precaution taken to avoid the danger of fire. All materials shall be protected from freezing.

1.11 FIELD CONDITIONS

A. Do not apply materials when surface and ambient temperatures are outside the temperature ranges required by the paint product manufacturer.

B. Follow manufacturer's recommended procedures for producing best results, including testing of substrates, moisture in substrates, and humidity and temperature limitations.

C. Minimum Application Temperatures for Latex Paints: 45 degrees F for interiors; 50 degrees F for exterior; unless required otherwise by manufacturer's instructions.

D. Provide lighting level of 80 ft candles measured mid-height at substrate surface.

E. The Owner and all subcontractors shall be kept informed of the use of products that may generate fumes in advance of the use of such products.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Provide all paint and coating products used in any individual system from the same manufacturer; no exceptions.

B. Paints:
   1. Basis of Design: Sherwin Williams Co.
   2. Acceptable Manufacturers:
      a. Benjamin Moore & Co.
      b. PPG Architectural Finishes, Inc.
      c. Tnemec Coatings.

C. Substitutions: See Section 01 60 00 - Product Requirements.

2.02 PAINTS AND COATINGS - GENERAL

A. All materials used on the Work shall be as specified in brand and quality. No claims as to unsuitability or unavailability of any materials specified, or unwillingness to use same, or inability to produce first class work with same, will be entertained unless such claims are made in writing and submitted prior to the receipt of proposals.

B. Paints and Coatings: Ready mixed, unless intended to be a field-catalyzed coating.
   1. Provide paints and coatings of a soft paste consistency, capable of being readily and uniformly dispersed to a homogeneous coating, with good flow and brushing properties, and capable of drying or curing free of streaks or sags.
   2. Provide materials that are compatible with one another and the substrates indicated under conditions of service and application, as demonstrated by manufacturer based on testing and field experience.
   3. For opaque finishes, tint each coat including primer coat and intermediate coats, one-half shade lighter than succeeding coat, with final finish coat as base color.

4. Supply each coating material in quantity required to complete entire project's work from a single production run.
5. Do not reduce, thin, or dilute coatings or add materials to coatings unless such procedure is specifically described in manufacturer's product instructions.

C. Primers: Where the manufacturer offers options on primers for a particular substrate, use primer categorized as "best" by the manufacturer.

D. Volatile Organic Compound (VOC) Content:
1. Provide coatings that comply with the most stringent requirements specified in the following:
   a. 40 CFR 59, Subpart D--National Volatile Organic Compound Emission Standards for Architectural Coatings.
   b. Architectural coatings VOC limits of State in which the project is located.
2. Determination of VOC Content: Testing and calculation in accordance with 40 CFR 59, Subpart D (EPA Method 24), exclusive of colorants added to a tint base and water added at project site; or other method acceptable to authorities having jurisdiction.

E. Flammability: Comply with applicable code for surface burning characteristics.

F. Colors: As Scheduled and indicated on ID Drawings.

2.03 PAINT SYSTEMS - EXTERIOR

A. Ferrous Metals, light to moderate duty, Acrylic, 3 Coat:
1. Primer 1st coat; SW ProCryl Universal Primer, B66-310. 2-4 mils DFT.
2. Semi-gloss: 2nd and 3rd coats; SW Sher-Cryl High Performance Acrylic, B66-350. 2.5-4 mil DFT/coat.

2.04 PAINT SYSTEMS - INTERIOR

A. Ferrous Metals, Pre-primed, Acrylic, 2 Coat:
1. Touch-up with compatible primer.
2. Semi-gloss: 1st and 2nd coats; SW ProClassic Water-borne Acrylic B31. 1.4 mils DFT/coat.

B. Galvanized Metals, Latex:
1. Primer 1st coat: SW Pro-Cryl Universal Primer B66-310. 2-4 mils DFT.
2. Semi-gloss: 2nd and 3rd coats; SW ProClassic Waterborne Enamel B31. 1.4 mils DFT.

C. Gypsum Board, Latex, 3 Coat:
1. Location: Office 305B and other areas not designated to receive other paint finishes.
2. Applications:
   a. Eggshell: For general walls.
   b. Flat: For ceilings and soffits.
3. 1st coat primer; SW Harmony Interior Latex Primer, B11W00500, 1.3 mils DFT
4. Eggshell: 2nd and 3rd coats; SW Harmony Low Odor Latex, B09-500 Series, 1.6 mils DFT/coat.

D. Gypsum Board, Acrylic-Epoxy, 3 Coat:
1. Location: Chemistry Lab 305 and Prep 305A.
2. 1st coat primer; SW Prep-Rite 200 Latex Primer.
3. Semi-gloss: 2nd and 3rd coats; SW Water Based Catalyzed Epoxy B70. 3-4 mil DFT/coat.

2.05 ACCESSORY MATERIALS

A. Accessory Materials: Other materials not specifically indicated but required to achieve the finishes specified; commercial quality, "best grade" of "first line" made by reputable, recognized manufacturers, shall be compatible with related products and shall bear manufacturer's labels.

B. Patching Material: Latex filler.

C. Fastener Head Cover Material: Latex filler.

PART 3 EXECUTION

3.01 WORKMANSHIP

A. Employ skilled mechanics to ensure the very best workmanship. Quality workmanship is required. Materials shall be applied by craftsmen experienced in the use of the specific product involved.

B. All materials shall be applied in strict accordance with the manufacturer's printed instructions.

C. Finish work shall be uniform and of the approved color. Paint and stain shall completely cover, be smooth and free from runs, sags, clogging, excessive flooding, or brush marks. Make edges of paint and stain adjoining other materials or colors sharp and clean without overlapping.

3.02 EXAMINATION

A. Do not begin application of coatings until substrates have been properly prepared.

B. Verify that surfaces are ready to receive work as instructed by the product manufacturer.

C. Examine surfaces scheduled to be finished prior to commencement of work. Report any condition that may potentially affect proper application.

D. Test shop-applied primer for compatibility with subsequent cover materials.

E. Measure moisture content of surfaces using an electronic moisture meter. Do not apply finishes unless moisture content of surfaces are below the following maximums:
   1. Gypsum Wallboard: 12 percent.

F. Submit test results and action taken to the Architect prior to the application of paint products.

G. Prime coats specified herein will not be required on items delivered with shop or factory prime coats already applied, providing that shop prime coats are equal in quality to those specified and the painting subcontractor determines their total compatibility with finish coats.

3.03 PREPARATION

A. Clean surfaces thoroughly and correct defects prior to coating application.

B. Prepare surfaces using the methods recommended by the manufacturer for achieving the best result for the substrate under the project conditions.

C. General: Do not begin painting on any surface until it is in proper condition to receive the paint or as specified. Should any surface be found unsuitable to produce a proper finish, the Architect and product manufacturer shall be notified in writing and no material shall be applied until the unsuitable surfaces have been made satisfactory.

D. Remove or mask surface appurtenances, including electrical plates, hardware, light fixture trim, escutcheons, and fittings, prior to preparing surfaces or finishing.

E. Seal surfaces that might cause bleed through or staining of topcoat.

F. Remove mildew from impervious surfaces by scrubbing with solution of tetra-sodium phosphate and bleach. Rinse with clean water and allow surface to dry.

G. New Gypsum Board Surfaces to be Painted: Fill minor defects with filler compound and sand to smooth level surface. Exercise care to avoid raising nap of paper. Spot prime defects after repair.

H. For Previously Painted Gypsum Board Surfaces: Remove grease, dirt, and other foreign materials as necessary to receive paint. Lightly sandpaper to smooth and even surface and then dust off. Fill all minor irregularities with approved patching materials and sand to smooth level surface. Exercise care to avoid raising nap of paper. Prime paint any patched surfaces.

I. New Galvanized Surfaces to be Painted: Remove surface contamination and oils and wash with solvent. Apply coat of etching primer or abrade all surfaces with 60 grit paper to create a uniform anchor profile, then prime.

J. Corroded Steel and Iron Surfaces to be Painted: Prepare using at least SSPC-SP 2 (hand tool cleaning) or SSPC-SP 3 (power tool cleaning) followed by SSPC-SP 1 (solvent cleaning).

K. New Uncoated Steel and Iron Surfaces to be Painted: Remove grease, mill scale, weld splatter, dirt, and rust. Where heavy coatings of scale are evident, remove by power tool wire brushing or sandblasting; clean by washing with solvent. Apply a treatment of phosphoric acid solution, ensuring weld joints, bolts, and nuts are similarly cleaned. Prime paint entire surface; spot prime after repairs.

L. New Shop-Primed Interior Steel Surfaces to be Finish Painted: Sand and scrape to remove loose primer and rust. Feather edges to make touch-up patches inconspicuous. Clean surfaces with solvent. Prime bare steel surfaces.

M. Previously Painted Ferrous Metal: Remove grease, dirt, rust, and other foreign materials as necessary to receive paint. Sandpaper surfaces to a smooth, even surface and dust off. Touch-up any chipped or abraded surfaces and fill all holes and other surface imperfections with metal repair bondo, sand smooth and prime.

N. Non-compatible Shop Primers: Cover with suitable barrier coat or remove primer and reprime as required.
   1. Testing: Apply a test patch of the new painting system to test for adhesion. Allow to dry one week before testing per ASTM D3359. If new painting system lifts, completely remove the existing finish.

3.04 APPLICATION

A. Spray painted wall surfaces shall be back-rolled.

B. No interior painting or finishing shall be permitted until the building has been thoroughly dried out. See Environmental Requirements for application air temperature requirements. Relative humidity shall be 75% maximum. Moisture levels for painting shall be within 5 degrees F of the dew point and shall be determined by use of an electronic moisture meter.

C. The atmosphere shall be relatively free of airborne dust. Each coat of paint shall be applied smoothly, worked out evenly and allowed to dry completely before the subsequent coat is applied. Follow manufacturer's labeled instructions for drying time between coats

D. Apply products in accordance with manufacturer's instructions.

E. Where adjacent sealant is to be painted, do not apply finish coats until sealant is applied.

F. Before painting, remove hardware, accessories, plates, lighting fixtures and similar items or provide ample protection of such items. On completion of each area, replace items removed.

G. Apply each coat to uniform appearance. Apply each coat of paint slightly darker than preceding coat unless otherwise approved.

H. Sand metal surfaces, enamels and varnishes lightly between coats to achieve required finish.

I. Vacuum clean surfaces of loose particles. Use tack cloth to remove dust and particles just prior to applying next coat.

J. Reinstall electrical cover plates, hardware, light fixture trim, escutcheons, and fittings removed prior to finishing.

K. All closets shall be finished the same as adjoining rooms, unless otherwise indicated.

L. All doors frames shall have the same finish and number of coats on both interior and exterior sides. Do not paint over door frame fire-rating labels.

M. Upon completion, touch up and restore finish where damaged and leave in good condition.

N. Paint shop-primed equipment.

O. Access panels, registers, cabinet heaters, radiators, and electrical panels and similar equipment shall be painted in colors as selected by the Architect.

P. Exposed piping, conduit, wiremold, ductwork, pipe insulation, and hangers shall be painted in colors selected by the Architect.

Q. Access panel doors and frames shall be painted to match wall color.

R. Upon completion of painting, reinstall electrical cover plates, hardware, light fixture trim, escutcheons, and fittings removed prior to finishing.

3.05 CLEANING AND PROTECTION

A. Collect waste material that could constitute a fire hazard, place in closed metal containers, and remove daily from site.

3.06 PROTECTION

A. Protect finished coatings until completion of project.

B. Provide drop cloths in all areas where painting is being done to protect floors and other work form damage during painting. Mask or otherwise protect smaller objects adjacent to painted surfaces.

C. Waste materials shall not be disposed of in the existing sanitary system.

D. When the Work of this Section is completed, remove all surplus materials and scaffolding from the premises and clean off all misplaced paint, varnish, stain and the like so as to leave the premises in perfect condition, free of all paint.

3.07 COLOR SCHEDULE

A. Schedule: Refer to the ID Drawings.

END OF SECTION

SECTION 10 11 01
VISUAL DISPLAY BOARDS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Markerboards.

1.02 RELATED REQUIREMENTS

A. Section 06 10 54 - Wood Blocking and Curbing: Concealed wood blocking.

1.03 REFERENCE STANDARDS

A. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials; 2014.

B. PS 1 - Structural Plywood; 2009.

C. Porcelain Enamel Institute Specifications.

1.04 SUBMITTALS

A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.

B. Product Data: Provide manufacturer's data on markerboard, trim, and accessories. Include surface burning test results. Submit sample warranty.

C. Shop Drawings: Indicate wall elevations, dimensions, joint locations, special anchor details.
   1. Take field measurements prior to fabrication and installation to ensure proper fitting and coordinate / confirm locations of any mechanical and electrical wall mounted devices.

D. Samples: Submit color charts for markerboard.

E. Manufacturer's printed installation instructions.

F. Maintenance Data: Include data on regular cleaning and stain removal.

1.05 QUALITY ASSURANCE

A. Manufacturer Qualifications: Company specializing in manufacturing the products specified in this Section with minimum ten years documented experience.

1.06 WARRANTY

A. See Section 01 78 01 - Warranties, for additional warranty requirements.

B. Provide twenty (20) year warranty for markerboard to include warranty against discoloration due to cleaning, crazing or cracking, and staining.
   1. Warranty shall cover replacement cost of the boards.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Visual Display Boards:
   1. Basis of Design: Vitracolor Magnetic Markerglass by Skyline Design
   2. Acceptable Manufacturer's:
      a. MooreCo, Inc.
      b. Claridge Products and Equipment, Inc.
      c. Nelson Adams - Polyvision Corp.
      d. Aarco Products Inc.
   3. Substitutions: See Section 01 60 00 - Product Requirements.

2.02 VISUAL DISPLAY BOARDS

A. Markerboards: Tempered glass dry-erase writing surface with steel back.
   1. Color: As selected from manufacturers full range.

2. Steel Face Sheet Thickness: 24 gage, 0.0239 inch.
3. Size: As indicated on the Drawings. Boards shall be maximum possible lengths to eliminate vertical seams.
4. Glass: Low-iron, 1/4 inch tempered with eased corners and polished edges.
5. Mounting: Concealed mounting brackets.
6. Accessories: Earth magnets.

2.03 ACCESSORIES

A. Marker Tray: Aluminum, manufacturer's standard profile one piece full length of markerboard, molded ends; magnetic.
   1. Finish: Satin anodized extruded aluminum.
   2. Application: Provide a marker tray at each board whether shown or not on the Drawings.

B. Mounting Brackets: Concealed.

C. Board Magnet: ½" diameter x ¾" high cylindrical neodymium magnet with protective cap.
   1. Product: Magnetic Markerglass Rare Earth Magnets by Skyline Design.
   2. Quantity: (6) six.

2.04 FABRICATION

A. Coordinate factory assembled units with accessories. Join parts with a neat, precise fit. Make joints only where total length exceeds maximum manufactured length. Fabricate in full sheet widths. Provide manufacturer's standard mullion trim at joints between boards in combination units.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify that field measurements are as indicated.

B. Verify that internal wall blocking is ready to receive work and positioning dimensions are as indicated on shop drawings.

3.02 INSTALLATION

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

B. See Drawings for mounting height of boards. Any questions or conflicts shall be brought to the attention of the Architect.

C. Secure units level and plumb.

3.03 CLEANING

A. Clean board surfaces in accordance with manufacturer's instructions.

END OF SECTION

SECTION 10 14 25
CODE REQUIRED BUILDING SIGNAGE

PART 1 GENERAL

1.01 SECTION INCLUDES

A. All interior signage shall be provided by the University of Southern Maine. This Section describes code required signage.

1.02 REFERENCES

A. ANSI/ICC A117.1 - Accessible and Useable Buildings and Facilities; 2009.

B. IBC - International Building Code; 2009.

C. ADAAG - Americans with Disabilities Act (ADA), Accessibility Guidelines for Buildings and Facilities (ADAAG) 2010.

PART 2 PRODUCTS

2.01 INTERIOR SIGNS

A. Accessibility-Compliant Interior Signage:
   1. General: Signs with tactile lettering, numbers and symbols raised 1/32 inch minimum from sign plate face.
   2. Lettering Style: Sans serif, standard medium, upper case.
   3. Character width, stoke width, character spacing and line spacing shall comply with ANSI A117.1 requirements.
   4. Braille: Grade 2 Braille, placed directly below the corresponding text, and for multi-line text below the entire text. Spacing and dimensions shall comply with ANSI A117.1 requirements.
   5. Performance: Non-static, fire-retardant, and self-extinguishing.
   6. Contrast: Non-glare finish; letters numbers and symbols shall contrast with background.
   7. Borders, Materials and Colors: As selected by the Owner.
   8. Letter and Number Sizes: 1 inch.
   9. Pictograms: International Symbol of Access shall have a field size of 6 inches x 6 inches minimum. Characters and braille shall not be in the pictogram field. Other types, if provided, shall be located in a clear area 6 inches high.
   10. International symbol of accessibility shall meet layout standards in ANSI A117.1.
   11. Sign Sizes: As required by sign content and selected by the Owner, but in no case less than 7 by 7 inches.

B. Required Sign Types:
   1. Classrooms: All corridor classroom and office doors shall be identified by room number.

PART 3 EXECUTION

3.01 PREPARATION

A. Verify mounting heights and locations for interior signage will comply with referenced standards.

B. Clean mounting locations of dirt, dust, grease or similar conditions that would prevent proper installation.

3.02 INSTALLATION

A. Install signs level, plumb, without distortion, and in proper relationship with adjacent surfaces using manufacturer's recommended standard mounting system.

B. Sign mounting locations shall be in compliance with referenced codes. Exact locations of signage shall be reviewed with the Owner prior to installation.
   1. In general, signs shall be mounted no higher than 60" above the floor to the baseline of the highest line of text and no lower than 48" above the floor to the baseline of the lowest line of text braille. Sign mounting height shall be consistent throughout the Project and reviewed with the Owner and Architect prior to installation.
   2. Door signs shall be mounted within 18" of door latch jambs. Signs shall not be located so as to be obscured by doors in the open position.
   3. Where there is no wall space on the latch side of a single door, or to the right of double doors, signs shall be located on the nearest adjacent wall.
   4. Tactile signs shall be located to provide a clear floor area 18 inches by 18 inches minimum, centered on the tactile sign beyond the arc of any door swing between the closed position and 45 degree open position.

END OF SECTION

SECTION 10 26 01
WALL AND CORNER PROTECTION

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Corner guards.

1.02 RELATED REQUIREMENTS

A. Section 06 10 54 - Wood Blocking and Curbing: Support blocking for wall anchors.

B. Section 09 21 16 - Gypsum Board Assemblies: Metal stud wall construction.

1.03 REFERENCE STANDARDS

A. ANSI/ICC A117.1 - American National Standard for Accessible and Usable Buildings and Facilities; 2009.

B. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials; 2013a.

C. ASTM E119 - Standard Test Methods for Fire Tests of Building Construction and Materials; 2012.

1.04 SUBMITTALS

A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.

B. Product Data: Indicate physical dimensions, features, anchorage details, and rough-in measurements.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Corner Guards:
   1. Construction Specialties, Inc.
   2. InPro Corporation.
   3. Substitutions: See Section 01 60 00 - Product Requirements

2.02 COMPONENTS

A. Corner Guards - Surface mounted: Stainless steel.
   1. Material: Type 304 stainless steel, No. 4 finish; 16 gauge.
   2. Fire Resistance: ASTM E84, Flame spread 25 or less and Smoke developed 450 or less.
   3. Corner: Square angle.
   4. Size: 2 inches.
   5. Length: One piece.
   6. Product: Type 430 by InPro.
   7. Substitutions: See Section 01 60 00 - Product Requirements.

2.03 FABRICATION

A. Fabricate components with tight joints, corners and seams.

B. Pre-drill holes for attachment.

C. Form end trim closure by capping and finishing smooth.

END OF SECTION

SECTION 10 28 00
ACCESSORIES

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Accessories for sinks and other fixtures at locations indicated on the Drawings.

1.02 RELATED REQUIREMENTS

A. Section 06 10 54 - Wood Blocking and Curbing: Concealed wood blocking.

B. Section 09 21 16 - Gypsum Board Assemblies: Metal stud partitions for special loading imposed.

1.03 REFERENCE STANDARDS

A. 36 CFR 1191 - Americans with Disabilities Act Accessibility Guidelines for Buildings and Facilities; current edition.

B. ASTM A653 - Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process; 2011.

C. ASTM A666 - Standard Specification for Annealed or Cold-Worked Austenitic Stainless Steel Sheet, Strip, Plate, and Flat Bar; 2010.

1.04 ADMINISTRATIVE REQUIREMENTS

A. Coordinate the work with the placement of internal wall reinforcement to receive anchor attachments.

1.05 SUBMITTALS

A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.

B. Product Data: Provide data on accessories describing size, finish, details of function, attachment methods.

C. Samples: Submit one sample of each accessory, illustrating color and finish, if requested by Architect.

D. Manufacturer's Installation Instructions: Indicate special procedures and conditions requiring special attention.

E. Close-out Requirements: Submit maintenance data, operating instructions and keys required for each type of equipment and lock.

1.06 PRODUCT HANDLING

A. Deliver items in manufacturer's original unopened protective packaging. Store materials as required to prevent soiling, damage, or wetting. Maintain protective covers on all units. Remove protective covers at final clean-up of installation.

1.07 WARRANTY

A. Provide manufacturer's standard product warranty for mirrors against silver spoilage for ten (10) years.

B. Provide manufacturer's standard product warranty for hand and hair dryers against defects in materials and workmanship for ten (10) years.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Basis of Design: Bobrick Washroom Equipment, Inc.

B. Other Acceptable Manufacturers:
   1. Bradley Corp.

2. McKinney Parker.
3. Substitutions: Section 01 60 00 - Product Requirements.

C. All items of each type to be made by the same manufacturer.

2.02 MATERIALS

A. Accessories - General: Shop assembled, free of dents and scratches and packaged complete with anchors and fittings, steel anchor plates, adapters, and anchor components for installation.
1. Grind welded joints smooth.
2. Fabricate units made of metal sheet of seamless sheets, with flat surfaces.

B. Stainless Steel Sheet: ASTM A 666, Type 304, 0.034 inch (22 gage) minimum thickness, unless otherwise indicated.

C. Galvanized Sheet Steel: Hot-dipped galvanized steel sheet, ASTM A653, with G90/Z275 coating.

D. Adhesive: Two component epoxy type, waterproof.

E. Fasteners, Screws, and Bolts: Hot dip galvanized, tamper-proof and of same materials as accessory where exposed.

2.03 FINISHES

A. Stainless Steel: No. 4 satin brushed finish, unless otherwise noted.

2.04 ACCESSORIES

A. NOTE: Accessory item numbers correspond to accessory symbol numbers on the Drawings.

B. Item 2A - Paper Towel Dispenser: Surface mounted.
1. Product: Furnished by Owner, installed by Contractor.

C. Item 10C - Soap Dispenser: Surface mounted.
1. Product: Furnished by Owner, installed by Contractor.

D. Item 90B - Robe Hook: Heavy-duty stainless steel, double-prong, rectangular-shaped bracket and backplate for concealed attachment, satin finish.
1. Products:
a. B-672 by Bobrick (dual).
b. 9124 by Bradley (dual).

E. Item 92 - Drop Box: Through-the-Wall, heavy duty steel, piano hinge, adjustable metal frames, 14" W x 15" H x 8-3/4" D.
1. Metal Baffle to protect drop opening from fishing.
2. Drop slot: Minimum 12-3/8" to accept legal size paper and large envelopes. Accept up to 1/2" thick item.
3. Wall thickness: See Drawings.
4. Installation hardware and accessories as required for complete installation.
5. Product: WDS-311-DD Through-The-Wall Drop Box by Protex Safe Company.
6. Substitutions: Section 01 60 00 - Product Requirements.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify existing conditions before starting work. Check opening scheduled to receive recessed units for correct dimensions, plumbness of blocking or frames, and preparation that would affect installation of accessories.

B. Verify exact location of accessories for installation. Check for conditions that would affect placement, quality and execution of work.

C. Verify that field measurements are as indicated on drawings. Verify spacing of plumbing fixtures and toilet partitions that affect installation of accessories.

D. See Section 06 10 54 - Wood Blocking and Curbing, for installation of blocking, reinforcing plates, and concealed anchors in walls. Do not begin installation of accessories until openings and surfaces are acceptable and adequate blocking has been provided

3.02 PREPARATION

A. Deliver inserts and rough-in frames to site for timely installation.

B. Provide templates and rough-in measurements as required.

3.03 INSTALLATION

A. Install accessories in accordance with manufacturers' instructions in locations indicated on the drawings.

B. Install plumb and level, securely and rigidly anchored to substrate.

C. Mounting Heights and Locations: As required by accessibility regulations and as indicated on drawings.

D. Secure all items to concealed blocking or anchor plates installed in walls. All anchors shall be fully concealed.

E. Adjust accessories for proper operation. After completion of installation, clean and polish all exposed surfaces. Deliver keys and instruction sheet to Owner. All keys shall be clearly labeled.

F. Paper towel and soap dispensers shall be installed at all sinks, whether indicated or not on the Drawings.

3.04 PROTECTION

A. Protect installed accessories from damage due to subsequent construction operations.

END OF SECTION

SECTION 10 44 00
FIRE PROTECTION SPECIALTIES

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Fire extinguishers.

B. Fire blankets.

C. Fire extinguisher cabinets.

D. Accessories.

E. See Code Analysis Key Plan Drawings for fire extinguisher locations.

1.02 RELATED REQUIREMENTS

A. Section 06 10 54 - Wood Blocking and Curbing: Wood blocking and shims.

B. Section 09 21 16 - Gypsum Board Assemblies: Roughed-in metal stud wall openings.

C. Division 22 - Plumbing: Emergency Station with fire blanket and fire extinguisher integral cabinet.

1.03 REFERENCE STANDARDS

A. NFPA 10 - Standard for Portable Fire Extinguishers; 2013.

B. UL - Fire Protection Equipment Directory; current edition.

1.04 SUBMITTALS

A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.

B. Shop Drawings: Indicate cabinet physical dimensions and rough-in measurements for recessed cabinets. Verify that cabinets are sized to accommodate the type and capacity of extinguishers specified.

C. Product Data:
   1. Submit fire extinguisher cabinet and extinguisher operational features, color and finish, and anchorage details.

D. Manufacturer's Installation Instructions: Indicate special criteria and wall opening coordination requirements.

1.05 FIELD CONDITIONS

A. Do not install extinguishers when ambient temperature may cause freezing of extinguisher ingredients.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Manufacturer (Basis of Design): J.L. Industries.

B. Acceptable Manufacturers:
   1. Larsen's Manufacturing Co
   2. Amerex Corp.
   3. American Specialties Inc.
   4. Substitutions: See Section 01 60 00 - Product Requirements.

2.02 FIRE EXTINGUISHERS

A. Fire Extinguishers - General: Comply with product requirements of NFPA 10 and applicable codes, whichever is more stringent.
   1. Provide extinguishers labeled by UL for the purpose specified and indicated.

B. FE-36 Type Fire Extinguishers: Stainless steel tank, with pressure gage.
   1. Class: A:B:C.
   2. Size: 5 pound.
   3. Size and classification as scheduled.
   4. Finish: Baked polyester powder coat, red color.

2.03 FIRE EXTINGUISHER CABINETS

A. General: Cabinets for fire-rated locations shall be listed and labeled to comply with requirements of ASTM E814 for the fire-resistance rating of the walls where they are to be installed.

B. Product: JL Industries Ambassador Series # 1816F10.

C. Metal: Formed primed steel sheet; 0.036 inch thick base metal.

D. Cabinet Configuration: Semi-recessed type.
   1. Sized to accommodate accessories.
   2. Trim: Flat, 3/8 inch wide face.
   3. Trim: Returned to wall surface, with 4" projection.
   4. Form cabinet enclosure with right angle inside corners and seams. Form perimeter trim and door stiles.

E. Door: 0.036 inch thick, reinforced for flatness and rigidity; latch. Hinge doors for 180 degree opening with continuous piano hinge. Provide nylon catch.

F. Door Glazing: Plastic, clear, 1/4 inch thick acrylic. Set in resilient channel gasket glazing.

G. Cabinet Mounting Hardware: Appropriate to cabinet. Pre-drill for anchors.

H. Weld, fill, and grind components smooth.

I. Finish of Cabinet Exterior Trim and Door: Baked enamel, color as selected.

J. Finish of Cabinet Interior: White enamel.

K. Provide Red Vertical FE Letters:
   1. Product: LDCVRFE by JL Industries.

L. Provide ADAC option for cabinets located in fire-rated wall construction.

2.04 ACCESSORIES

A. Fire Blanket: Fire retardant treated wool; red, 62 x 84 inch size.

B. Cabinet Signage: JL Industries; Plastic sign 5" x 6" 3D tent Fire Extinguisher #24S.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify existing conditions before starting work.

B. Verify rough openings for cabinet are correctly sized and located.

3.02 INSTALLATION

A. Refer to the Drawings for locations of fire extinguisher cabinets and fire extinguishers (designated F.E.C.), wall mounted fire extinguishers without cabinets (designated F.E.). Locations shown on the Drawings are approximate. Verify all locations and mounting heights with the Architect prior to roughing-in of cabinets or mounting brackets. In general, fire extinguishers shall be installed no higher than 4'-6" AFF to top of unit.

B. Install in accordance with manufacturer's instructions.

C. Install cabinets plumb and level in wall openings, no higher than 4'-6" inches from finished floor to top of cabinet.

D. Secure rigidly in place.

E. Place extinguishers and accessories in cabinets as indicated.

F. All fire extinguishers shall be fully charged and inspected within one (1) month prior to date of Substantial Completion.

END OF SECTION

SECTION 11 31 00
APPLIANCES

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Kitchen appliances.

B. Installation of Owner furnished appliances.

1.02 RELATED REQUIREMENTS

A. Section 09 21 16 - Gypsum Board Assemblies

B. Section 12 32 00 - Wood Casework.

C. Section 12 36 00 - Countertops.

D. Section 22 10 05 - Plumbing Piping: Plumbing connections for appliances.

E. Section 26 27 17 - Equipment Wiring: Electrical connections for appliances.

1.03 REFERENCE STANDARDS

A. UL 300A

1.04 SUBMITTALS

A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.

B. Product Data: Manufacturer's data indicating dimensions, capacity, and operating features of each piece of equipment specified.

C. Copies of Warranties: Submit manufacturer warranty and ensure that forms have been completed in Owner's name and registered with manufacturer.

1.05 QUALITY ASSURANCE

A. Manufacturer Qualifications: Company specializing in manufacturing products specified in this Section, with not less than three years of documented experience.

B. Electric Appliances: Listed and labeled by UL or Intertek (ETL) and complying with NEMA standards.

C. Energy Ratings: Provide residential appliances that carry labels indicating energy-cost analysis (estimated annual operating cost) and efficiency information as required by the Federal Trade Commission.

1.06 WARRANTY

A. See Section 01 78 10 - Warranties, for additional warranty requirements.

B. Provide manufacturer's standard one (1) year product warranties agreeing to repair or replace residential appliances or components against failure in materials or workmanship within the specified periods. In addition, provide the following extended warranties:

PART 2 PRODUCTS

2.01 APPLIANCES

A. All Equipment Eligible for Energy Star Rating: Energy Star Rated.

B. Refrigerator: Free-standing, top-mounted freezer, frost-free.
   1. Product: Furnished by Owner, Installed by Contractor.

C. Dishwasher: Undercounter.
   1. Product: Furnished by Owner, installed by Contractor.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify utility rough-ins are present and correctly located.

B. Examine cabinet installation with the appliance installer to verify proper conditions. Proceed with the installation only after unsatisfactory conditions have been corrected.

3.02 INSTALLATION

A. Install in accordance with manufacturer's instructions.

B. Anchor built-in equipment in place to supporting cabinets or countertops with concealed fasteners.

C. Verify that clearances are adequate for proper functioning and rough openings are completely concealed. Place freestanding equipment in final locations after finishes have been completed in each area. Verify that clearances are adequate to properly operate equipment.

D. Provide all miscellaneous installation kits, pigtails, washer hose, and connections required for complete and proper installations for all appliances (Contractor and Owner furnished).

3.03 CLEANING

A. Remove packing materials from equipment.

B. Clean equipment, leave in a condition ready for operation.

END OF SECTION

SECTION 11 52 13
PROJECTION SCREENS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Front projection screen assemblies.

1.02 RELATED REQUIREMENTS

A. Section 05 50 00 - Metal Fabrications: Supports for suspended projection screens.

B. Section 06 10 54 - Wood Blocking and Curbing: Wood blocking in walls and ceilings.

C. Section 09 51 00 - Acoustical Ceilings: Suspended panel ceilings for recessed screens.

D. Section 26 27 17 - Equipment Wiring: Electrical supply, conduit, and wiring for electric motor operated projection screens.

1.03 SUBMITTALS

A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.

B. Product Data: Manufacturer's catalog cuts and descriptive information on each product to be used, including:
   1. Preparation instructions and recommendations.
   2. Storage and handling requirements and recommendations.
   3. Installation methods.
   4. Wiring diagrams for motor operators and actuators, and controls and switches.

C. Shop Drawings: Show layouts, screen types, drop lengths, accessories, wiring, indicate dimensions, verified field measurements, mounting details, and interface with adjacent construction.

D. Samples: For screen fabrics, submit two samples 6 x 6 inch in size.

E. Operation and Maintenance Data: Provide manufacturer's operation and maintenance instructions.

F. Warranty: Submit manufacturer warranty and ensure that forms have been completed in Owner's name and registered with manufacturer.

1.04 QUALITY ASSURANCE

A. Manufacturer Qualifications: Experienced in manufacturing products specified in this section.

B. Installer Qualifications: Experienced in installation of the work of this section.

1.05 DELIVERY, STORAGE, AND HANDLING

A. Deliver projection screens to project site in manufacturer's original unopened packaging. Inspect for damage and size before accepting delivery.

B. Store in a protected, clean, dry area with temperature maintained above 50 degrees F. Stack according to manufacturer's recommendations.

C. Acclimate screens to building temperatures for 24 hours prior to installation, or in accordance with manufacturer's recommendations.

1.06 WARRANTY

A. See Section 01 78 10 - Warranties, for additional warranty requirements.

B. Provide One year manufacturer warranty for projection screen assembly.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Basis of Design: Draper, Inc (Motorized); Premier.

B. Acceptable Manufacturers:
   1. Bretford.
   2. Da-Lite Screen Company.
   3. Knox Manufacturing Co.

C. Substitutions: See Section 01 60 00 - Product Requirements.

2.02 FRONT PROJECTION SCREENS

A. Front Projection Screens: Factory assembled unless otherwise indicated.
   1. Dimensions: Screen Viewing Area: 87 1/2" high x 140" wide. Diagonal: 165 inches. Case length: 160.5 inches.

B. Masking Borders: White, on four sides.

C. Screen Fabric: Confirm type with Owner.

D. Concealed-in-Ceiling Screen Cases: Steel; integral roller brackets.
   1. Door Slat: Self trim; self-closing and -opening.
   2. Case Finish: Baked enamel.
   3. Case Color: White.
   4. End Caps: Steel; finished to match case.
   5. Electrically-Operated Screens: 1-1/2 inch aluminum door roller.

E. Electrically-Operated Screens:
   1. Roller: 2 inch aluminum, with locking device.
   2. Vertical Tensioning: Screen fabric weighted at bottom with steel bar with plastic end caps.

F. Provide mounting hardware, brackets, supports, fasteners, and other mounting accessories required for a complete installation, in accordance with manufacturer's recommendations for specified substrates and mountings.

2.03 ELECTRICAL COMPONENTS

A. Electrical Components: Listed and classified by UL as suitable for the purpose specified and indicated.

B. Motors: Direct drive, 110 V, 60 Hz.
   1. Screen Motor: Mounted at end of roller; three wire with ground; quick reverse type and lifetime lubricated; equipped with thermal overload cut-off.
      a. Electrical Characteristics: 1.2 amps.
      b. Motor mounted on sound absorber.
   2. Door and Adjustable Masking Motor: Mounted at end of roller; three wire with ground; quick reverse type; equipped with thermal overload cut-off.
      a. Electrical Characteristics: 1.2 amps.

C. Controls: 3 position control switch with plate.
   1. Remote Control: Infrared; provide one transmitter.

2.04 PROJECTOR

A. Projector, projector ceiling mount and mounting hardware furnished by Owner, installed by Contractor.

B. Supplemental brackets, supports, fasteners, and other mounting accessories required for a complete installation, in accordance with manufacturer's recommendations for specified substrates and mountings furnished and installed by Contractor

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify that substrate is finished and ready to accept screen installation.

B. If substrate preparation is the responsibility of another installer, notify Architect of unsatisfactory preparation before proceeding.

C. Verify that openings for recessed screens are correctly sized.

D. Verify type and location of electrical connections.

E. Do not install projection screens until climate control systems are in place and interior painting and other finishes are completed.

3.02 PREPARATION

A. Coordinate screen installation with installation of projection systems.

B. Coordinate installation with adjacent construction and fixtures, including ceilings, walls, lighting, fire suppression, and registers and grilles.

3.03 INSTALLATION

A. Install in accordance with manufacturer's instructions, using manufacturer's recommended hardware for relevant substrates.

B. The Contractor shall field verify screen locations with the Architect prior to installation.

C. Do not field cut screens.

D. Install screens in mountings as specified and as indicated on Drawings.

E. Install plumb and level.

F. Install electrically operated screens ready for connection to power and control systems by others.

G. Adjust projection screens and related hardware in accordance with manufacturer's instructions for proper placement and operation.

H. Test electrical screens for proper working condition. Adjust as needed.

3.04 PROTECTION

A. Protect installed products until completion of project.

B. Touch up, repair, or replace damaged products before Substantial Completion.

END OF SECTION

SECTION 11 53 00
LABORATORY EQUIPMENT

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Laboratory equipment.

B. Fume Hoods.

C. Connection to utilities.

D. Service fittings and outlets.

1.02 RELATED REQUIREMENTS

A. Section 06 10 54 - Wood Blocking and Curbing: Placement of rough-in frame and anchors.

B. Section 12 32 00 - Wood Casework: Supporting base millwork cabinets.

C. Section 12 36 00 - Countertops.

D. Division 22 - Plumbing: Plumbing contractor shall provide all supply/return service lines and final connections for all equipment installations.

E. Division 23 - HVAC: Mechanical contractor shall provide exhaust rough-ins, ducting, final connections and balancing of hood system.

F. Division 26 - Electrical: Electrical contractor shall provide all electrical service rough-ins, and final connections for all equipment installations.

1.03 REFERENCE STANDARDS

A. ASHRAE Standard 110.1995 - Method of Testing Performance of Laboratory Fume Hoods.

B. NSF STD#49 - Photometric Method of Testing.

C. NIH03-112C - National Institute of Health Specification

D. UL - Underwriters Laboratories.

E. ASTM D552 - Bending Test.

F. NFPA 45 - National Fire Protection Association.

1.04 QUALITY ASSURANCE

A. Fume hood manufacturer shall have a minimum of ten years experience in the manufacture of laboratory fume hoods and equipment.

B. Air balancing and blower adjustments to provide proper operation and design air flow for laboratory fume hoods and spray booths per SEFA 1 test procedures shall be part of the Work of this Section. The casework subcontractor shall employ the services of the mechanical subcontractor's balancing agent, or another approved balancing agent. Prior to any balancing activities, the proposed balancing agent shall be submitted to the Architect. Submit copies of the air balancing report to the Architect.

1.05 ADMINISTRATIVE REQUIREMENTS

A. Large Components: Ensure that large components can be moved into final position without damage to other construction.

B. Pre-installation Meeting: Convene at least two weeks before starting work of this Section.

1.06 SUBMITTALS

A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.

B. Product Data: Provide equipment dimensions and construction, equipment capacities, physical dimensions, utility and service requirements and locations, point loads.

1. Submit test reports for each type of fume hood, verifying compliance with ASHRAE Standard 110 for face velocity, smoke challenges and containment efficiency.

2. Fume Hoods: Submit name of the proposed balancing agent for hoods. Submit copies of the hood air balancing reports.

C. Shop Drawings: Indicate equipment locations, large scale plans, elevations, cross sections, rough-in and anchor placement dimensions and tolerances, clearances required and type of service fittings.
   1. Coordinate shop drawings with other work involved.
   2. Provide rough-in drawings for mechanical, plumbing and electrical services as required.
   3. Provide face opening, air volume and static pressure drops.

D. Samples: Submit two samples of exposed finish surfaces, 6 x 6 inch in size illustrating color and finish.

E. Manufacturer's Installation Instructions: Indicate special installation requirements.

F. Manufacturer's Certificate: Certify that products meet or exceed specified requirements.

G. Operation Data: Include description of equipment operation and required adjusting and testing.

H. Maintenance Data: Identify system maintenance requirements, servicing cycles, lubrication types required and local spare part sources.

I. Warranty: Submit manufacturer warranty and ensure that forms have been completed in Owner's name and registered with manufacturer.

1.07 QUALITY ASSURANCE

A. Manufacturer: Company specializing in manufacturing the types of products specified in this section, with minimum of fifteen years of documented experience.

1.08 REGULATORY REQUIREMENTS

A. Conform to applicable code for all equipment.

B. Conform to UL requirements for fabrication and installation of all equipment.

1.09 WARRANTY

A. See Section 01 78 00 - Closeout Submittals, for additional warranty requirements.

B. Except where more stringent warranty requirements are provided, all equipment furnished under this Section shall be guaranteed for a minimum of one year, parts, and labor from date of Substantial Completion against defective materials, design and workmanship.

PART 2 PRODUCTS

2.01 COMPONENTS

A. Installation Accessories: Provide all rough-in frames, anchors, supports, accessories and closure trim required for complete installation.

2.02 FUME HOODS

A. Fume Hood: Low constant volume. Hood assembly shall include all necessary components and design features to perform as a completely autonomous exhaust system, entirely independent of and unaffected by the building mechanical systems.
   1. Quantity Required: Seven.
   2. Size: 36” deep x 54” high above work surface x 60” wide, nominal <u>in Lab C300. 36” x 54” high above work surface x 48” wide, nominal in Prep Room C300A.</u>
   3. Enclosure: Painted steel exterior, with interior lining of light colored KMER Epoxy Resin Lining.
   4. Work Surface: Epoxy resin.
      a. Hood worksurface shall be 1-1/4” thick molded epoxy resin made in the form of a watertight pan, not less than 3/8” deep to contain spillage with a 6” wide safety ledge across the front edge.
      b. A cup drain flush with the recessed worksurface shall be provided. The worksurface and cup drain shall be available in either black or grey.

5. Sash: Single vertical sliding sash; welded steel frame, with laminated safety glazing, counterbalanced, smooth operation.
6. Light: Interior vapor sealed lighting with lamps; minimum of 100 foot-candles at 13 inches above the worksurface; controlled from the front apron.
7. Blower control and receptacle: Switch and a duplex receptacle at front apron.
8. Other Services: A double turret gas cock inside hood. No sink is required.
9. Blower: AMCA rated, belt drive, weatherproof enclosure for roof mounting. One per hood, sized as recommended by the manufacturer.
10. LCV Fume Hood Characteristics:
    a. The CFM exhaust shall be that detailed in the following chart:
       Bench Hood Size: 5 Feet
       Horiz. Max Width: 18 inches
       Horiz FPM: 102
       Vert FPM: 78
       CFM: 280
       Bench Hood Size: 4 Feet
       Horiz. Max Width: 14 1/2 inches
       Horiz FPM: 100
       Vert FPM: 81
       CFM: 225

11. Other: Ceiling enclosure panels and finished backs where indicated on drawings..
12. Other Equipment: Air flow monitor alarm.
13. Furnishing and delivering all service outlets, accessory fittings, electrical receptacles and switches, as listed in these specifications, equipment schedules or as shown on drawings. The fume hood superstructure shall be listed to UL Standards for Safety by Underwriters Laboratories Inc. (UL). Final plumbing and electrical connections are the responsibility of those contractors fulfilling requirements of Division 22 and 26.
    a. Plumbing services shall consist of remote control valves as selected located within the end panels, controlled by extension rods projecting through the control panels of the hood, with color coded plastic handles. Interior fittings for gases shall be nylon panel flanges and angled serrated hose connectors, color coded. All plumbing fittings shall be factory installed and piped between the valve and the outlet. Inlet piping shall have a single-point connection for each valve provided and carried to a point 1" above the fume hood roof or 1" above the worktop rear corner depending on the rough-in locations shown in the drawings. Points of final service connection by other trades shall be at the stub provided by the fume hood manufacturer.
    b. The hood superstructure shall be pre-wired and contain a UL 3101 label certifying acceptable wire gauge, connections, fixtures and wire color coding. Wiring electrical services shall consist of two duplex receptacles and a light switch. The duplex receptacles shall be 20 Amp., 125 volt AC, and 3-wire polarized grounded with ground fault interruption. The receptacles shall be of specification grade, side wired only, to insure a positive connection. The light switch shall be 20 Amp., 125 volt AC, and 3-wire polarized grounded. Wiring shall terminate in one 6" x 6" x 4" service junction box located on the fume hood roof. Final wiring and circuit dedication shall be by others.
14. Basis of Design: Dynamic Barrier Low Constant Volume (LCV) Laboratory Fume Hood by Kewaunee Scientific Corporation.
15. Substitutions: See Section 01 60 00 - Product Requirements.

2.03 SOURCE QUALITY CONTROL AND TESTS

A. Provide shop inspection and testing for fume hood equipment items.

B. Fume hood liner chemical spot tests; 24 hours.
   1. See Hazardous Materials Questionnaire, dated 10/10/14 at the end of this Section for list of applicable reagents.

2. Test result rating: No effect or slight change in gloss - to - Slight change in gloss or color.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify that rough-in frames, anchors and supports are accurately placed.

3.02 INSTALLATION

A. Install in accordance with manufacturer's instructions.

B. Install in accordance with standards required by authority having jurisdiction.

C. Anchor equipment securely in place.

D. Sequence installation to ensure utility connections are achieved in an orderly and expeditious manner.

3.03 ADJUSTING

A. Adjust operating equipment to efficient operation.

3.04 CLOSEOUT ACTIVITIES

A. Demonstrate equipment operation.

END OF SECTION

HAZARDOUS MATERIALS QUESTIONNAIRE
Lavallee Brensinger Architects

As required by the International Building Code, a report identifying all hazardous materials to be manufactured, processed, generated, stored, sold or otherwise utilized in the buildings and structures of this project must be submitted to building and fire officials. The information provided in this questionnaire will constitute the required report. Lavallee/Brensinger P.A. and its consultants will rely upon the accuracy of the information provided on this questionnaire to design appropriate building systems for the presence of hazardous materials.

7/21/2015
Science Building C300 Chemistry Lab
University of Southern Maine
Nancy Theriault
25 Bedford St Portland, ME 04104

Completed by:

Name: Leigh Schwieterman
Affiliation: USM Chemistry Department
Date:10/10/14 (Revised 1/20/2015 and 7/20/2015)

Please note whether:

1. The material is being stored.
2. The material is used in a closed system where vapors emitted by the product are not liberated outside of the system, or the product is not exposed to the atmosphere.
3. The material is used in an open system, where the solid or liquid hazardous material is continuously open to the atmosphere and/or vapors are liberated.

Please note "NONE" in categories as applicable.

PHYSICAL HAZARDS

Material / Classification:		Material Name:	Anticipated Quantity:	Note 1, 2, or 3:	Location Where Used or Stored:
Combustible Liquid Class II			*Liquid Gallons (pounds)*		
Liquids having *flash points* at or above 100 deg. F and below 140 deg. F.	1	Acetic Acid	4 L	1	Acid Cabinet
	2	Cyclohexane	1 L	1	Flammable Cabinet
	3				
	4				

Material / Classification:	Material Name:	Anticipated Quantity:	Note 1, 2, or 3:	Location Where Used or Stored:
Combustible Liquid Class IIIA Liquids having *flash points* at or above 140 deg. F and below 200 deg. F.	1 None	*Liquid Gallons (pounds)*		
	2			
	3			
	4			
Combustible Liquid Class IIIB Liquids having *flash points* at or above 200 degrees F.	1 None	*Liquid Gallons (pounds)*		
	2			
	3			
	4			
Consumer Fireworks (Class C, Common)	1 None	*Solid Pounds (cu. ft.)*		
	2			
	3			
	4			
Combustible Fiber Includes readily ignitable and free-burning fibers such as cotton, sisal, henequen, jute, hemp, tow, cocoa fiber, oakum, baled waste, baled wastepaper, kapok, hay, straw, excelsior, Spanish moss, and other like material.	1 None	*Solid Pounds (cu. ft.)*		
	2			
	3			
	4			

Material / Classification:		Material Name:	Anticipated Quantity:	Note 1, 2, or 3:	Location Where Used or Stored:
Cryogenics, Flammable or Oxidizing Any liquid that has a *boiling point* below -150 degrees F at 14.7 psi.			*Liquid Gallons (pounds)*		
	1	None			
	2				
	3				
	4				
Explosives - Solid or Liquid Any chemical compound, mixture or device, the primary or common purpose of which is to function by explosion. The term includes, but is not limited to, dynamite, black powder, pellet powder, initiating explosives, detonators, safety fuses, squibs, detonating cord, igniter cords, igniter, and display fireworks, 1.3G (Class B, Special)			*cu. ft. or pounds*		
	1	None			
	2				
	3				
	4				
Flammable Gas - Gaseous Liquified A liquified compressed gas which, under a charged pressure, is partially liquid at a temperature of 68 degrees F and which is flammable.			*pounds or cu. ft.*		
	1	Acetylene	250 cu ft		
	2	Hydrogen	250 cu ft		
	3	Helium	250 cu ft		Per Portland Fire Dept
	4				
Flammable Liquid - Class IA Liquids having a *flash point* below 73 deg. F and having a *boiling point* below 100 deg. F.			*Liquid Gallons (pounds)*		
	1	Pentane	500mL		
	2				
	3				
	4				

Material / Classification:		Material Name:	Anticipated Quantity:	Note 1, 2, or 3:	Location Where Used or Stored:
Flammable Liquid - Class IB			*Liquid Gallons (pounds)*		
Liquids having a *flash point* below 73 deg. F and having a *boiling point* at or above 100 deg. F.	1	Acetone	2L	1	Flammable Cabinet
	2	Hexanes	2L	1	Flammable Cabinet
	3	Butyl Alcohol	1L	1	Flammable Cabinet
	4	Isopropyl Alcohol	1L	1	Flammable Cabinet
Flammable Liquid - Class IC			*Liquid Gallons (pounds)*		
Liquids having a *flash point* at or above 73 deg. F and below 100 deg. F.	1	Methanol	2L	1	Flammable Cabinet
	2				
	3				
	4				
Flammable Solid			*cu. ft.*		
A solid, other than a blasting agent or *explosive* that is capable of causing fire through friction, absorption of moisture, spontaneous chemical change, or retained heat from manufacturing or processing, or which an ignition temperature below 212 deg. F., or which burns so vigorously and persistently when ignited as to create a serious hazard. A chemical shall be considered a flammable solid as determined in accordance with the test method of CPSC 16 CFR; 1500.44, if it ignites and burns with a self-sustained flame at a rate greater than 0.1 inch per second along its major axis.	1	Camphor	250g	1	General Chem Storage
	2	Naphthalene	500g	1	General Chem Storage
	3	Magnesium turnings	500g	1	General Chem Storage
	4				
Organic Peroxide - Class UD			*cu. ft. or pounds*		
Organic peroxides which are capable of *detonation*. These peroxides present an extremely high explosion hazard through rapid explosive decomposition.	1	None			
	2				
	3				
	4				

Material / Classification:	Material Name:	Anticipated Quantity:	Note 1, 2, or 3:	Location Where Used or Stored:
Organic Peroxide - Class I Class I organic peroxides are capable of *deflagration*, but not *detonation*. These peroxides present a high explosion hazard through rapid decomposition.	1 None	*cu. ft. or pounds*		
	2			
	3			
	4			
Organic Peroxide - Class II Class II organic peroxides burn very rapidly and present a moderate reactivity hazard.	1 None	*cu. ft. or pounds*		
	2			
	3			
	4			
Organic Peroxide - Class III Class III organic peroxides burn rapidly and present a moderate reactivity hazard.	1 None	*cu. ft. or pounds*		
	2			
	3			
	4			
Organic Peroxide - Class IV Formulations that burn in the same manner as ordinary combustibles and that pose a minimal reactivity hazard.	1 None	*cu. ft. or pounds*		
	2			
	3			
	4			
Organic Peroxide - Class V Formulations that burn with less intensity than ordinary comubstible or do not sustain combustion and that pose no reactivitiy hazard.	1 None	*cu. ft. or pounds*		
	2			
	3			
	4			

Material / Classification:		Material Name:	Anticipated Quantity:	Note 1, 2, or 3:	Location Where Used or Stored:
Oxidizer - Class 4			*cu. ft. or pounds*		
An oxidizer that can undergo an explosive reaction due to contamination or exposure to thermal or physical shock. Additionally, the oxidizer will enhance the burning rate and is capable of causing spontaneous ignition of combustibles.	1	None			
	2				
	3				
	4				
Oxidizer - Class 3			*cu. ft. or pounds*		
An oxidizer that will cause a severe increase in the burning rate of combustible materials with which the oxidizer comes in contact or that will undergo vigorous self-sustaimed decomposition due to contamination or exposure to heat.	1	Potassium Bromate	200g	1	Oxidizer Shelf
	2				
	3				
	4				
Oxidizer - Class 2			*cu. ft. or pounds*		
An oxidizer that will cause a moderate increase in the burning rate or that is capable of causing spontaneous ignition of combustible materials with which the oxidizer comes in contact.	1	Potassium Permanganate	400g	1	Oxidizer Shelf
	2				
	3				
	4				
Oxidizer - Class 1			*cu. ft. or pounds*		
An oxidizer whose primary hazard is a slight increase in the burning rate but which does not cause spontaneous ignition when the oxidizer comes in contact with combustibel materials.	1	Aluminum Nitrate	800g	1	Oxidizer Shelf
	2	Ammonium Nitrate	500g	1	Oxidizer Shelf
	3	Calcium Nitrate	200g	1	Oxidizer Shelf
	4	Copper(II) Nitrate	300g	1	Oxidizer Shelf
		Iron(III) Nitrate	500g	1	Oxidizer Shelf
		Lead Nitrate	400g	1	Oxidizer Shelf
		Magnesium Nitrate	500g	1	Oxidizer Shelf
		Nickel (II) Nitrate	200g	1	Oxidizer Shelf
		Potassium Chromate	300g	1	Oxidizer Shelf
		Potassium Dichromate	300g	1	Oxidizer Shelf
		Potassium Nitrite	50g	1	Oxidizer Shelf
		Silver Nitrate	50g	1	Oxidizer Shelf
		Sodium Nitrate	250g	1	Oxidizer Shelf

	Sodium Nitrite	100g	1	Oxidizer Shelf
	Strontium Nitrate	200g	1	Oxidizer Shelf
	Zinc Nitrate	500g	1	Oxidizer Shelf
Oxidizer - Gas		*cu. ft. or pounds*		
A gas that can support and accelerate combustion of other materials.	1 None			
	2			
	3			
	4			

Material / Classification:		Material Name:	Anticipated Quantity:	Note 1, 2, or 3:	Location Where Used or Stored:
Pyrophoric Material		*None*	*cu. ft. or pounds or cu.ft. gas*		
A material with an autoignition temperature in air at or below a temperature of 130 deg. F.	1				
	2				
	3				
	4				
Unstable (Reactive) - Class 4			*cu. ft. or pounds or cu.ft. gas*		
Materials that in themselves are readily capable of *detonation* or explosive decomposition or explosive reaction at normal temperatures and pressures. This class includes, among others, materials that are sensitive to localized thermal or mechanical shock at normal temperatures and pressures.	1	None			
	2				
	3				
	4				
Unstable (Reactive) - Class 3			*cu. ft. or pounds or cu.ft. gas*		
Materials that in themselves are capable of *detonation* or of explosive decomposition or explosive reaction, but that require a strong initiating source or that must be heated under confinement before initiation. This class includes, among others, materials that are sensitive to thermal or mechanical shock at elevated temperatures and pressures.	1	None			
	2				
	3				
	4				
Unstable (Reactive) - Class 2			*cu. ft. or pounds or cu.ft. gas*		
Materials that are normally unstable and readily undergo violent chemical change but do not detonate. This class includes, among others, materials that undergo chemical change with rapid release of energy at normal or elevated tempe+B298ratures and pressures.	1	None			
	2				
	3				
	4				

Material / Classification:		Material Name:	Anticipated Quantity:	Note 1, 2, or 3:	Location Where Used or Stored:
Unstable (Reactive) - Class 1			*cu. ft. or pounds or cu.ft. gas*		
Materials that in themselves are normally stable, but which can become unstable at elevated temperatures and pressures.	1	None			
	2				
	3				
	4				
Water Reactive - Class 3			*cu. ft. or pounds*		
A material which reacts explosively with water without requiring heat or confinement.	1	None			
	2				
	3				
	4				
Water Reactive - Class 2			*cu. ft. or pounds*		
Materials that may form potentially explosive mixtures with water.B374	1	Sulfuric Acid	4L	1	Acid Cabinet
	2				
	3				
	4				
Water Reactive - Class 1			*cu. ft. or pounds*		
Materials that may react with water with some release of energy, but not violently.	1	Acetic Anhydride	1.5L	1	Acid Cabinet
	2	Sodium Hydroxide	3000g	1	General Chem Storage
	3				
	4				

HEALTH HAZARDS				
Material / Classification:	Material Name:	Anticipated Quantity:	Note 1, 2, or 3:	Location Where Used or Stored:
Corrosive		*cu. ft. or pounds*		
A chemical that causes visible destruction of, or irreversible *alterations* in, living tissue at the point of contact. A chemical shall be considered a corrosive if, when tested on the intact skin of albino rabbits by the test method described by DOTn 49 CFR; 173, such chemical destroys or changes irreversibly the structure of the tissue at the point of contact following an exposure period of 4-hours. This term shall not refer to action on inanimate surfaces.	1 Nitric Acid	2.5L	1	Acid Cabinet
	2 Hydrochloric Acid	4L	1	Acid Cabinet
	3 Sulfuric Acid	1L	1	Acid Cabinet
	4 Sodium Hydroxide	3000g	1	General Chem Storage\
	Acetic Acid	8L	1	Acid Cabinet
	Ammonium Hydroxide	1L	1	Base Cabinet
	Acetic Anhydride	1.5L	1	Acid Cabinet
	Hydrobromic Acid	5L	1	Acid Cabinet
	Phosphoic Acid	3L	1	Acid Cabinet
Highly Toxic		*pounds or cu. ft.*		
A chemical falling within any of the following categories is considered highly toxic:				
A. A chemical that has a median lethal dose (LD_{50}) of 50 milligrams or less per kilogram of body weight when administered orally to albino rats weighing between 200 and 300 grams each.	1 None			
	2			
	3			
	4			
B. A chemical that has a median lethal dose (LD_{50}) of 200 milligrams or less per kilogram of body weight when administered by continuous contact for 24-hour (or less if death occurs within 24 hours) with the bare skin of albino rabbits weighing between 2 and 3 kilograms each.	1 None			
	2			
	3			
	4			
C. A chemical that has a median lethal concentration (LD_{50}) in air of 200 parts per million by volume or less of gas or vapor, or 2 milligrams per liter or less of mist, fume or dust, when administered by continuous inhalation for 1-hour (or less if death occurs within 1-hour) to albino rats weighing between 200 and 300 grams each.	1 None			
	2			
	3			
	4			

Material / Classification:	Material Name:	Anticipated Quantity:	Note 1, 2, or 3:	Location Where Used or Stored:
Toxic A chemical that is within any of the following categories shall be considered toxic:		*pounds or cu. ft.*		
A. A chemical that has a median lethal dose (LD_{50}) of more than 50 milligrams per kilogram, but not more than 500 milligrams per kilogram of body weight when administered orally to albino rats weighing between 200 and 300 grams each.	1 None			
	2			
	3			
	4			
B. A chemical that has a median lethal dose (LD_{50}) of more than 200 milligrams per kilogram, but not more than 1,000 milligrams per kilogram of body weight when administered by continuous contact for 24 hours (or less if death occurs within 24 hours) with the bare skin of albino rabbits weighing between 2 and 3 kilograms each.	1 None			
	2			
	3			
	4			
C. A chemical that has a median lethal concentration (LD_{50}) in air of more than 200 parts per million but not more than 2,000 parts per million by volume of gas or vapor, or more than two milligrams per liter but not more than 20 milligrams per liter of mist, fume or dust, when administered by continuous inhalation for 1 hour (or less if death occurs within 1 hour) to albino rats weighing between 200 and 300 grams each.	1 None			
	2			
	3			
	4			

SECTION 12 24 00
WINDOW SHADES

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Window shades and accessories.

B. Electric motor operators.

C. Motor controls.

D. Work shall include the fabrication and installation of all window shades at all exterior windows at the following locations:
   1. Chemistry Lab C300.
   2. Prep C300A.
   3. Office C300C.

1.02 RELATED REQUIREMENTS

A. Section 06 10 54 - Wood Blocking and Curbing: Concealed wood blocking for attachment of headrail brackets.

B. Section 09 21 16 - Gypsum Board Assemblies: Substrate for window shade systems.

C. Division 26 - Electrical.

D. Section 26 27 26 - Wiring Devices: Finish requirements for wall controls specified in this section.

1.03 REFERENCE STANDARDS

A. ASTM D4674 - Standard Practice for Accelerated Testing for Color Stability of Plastics Exposed to Indoor Office Environments; 2002a (Reapproved 2010).

B. ASTM G21 - Standard Practice for Determining Resistance of Synthetic Polymeric Materials to Fungi; 2009.

C. NFPA 70 - National Electrical Code; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.

D. NFPA 701 - Standard Methods of Fire Tests for Flame Propagation of Textiles and Films; 2010.

E. UL 325 - Standard for Door, Drapery, Gate, Louver, and Window Operators and Systems; Current Edition, Including All Revisions.

1.04 ADMINISTRATIVE REQUIREMENTS

A. Coordination:
   1. Coordinate the work with other trades to provide rough-in of electrical wiring as required for installation of hardwired motorized shades.

B. Sequencing:
   1. Do not fabricate shades until field dimensions for each opening have been taken.
   2. Do not install shades until final surface finishes and painting are complete.

1.05 SUBMITTALS

A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.

B. Product Data: Provide manufacturer's standard catalog pages and data sheets including materials, finishes, fabrication details, dimensions, profiles, mounting requirements, and accessories.
   1. Motorized Shades: Include power requirements and standard wiring diagrams.

C. Shop Drawings: Prepared specifically for this Project; show interface with other products.

1. Submit shade schedule indicating size, location and keys to details, head, jamb and sill details, mounting dimension requirements for each product and condition, and operation direction.
2. Motorized Shades: Provide schematic system riser diagram indicating component interconnections. Include requirements for interface with other systems.
3. Indicate System Series, operator, fabric selection, and mounting type.

D. Certificates: Manufacturer's documentation that line voltage components are UL listed or UL recognized.

E. Selection Samples: Include fabric samples in full range of available colors and patterns.
1. Motorized Shades: Include finish selections for controls.

F. Manufacturer's Instructions: Include instructions for storage, handling, protection, examination, preparation, and installation of product.

G. Warranty: Submit sample of manufacturer's warranty and documentation of final executed warranty completed in Owner's name and registered with manufacturer.

1.06 QUALITY ASSURANCE

A. Manufacturer Qualifications: Company specializing in manufacturing products specified in this Section, with not less than ten years of experience.

B. Installer Qualifications: Company specializing in performing work of this type with minimum five years of experience, factory trained and accepted by the manufacture.

1.07 DELIVERY, STORAGE, AND HANDLING

A. Deliver shades in manufacturer's unopened packaging, labeled to identify each shade for each opening.

B. Handle and store shades in accordance with manufacturer's recommendations.

1.08 FIELD CONDITIONS

A. Do not install products under environmental conditions outside manufacturer's absolute limits.

1.09 WARRANTY

A. See Section 01 78 00 - Closeout Requirements, for additional warranty requirements.

B. Provide manufacturer's warranty from the Date of Substantial Completion, covering the following:
1. Shade Hardware: One year.
2. Electric Motors: One year.
3. Electronic Control Equipment: One year.
4. Fabric: One year.
5. Aluminum and Steel Coatings: One year.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Manually Operated Roller Shades:
1. Application: Prep C300A and Office C300C.
2. Basis of Design: MechoShade Systems, Inc.; Mecho/5.
3. Acceptable Manufacturers:
a. Draper, Inc.
b. Lutron Electronics Co.
4. Substitutions: See Section 01 60 00 - Product Requirements.

B. Motorized Roller Shades, Motors and Motor Controls:
1. Application: Chemistry Lab C300.
2. Basis of Design: MechoShade Systems, Inc.; Mecho/5.
3. Acceptable Manufacturers:

a. Draper, Inc.
b. Lutron Electronics Co.

4. Substitutions: See Section 01 60 00 - Product Requirements.

C. Source Limitations: Furnish products produced by a single manufacturer and obtained from a single supplier.

2.02 ROLLER SHADES

A. Roller Shades: Fabric roller shades complete with mounting brackets, roller tubes, hembars, hardware and accessories; fully factory-assembled.
1. Drop: Regular roll.
2. Size: As indicated on drawings.

B. Fabric: Non-flammable, color-fast, impervious to heat and moisture, and able to retain its shape under normal operation; PVC-free; 100 percent recycled.
1. Sheer Shades:
a. Application: Prep C300A and Office C300C.
b. Sheer Shades: Reduce glare yet still reveal considerable details to the outside; no privacy; Openness Factor 1 to 2 percent.
2. Blackout Shades with second shade in same opening:
a. Application: Chemistry Lab C300.
b. Blackout Shade: Block virtually all the light; Openness Factor equal to zero (0).
c. Sheer Shades: Reduce glare yet still reveal considerable details to the outside; no privacy; Openness Factor 1 to 2 percent.
3. Flammability: Pass NFPA 701 large and small tests.
4. No growth, tested to ASTM G21 for ATCC9642, ATCC9348, and ATCC9645.

C. Roller Tube: As required for type of operation, extruded aluminum with end caps.
1. Dimensions: Manufacturer's standard, selected for suitability for installation conditions, span, and weight of shades.
2. Fabric Attachment: Utilize double sided adhesive tape.
3. Finish: Clear anodized.

D. Hembars and Hembar Pockets: Wall thickness designed for weight requirements and adaptation to uneven surfaces, to maintain bottom of shade straight and flat.

E. Manual Operation: Clutch operated continuous loop; beaded ball chain.

F. Motor Operation: Motor system housed inside roller tube, controlling shade movement via motor controls indicated; listed to UL 325.
1. Audible Noise: Maximum 39 dBA measured 3 feet from the motor unit; no audible clicks when motor starts and stops.
2. Motors: Size and configuration as recommended by manufacturer for the type, size, and arrangement of shades to be operated; integrated into shade operating components and concealed from view.
3. Motor Type: Both AC and DC motors are acceptable; provide required transformers for DC motors.
4. Control Compatibility: Fully compatible with the controls to be installed.

2.03 MOTOR CONTROLS

A. Motorized shades to be controlled by wall-mounted controls as specified below.

B. Control Requirements:
1. Unless specifically indicated to be excluded, provide all required equipment, conduit, boxes, wiring, connectors, hardware, supports, accessories, software, system programming, etc. as necessary for a complete operating system that provides the control intent indicated.
2. Capable of controlling shade speed for tracking within plus or minus 0.125 inch throughout entire travel.
3. Capable of synchronizing multiple units of the same size to start, stop and move in unison.

C. Wall-Mounted Controls: UV stabilized visible parts meeting ASTM D4674; furnished with backlit buttons; provided by shade manufacturer.
   1. Control Functions:
      a. Open: Automatically open controlled shade(s) to fully open position when button is pressed.
      b. Close: Automatically close controlled shade(s) to fully closed position when button is pressed.
      c. Raise: Raise controlled shade(s) only while button is pressed.
      d. Lower: Lower controlled shade(s) only while button is pressed.
      e. Stop shade(s) in motion by tap on any button.
   2. Finish: As specified in Section 26 27 26.
   3. Button Engraving: Manufacturer's standard engraving, unless otherwise indicated.

2.04 ACCESSORIES

A. Fascias: Size as required to conceal shade mounting.
   1. Style: As selected by Architect from shade manufacturer’s full selection.
   2. Material and Color: To match shade.

B. Brackets and Mounting Hardware: As recommended by manufacturer for mounting configuration and span indicated.

C. Fasteners: Non-corrosive, and as recommended by shade manufacturer.

2.05 FABRICATION

A. Fabricate shades to fit openings within specified tolerances.
   1. Vertical Dimensions: Fill openings from head to sill with 1/2 inch space between bottom bar and window stool.
   2. Horizontal Dimensions - Inside Mounting: Provide symmetrical light gaps on both sides of shade not to exceed 0.75 inches total.

PART 3 EXECUTION

3.01 EXAMINATION

A. Examine finished openings for deficiencies that may preclude satisfactory installation.

B. Start of installation shall be considered acceptance of substrates.

3.02 PREPARATION

A. Coordinate with placement of concealed blocking to support shades.

3.03 INSTALLATION

A. Install in accordance with manufacturer's instructions and approved shop drawings, using mounting devices as indicated.

B. Installation Tolerances:
   1. Inside Mounting: Maximum space between shade and jamb when closed of 1/16 inch.
   2. Maximum Offset From Level: 1/16 inch.

C. Adjust level, projection and shade centering from mounting bracket. Verify there is no telescoping of shade fabric. Ensure smooth shade operation.

3.04 SYSTEM STARTUP

A. Motorized Shade System: Provide services of a manufacturer's authorized representative to perform system startup.

3.05 CLEANING

A. Clean soiled shades and exposed components as recommended by manufacturer.

B. Replace shades that cannot be cleaned to "like new" condition.

3.06 CLOSEOUT ACTIVITIES

A. Demonstration: Demonstrate operation and maintenance of window shade system to Owner's personnel.

3.07 PROTECTION

A. Protect installed products from subsequent construction operations.

END OF SECTION

SECTION 12 32 00
WOOD CASEWORK

PART 1 - GENERAL

1.01 SECTION INCLUDES

A. Wood Casework.

B. Safety Cabinets.

C. Accessories.

D. Countertops: All countertops, including Laboratory Countertops, are a part of the Work of Section 12 36 00 - Countertops.

E. Sinks and Fixtures: All plumbing fixtures, including sinks, faucets, tail pieces, nipples, etc. shall be provide as a part of the Work of Section 12 36 00 Countertops and Division 23 - Plumbing. Coordination of casework with requirements for plumbing fixtures shall be provided as part of the Work of this Section. Factory and field cut-outs in casework required for the installation of all plumbing fixtures shall be part of the Work of this Section.

F. Electrical Service Fixtures (including specialty power supplies) specified herein shall be furnished under the Work of this Section. Other electrical service fixtures to be mounted in casework such as data receptacles, shall be provided as part of the Work of Division 26 - Electrical. Factory and field cut-outs in casework required for the installation of all electrical service fixtures shall be part of the Work of this Section. The assembly to the casework of all electrical service fixtures, connections and wiring shall be provided as a part of the Work of Division 26 - Electrical.

G. Safety Cabinets shall be provided as a part of the Work of this Section.

1.02 RELATED SECTIONS

A. Section 06 10 54 - Wood Blocking and Curbing

B. Section 08 80 00 - Glazing

C. Section 09 21 16 - Gypsum Board Assemblies

D. Section 09 65 00 - Resilient Flooring

E. Section 11 53 00 - Laboratory Equipment: Fume hoods supported atop base cabinets; Hazardous Materials Questionnaire.

F. Section 12 36 00 - Countertops: Countertops and molded sinks.

G. Division 22 - Plumbing

H. Division 23 - HVAC

I. Division 26 - Electrical

1.03 SUBMITTALS

A. Product Data: Submit manufacturer’s technical data and installation instructions on all products specified herein.

B. Shop Drawings: Submit shop drawings drawn at not less than 1/4" scale indicating floor plan showing casework layout, casework elevations, materials, dimensions, equipment and appliance cut-out locations, all plumbing, electrical, ventilating and other service connections. Shop drawings at 1/2" scale shall be submitted indicating details of construction of all casework components. Shop drawings shall indicate all locations required for back-up blocking. Blocking shall be provided as part of the Work of Section 06 10 54 - Wood Blocking and Curbing.

1. Special care shall be taken to ensure proper interface between any casework requiring coordination with work specified in Division 22 - Plumbing, Division 23 HVAC and Division 26 - Electrical. Thoroughly review all Drawings in order to determine locations of plumbing

fixtures, appliances, electrical fixtures, plenum requirements, and other miscellaneous items and identify same on the casework shop drawings.

2. Field Measurements: Verify all building dimensions relative to equipment to be furnished and installed by taking actual field measurements at the job site prior to casework fabrication.

1.04 QUALITY ASSURANCE

A. Casework products shall comply with applicable standards of the AWI Architectural Woodwork Quality Standards.

B. Casework installation contractor shall be approved by the manufacturer and shall provide adequate numbers of skilled workmen who are thoroughly trained and experienced in the necessary crafts and also are completely familiar with the specified requirements and the methods needed for proper performance of the Work of this Section.

C. Comply with applicable electrical, mechanical and plumbing, accessibility and other codes and regulations of all Federal, State and Local authorities having jurisdiction.

1.05 DELIVERY, STORAGE AND PROTECTION

A. Protect all casework during transit, delivery, storage and handling to prevent damage, soiling and deterioration.

B. Do not deliver casework until painting, wet work, grinding, and similar operations, which could be performed before installation of cabinets, have been completed in installation areas. Store casework in installation areas or, if that is impracticable, in areas with ambient conditions meeting the same requirements.

C. All components shall be clearly marked with an identifying code or tag on the protective crating, or on a concealed but accessible surface of each item of the Work of this Section, to aid in rapid and efficient location of each items specific installation point within the building.

1.06 JOB CONDITIONS

A. The manufacturer shall advise the Contractor of temperature and humidity requirements for casework installation areas. Do not install casework until required temperature and relative humidity have been stabilized and will be maintained in installation areas.

B. Maintain temperature and humidity in installation areas within a tolerance range of the optimum moisture content acceptable to the casework manufacturer, from date of installation through remainder of construction period.

1.07 WARRANTY

A. The casework manufacturer shall warrant for a period of one (1) year from the date of Substantial Completion the products manufactured by it shall be free from defects in material and workmanship when properly installed and under normal use. Upon notification of any such defects within said warranty period, the manufacturer shall promptly make all necessary repairs and replacements at no cost or expense to the Owner.

PART 2 - PRODUCTS

2.01 GENERAL

A. Manufacturer (Basis of Design): Kewaunee, Product: Signature Series Wood Casework, Style 1.

B. Acceptable manufacturers:
   1. Iaccarino & Son, equivalent product.
   2. Fisher Hamilton Co, equivalent product.
   3. Sheldon, equivalent product.
   4. Collegedale, equivalent product.
   5. Substitutions: See Section 01 60 00 - Product Requirements.

C. Finish: Plain Sliced, AWI Grade I, Select Maple, natural finish.

1. The interior of cabinets and cases without doors or with glass doors shall be furnished the same as the exterior of the cabinet. All hardwood surfaces shall be finished with multiple coats of chemical resistant acrylic urethane finish.

2.02 MATERIALS

A. Lumber: All lumber used for cabinet and case exteriors and exposed interiors shall be of selected northern grown hardwood, sound and free from checks and harmful case hardening. Lumber for interior construction shall be hardwood, sound and unselected as to grain and color. Lumber shall be properly air-dried and kiln dried by the manufacturer to 6% or less moisture content and then tempered before fabrication.

B. Hardwood Veneer Panels: All veneers on exposed exterior surfaces shall be AWI Grade 1 hardwood selected for grain and color. Exposed interior surfaces shall match exterior exposed surface. Interior semi-exposed surfaces shall be faced with hardwood veneers compatible with the exposed veneer for a balanced construction. Unexposed veneers shall be factory option hardwood for a balanced construction. Panel core shall be 45 lb particleboard.

2.03 WOOD CABINETS

A. Quality Standards: AWI Section 400 “Wood Veneer Cabinets”; Grade: “Custom”.
   1. Cabinet construction shall be flush overlay.

2.04 BASE CABINETS

A. Base Cabinets: All-compartment, sink base, drawer-and-compartment, and all-drawer type base cabinets shall be fully enclosed at the bottom.

B. Tops: Four-sided horizontal hardwood frame with pinned mortise and tenon joints or glued fluted hardwood dowels and shall be fastened securely into cabinet sides.

C. Divider Under Drawers: Front cross rail 3/4" thick by 1-3/4" deep, secured to cabinet sides with a glued and pinned mortise and tenon joint.

D. Side and Exposed Back Panels: 3/4" thick solid panels, faced with selected hardwood veneer with solid hardwood nosings for exposed surfaces and unselected but sound hardwood veneers for un-exposed surfaces.

E. Bottoms: 3/4" thick solid panels, hardwood veneer faced, and shall be let into cabinet sides and bottom rail.

F. Unexposed Back Panels: 3/16” minimum thickness fiberboard,, secured to the top and dadoed into cabinet sides. Backs shall be recessed 3/8" to permit accurate scribing to the wall.

G. Shelves: 3/4" thickness for cabinets 36" and less; 1" thickness for cabinets greater than 36" wide; half depth; selected hardwood veneer both sides and solid hardwood nosing. Shelves shall be adjustable on metal pilasters on 1" centers.

H. Toe Spaces: 4" high by 3-1/4" deep, with plywood toe board 3/4" thick extending full width of cabinet.

I. Aprons: 1" thick solid select hardwood.

J. Drawers: Drawer heads shall be 3/4" in thickness faced with select hardwood veneers. All edges shall be faced with hardwood veneer. The drawer head shall be securely fastened to a 1/2" front of the drawer body for a full 1-1/4" thick drawer front. Sides and backs shall be 1/2” thick hardwood and dovetailed. Drawer bottoms shall be 3/16” minimum thickness melamine faced fiberboard. Drawers shall be sealed and varnished to resist absorption. Drawer slides shall be side mount, epoxy coated, ball-bearing suspension, providing a minimum 100-pound loading capacity and shall have positive stops.

2.05 WALL CABINETS AND TALL CABINETS

A. Sides: Shall be 3/4" thick solid panels, faced with selected hardwood veneer and solid hardwood nosings for exposed surfaces and unselected but sound veneers for unexposed surfaces.

B. Tops and Bottoms: Shall be 1" thick solid panels, surfaced both sides with plastic laminate and hardwood edging.

C. Unexposed Back Panels: Shall be 3/16” thick hardboard faced with plastic laminate, dadoed into the sides, and secured top and bottom. Backs shall be recessed 3/8" to permit accurate scribing to the wall and shall be fitted with top and bottom strips in the recess for rigidity and assured anchoring to the wall. Backs for cabinets without doors shall be solid panels with select hardwood veneer face.

D. Shelves: Shall be 1” thick solid at cabinets 36” wide and wider, ¾” thick at narrower cabinets with selected hardwood veneer both sides and solid hardwood nosing. Shelves shall be adjustable the full height of cabinet unless otherwise shown or specified.

2.06 DOORS

A. Doors: For base and wall cabinets shall be flush construction, hardwood veneer on 3/4" thickness particleboard core, with a solid hardwood frame. Doors for tall cases shall be 1-1/8” thickness.)

B. Glazed Doors: On all cases shall have heavy selected hardwood frame 1-1/8" thick by 2-3/4" wide and fitted with tempered glass.

2.07 HARDWARE

A. Hinges: For all wall cabinets, base cabinets and case doors shall be a five-knuckle pin, wrap around type, heavy-duty institutional hinge with rounded ends, 2-3/4" high by.095 thick. Hinge finish shall be as selected by the Architect. Hinge screws shall be concealed when door is closed. Doors under 44" high shall have two hinges and those over 44" high shall have three hinges.

B. Pulls: Shall be 4" wire pulls, finishes as selected by the architect. Drawers under 27" wide to have one drawer pull and those 27" and wider to have two drawer pulls.

C. Catches: For doors on wall and base cabinets shall be double action, spring tension nylon roller catches. On all tall cases, catches shall be of heavy-duty spring tension rubber roller type.

D. Locks: Heavy duty, cylinder type with five disc tumblers; keyed and master keyed as specified.
   1. Key quantity: 2 keys per lock; 5 master keys.
   2. Provide for drawers and hinged doors as follows:
      a. Chemistry Labs: All doors and drawers.

2.08 COUNTERTOPS

A. Countertops, laboratory countertops and laboratory sinks: See Section 12 36 00 - Countertops.

2.09 ACCESSORIES

A. Epoxy Resin Pegboard Lab Drying Racks:
   1. Materials:
      a. Panel: 1 inch chemical resistant epoxy resin base.
      b. Pegs: Polypropylene.
         1) Lengths:
            (a) 66% at 6.5 inches
            (b) 33% at 8 inches.
   2. Colors: Selected by Architect from manufacturer's full line.
   3. Accessories: Mounting hardware, brackets and fasteners as required. Stainless Steel.
   4. Provide the following racks:
      a. (3) three pegboard rack, 36"h x 30"w. 50 pegs minimum.
      b. (1) one pegboard rack with drying rack, 24"h x 36"w. 40 pegs minimum.
   5. Product: Epoxy Resin Pegboard Lab Drying Rack by Kewaunee.
   6. Substitutions: See Section 01 60 00 - Product Requirements.

2.10 OTHER SPECIALTY CABINETS

A. Safety Cabinets: FM, OSHA, NFPA 251 and NFPA 30 compliant, hinged style self-closing doors, 3-point latch, key lock, wood construction with minimum 1 inch exterior grade plywood

top, bottom and sides. Provide joinery and details per NFPA 30. Flammable cabinets shall be safety yellow, corrosives cabinets shall be blue. Provide a 2" raised leak-proof sill, polyethylene shelf trays for corrosives cabinet, and 2" diameter top and bottom flame arrester vents. Provide large letter doors signs: "Flammable Keep Fire Away" at flammable cabinets and "Caution Corrosives - Acids" at corrosive cabinets.

1. Provide the following cabinets:
   a. (1) one flammable storage, 35"h x 24"w x 22"d. with 3 shelves.
   b. (2) two corrosives storage, 35"h x 24"w x 22"d. with 3 shelves.
   c. (1) one flammable storage, 18"h x 18"w x 20"d. with 1 shelf.
2. Manufacturer to submit written certification that safety cabinets meet or exceed required standards and regulations.

PART 3 - EXECUTION

3.01 COORDINATION

A. Coordinate Work of this Section with related Work of other Sections as necessary to obtain proper installation of all items.

B. Verify site dimensions of cabinet locations in building prior to fabrication.

C. Examine space in which specified Work is to be installed to assure that conditions are satisfactory for the installation of specified Work. Report in writing to the Architect any deficiency in the work of other contractors affecting specified Work. Commencement of Work shall be construed as acceptance of space conditions.

D. Verify adequacy of backing and support framing. Verify type of support framing for determination of proper fastener type. A minimum load of 60 pounds/LF for wall cabinets shall be supported. Provide a safety factor of 2.

E. Verify location and sizes of utility rough-in associated with work of this Section.

F. At existing walls, verify adequacy of support framing and blocking to support new wall mounted cabinets. Report any deficiencies to the Contractor prior to commencing installation.

3.02 INSTALLATION

A. Set and secure cabinets in place, assuring that they are rigid, plumb, and level. Install to a tolerance of 1/8" in 8'-0" for plumb and level and with 1/16" maximum offset in flush adjoining surfaces, 1/8" maximum offsets in revealed adjoining surfaces.

B. Attach wall mounted cabinets to support framing / blocking / plates, as appropriate, following industry standards and best practices. Ensure that proper fastener type is utilized for support structure material.

C. Use concealed joint fasteners to align and secure adjoining cabinet units.

D. Carefully scribe casework abutting other components, with maximum gaps of 1/32 inch. Do not use additional overlay trim for this purpose.

E. Secure cabinets and counter bases to floor using appropriate angles and anchorages. Base toekick board shall be scribed to uneven floor surfaces.

F. Countersink anchorage devices at exposed locations. Conceal with solid wood plugs of species to match surrounding wood; finish flush with surrounding surfaces.

G. Install without distortion so that doors and drawers will fit openings properly and be accurately aligned.

H. Workmen: Install casework under the supervision of the manufacturer's representative with factory-trained mechanics authorized by manufacturer.

I. Cut and fit work around pipes, ducts, etc. All shims under cabinets at floors shall be continuous for proper support of cabinets and shall be water-resistant.

J. Install all items complete and adjust all moving parts to operate properly.

K. Cabinets set off from a wall surface shall have extended finished ends, and top and bottom closure panels to the wall surface.

3.03 CLEAN-UP, PROTECTION AND INSTRUCTION

A. Clean Up: Remove all cartons, debris, sawdust, scraps, etc. and leave spaces clean and all casework ready for Owner's Use. Following completion, and before final acceptance by the Owner, clean finished surfaces in accordance with the manufacturer's instructions, and leave specified Work free of imperfections.

B. Protect specified Work from damage until acceptance by the Owner.

C. Damaged Work as determined by the Architect, shall be repaired, or replaced as determined, by, and to the satisfaction of, the Architect.

D. Instruct Owner's personnel in the proper operation and maintenance of the equipment and their parts.

END OF SECTION

SECTION 12 36 00
COUNTERTOPS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Countertops for manufactured casework.

B. Wall-hung counters.

C. Sinks molded into countertops.

D. Epoxy resin sinks.

E. Loose shelving.

1.02 RELATED REQUIREMENTS

A. Section 06 10 54 - Wood Blocking and Curbing: Concealed wood blocking.

B. Section 06 20 00 - Finish Carpentry: Countertop support brackets; Adjustable shelving hardware.

C. Section 11 53 00 - Laboratory Equipment: Hazardous Materials Questionnaire, 10/10/14.

D. Section 12 32 00 - Wood Casework.

E. Section 12 34 00 - Plastic Laminate Casework.

F. Division 22 - Plumbing: Tie-in of sinks and installation of mounted fixtures.

1.03 REFERENCE STANDARDS

A. ANSI A161.2 - Performance Standards for Fabricated High Pressure Decorative Laminate Countertops; 1998.

B. ANSI A208.1 - American National Standard for Particleboard; 2009.

C. ANSI A208.2 - American National Standard for Medium Density Fiberboard for Interior Use; 2009.

D. ASTM D635 - Standard Test Method for Rate of Burning and/or Extent and Time of Burning of Plastics in a Horizontal Position; 2010.

E. AWI/AWMAC/WI (AWS) - Architectural Woodwork Standards; 2009.

F. ISSFA-2 - Classification and Standards for Solid Surfacing Material; 2001 (2007).

G. NEMA LD 3 - High-Pressure Decorative Laminates; 2005.

1.04 SUBMITTALS

A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.

B. Product Data: Manufacturer's data sheets for surfacing, substrate and other products; include manufacturer’s maintenance instructions and recommendations.
   1. Preparation instructions and recommendations.
   2. Storage and handling requirements and recommendations.
   3. Specimen warranty.

C. Shop Drawings: Complete details of materials and installation; combine with shop drawings of cabinets and casework specified in other sections.

D. Verification Samples: Submit 4 inches square minimum size samples representing actual products and colors selected.

E. Test Reports: Chemical resistance testing, showing compliance with specified requirements.

1.05 QUALITY ASSURANCE

A. Fabricator Qualifications: Same fabricator as for Section 06 41 00 - Architectural Wood Casework.

B. Installer Qualifications: Fabricator.

1.06 DELIVERY, STORAGE, AND HANDLING

A. Store products in manufacturer's unopened packaging until ready for installation.

B. Store and dispose of solvent-based materials, and materials used with solvent-based materials, in accordance with requirements of local authorities having jurisdiction.

1.07 FIELD CONDITIONS

A. Maintain environmental conditions (temperature, humidity, and ventilation) within limits recommended by manufacturer for optimum results. Do not install products under environmental conditions outside manufacturer's absolute limits.

PART 2 PRODUCTS

2.01 COUNTERTOP ASSEMBLIES

A. Quality Standard: Premium Grade, in accordance with AWI/AWMAC/WI (AWS).

B. Laboratory Type 1 Countertops: Filled epoxy resin molded into homogenous, non-porous sheets; no surface coating and color and pattern consistent throughout thickness; with integral or adhesively seamed components and highly resistant to chemical attack.
   1. Flat Surface Thickness: 1 1/2 inch, nominal.
   2. Chemical Resistance: Provide products that resist the following chemicals with not more than No Effect when tested in the same manner as specified in NEMA LD 3:
      a. Refer to Hazardous Materials Questionnaire attached to Section 11 53 00 for list of chemicals.
   3. Flammability: Self-extinguishing, when tested in accordance with ASTM D635.
   4. NSF approved for food contact.
   5. Surface Finish: Smooth, non-glare.
   6. Color: To be selected by Architect from manufacturer's full range.
   7. Exposed Edge Shape: 3/16 inch radius corner.
   8. Drip Edge: Drip groove 1/8 inch wide and deep, located 1/2 inch back from edge on underside of all exposed edges.
   9. Back and End Splashes: Same material, same thickness; integrally molded.
   10. Sinks: Same material, same color; lipped design to inset into counter top surface; bottom sloped to outlet; molded outlets; drain outlet located in back corner, accessible sinks shall outlet at rear corner.
      a. Sides and Ends: 1/2 inch minimum thickness.
      b. Bottoms: 5/8 inch minimum thickness.
      c. Interior Corners: 1 inch minimum radius.
      d. Clamping collars for 1-1/2 or 2 inch diameter waste pipe, for sealed but not permanent connection.
      e. Where required for size of the sink, steel channel supports front to back on each side, fastened to underside of top to support twice full sink weight. All accessible sinks shall be supported by alternate means.
   11. Sink models and sizes shall be as follows:
      a. Workstations: Size: 25” L x 15” W x 10” D
      b. Accessible Sinks: Size: 25” L x 15” W x 5” D, ADA compliant.
      c. Sinks shall be provided complete with epoxy resin sink outlets, stoppers and tailpieces.
   12. Associated Reagent Shelves: Same material, with molded raised edges.
   13. Associated Window Sills: Same material, same thickness.
   14. Associated Adjustable Shelving: Same material, 1 inch thickness.
   15. Manufacturers:
      a. Kemresin by Kewaunee Scientific Corporation.
      b. Substitutions: See Section 01 60 00 - Product Requirements.

2.02 ACCESSORY MATERIALS

A. Wood-Based Components:
   1. Wood fabricated from old growth timber is not permitted.

B. Counter Substrate: Medium density fiberboard; ANSI A208.2; Grade 130; no urea formaldehyde-added; water resistant.
   1. Application: Counters with sinks.
   2. Density: 45 pcf min.
   3. Modulus of Elasticity: 405,000 psi minimum.
   4. Panel Thickness for Plastic Laminate Facing: 3/4 inches with built-up edges.
   5. Panel Thickness for Solid Surfacing: 3/4 inches minimum.
   6. Product: Medex by SierraPine.

C. Adhesives: Silicone adhesive as recommended by manufacturer of materials being joined.

D. Joint Sealant: Mildew-resistant silicone sealant, clear.

2.03 FABRICATION

A. Fabricate in accordance with standards governing fabrication quality that are specified in herein. Field conditions shall be carefully measured prior to fabrication of countertops.

B. Fabricate tops and splashes in the largest sections practicable, with top surface of joints flush.
   1. Join lengths of tops using self-leveling metal splines to draw sections together.
   2. Fabricate to overhang fronts and ends of cabinets 1 inch except where top butts against cabinet or wall.
   3. Prepare all cutouts accurately to size; replace tops having improperly dimensioned or unnecessary cutouts or fixture holes.

C. Provide back and end splashes wherever counter edge abuts vertical surface unless otherwise indicated. Fabricate splashes 4 inches high, unless otherwise indicated. Splashes shall be integral with the counter surface.
   1. Height: 4 inches, unless otherwise indicated.

D. Note: There shall be no unfinished wood products. If not covered with plastic laminate products or otherwise finished, all wood surfaces shall be receive a minimum of one coat of sealer in concealed or semi-concealed areas.

E. Wall-Mounted Counters: Provide skirts, aprons, brackets, and braces as indicated on the Drawings, finished to match.

PART 3 EXECUTION

3.01 EXAMINATION

A. Do not begin installation until substrates have been properly prepared.

B. Verify that wall surfaces have been finished and mechanical and electrical services and outlets are installed in proper locations.

3.02 PREPARATION

A. Clean surfaces thoroughly prior to installation.

B. Prepare surfaces using the methods recommended by the manufacturer for achieving the best result for the substrate under the project conditions.

C. Acclimate countertop materials to temperature and relative humidity of the installation site for at least 24 hours.

3.03 INSTALLATION

A. Securely attach countertops to cabinets using concealed fasteners and with contact surfaces set in waterproof glue. Verify that cabinet top surfaces are level. Shim where required.

B. Counter cleats shall be installed at walls where indicated and where required for counter support. See Section 06 20 00 - Finish Carpentry. At countertops with no sinks, if counter

cantilevers more than 3 inches beyond cabinet support, install 3/4" plywood over cabinet tops extending to full countertop cantilever. Use moisture resistant MDF at counters with sinks.

C. Solid Surface Countertops:
   1. Secure countertops to cabinets with silicone sealant. Do not use water based adhesives.
   2. Provide a 1/32 inch expansion for 8 foot length of counter.
   3. Sealant joints shall be 1/8 inch minimum in width.
   4. Seam and finish joints as recommended by the manufacturer.

D. Epoxy Resin Countertops: Attach using compatible adhesive.

3.04 TOLERANCES

A. Variation From Horizontal: 1/8 inch in 10 feet, maximum.

B. Offset From Wall, Countertops: 1/8 inch maximum; 1/16 inch minimum.

C. Field Joints: 1/8 inch wide, maximum.

3.05 CLEANING

A. Clean countertops surfaces thoroughly.

3.06 PROTECTION

A. Protect installed products until completion of project.

B. Any scratched or defaced materials shall be completely replaced at no additional cost to the Owner.

C. Touch-up, repair or replace damaged products before Substantial Completion.

END OF SECTION

SECTION 21 10 00 - FIRE-SUPPRESSION SPRINKLER SYSTEM

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. The fire protection system shall be an automatic sprinkler system arranged to properly protect the new spaces and affected areas. Modify the sprinkler system as required per NFPA 13 to serve the finished spaces.

B. The lab spaces are classified as Class C - Low Fire Hazard in accordance with NFPA-45-2011, 4.2.1.1.

C. This Section includes fire-suppression sprinklers, piping, and equipment.

D. The Sprinkler Contractor shall place the sprinkler system in service and hand over the sprinkler system to the General Contractor for care and maintenance.

E. Performance and Design Criteria: Provide products and systems complying with specific performance and design criteria indicated.

1.3 SYSTEM PERFORMANCE REQUIREMENTS

A. Design sprinklers and obtain approval from authorities having jurisdiction. The design of the automatic sprinkler system shall be complete with all necessary accessories for proper operation.

B. The system shall be hydraulically calculated in accordance with all provisions of the Contract Documents and any authority having jurisdiction.

C. Design sprinkler piping according to the following and obtain approval from authorities having jurisdiction:

1. Include a 5 percent margin of safety for available water flow and pressure.
2. Include losses through water-service piping, valves, and backflow preventers.

D. Sprinkler Occupancy Hazard Classifications:

1. NFPA 45-2011, paragraph 6.2.1., “Automatic sprinkler systems for Class C and D laboratories shall be in accordance with NFPA 13, for ordinary hazard Group1 occupancies”.

E. Minimum Density for Automatic-Sprinkler Piping Design shall be in accordance with NFPA 13. Maximum Protection Area per Sprinkler shall be in accordance with NFPA 13.

1.4 GENERAL REQUIREMENTS

A. Components and Installation: Capable of producing piping systems with 175-psig minimum working-pressure rating, unless otherwise indicated.

B. Bundled/Grouped wired in concealed spaces: Non-combustible spaces having 15 or more non-plenum-rated wires grouped together shall be fully sprinklered.

C. Seismic Performance: If required by the authority with jurisdiction, fire-suppression piping shall be capable of withstanding the effects of earthquake motions determined according to NFPA 13.

D. Contractor shall obtain and pay for required permits.

1.5 SUBMITTALS

A. Shop Drawings: Submit working plans, prepared according to NFPA 13, and hydraulic calculations with cross reference to applicable drawings, water supply data, and equipment schedule with ratings for the system to the Owner's Representative, Insurance Underwriter, and other authorities having jurisdiction.

B. Product Data: Catalog sheets, specifications, and installation instructions. Indicate UL or FM approval for each product. Include the following additional information:

1. Pipe and fitting materials and methods of joining for sprinkler piping.
2. Pipe hangers and supports.
3. Piping seismic restraints.
4. Valves, including specialty valves, accessories, and devices.
5. Mechanical Devices: Complete description of intended use, including normal operating capacities and working pressures.
6. Enclosures: Dimensions, materials, gages of metals; type of door hinges and locks, and methods of securing the enclosure members to the building construction.

C. Design Data: The portions of the sprinkler system not sized on the Contract Drawings shall be sized in accordance with NFPA requirements for Hydraulically Designed Systems. Submit drawings and hydraulic calculations for approval.

D. Delegated-Design Submittal: In addition to Shop Drawings, Product Data, and other required submittals, submit three copies of a statement, signed and sealed by the responsible sprinkler system design professional. Indicate that products and systems comply with performance and design criteria in the Contract Documents.

1. Certification: Submit Contractor's NICET certification and number or PE license number.

E. Field Test Reports and Certificates: Indicate and interpret test results for compliance with performance requirements and as described in NFPA 13. Include "Contractor's Material and Test Certificate for Aboveground Piping" and "Contractor's Material and Test Certificate for Underground Piping."

F. Maintenance Data: For each type of sprinkler specialty to include in maintenance manuals specified in Division 1.

1.6 QUALITY ASSURANCE

A. Sprinkler Contractor

1. Installer Qualifications: An experienced installer who has designed and installed fire-suppression piping similar to that indicated for this Project and obtained design approval and inspection approval from authorities having jurisdiction.
2. Engineering Responsibility: Preparation of working plans, calculations, and field test reports by a qualified sprinkler designer. Base calculations on results of fire hydrant flow test. Sprinkler designer shall be legally qualified and licensed to practice in jurisdiction where Project is located and who is experienced in providing engineering services of the kind indicated. Engineering services are defined as those performed for installations of fire-suppression piping that are similar to those indicated for this Project in material, design, and extent.
3. Contractor shall be a licensed fire sprinkler contractor.

B. Manufacturer Qualifications:

1. Firms whose equipment, specialties, and accessories are listed by product name and manufacturer in UL's "Fire Protection Equipment Directory" and FM's "Fire Protection Approval Guide" and that comply with other requirements indicated.
2. Sprinkler Components: Listing/approval stamp, label, or other marking by a testing agency acceptable to authorities having jurisdiction.
3. Factory Mutual Engineering Corporation (FM) Approval Guide

C. NFPA Requirements

1. NFPA#1 Fire Prevention Code, 2007 edition.
2. NFPA #13 “Standard for the Installation of Sprinkler Systems” 2007 edition.

1.7 EXTRA MATERIALS

A. Furnish extra materials described below that match products installed and that are packaged with protective covering for storage and identified with labels describing contents. Sprinkler Cabinets: Finished, wall-mounting steel cabinet and hinged cover, with space for a minimum of six spare sprinklers plus sprinkler wrench. Include the number of sprinklers required by NFPA 13 and wrench for sprinklers. Include separate cabinet with sprinklers and wrench for each type of sprinkler on Project.

PART 2 - PRODUCTS

2.1 PIPING

A. Pipe and fittings shall conform to the requirements of NFPA 13. Pipe shall be listed by UL and be FM approved, and installed per its listing and approval.

2.2 Sprinkler piping shall be black steel schedule 40, 2 inch and smaller, and thinwall 2 ½ inch and larger. C factor 120.

A. System piping shall be substantially supported to the building structure. The installation of hangers and supports shall adhere to the requirements set forth in N.F.P.A. 13. Materials used in the installation or construction of hangers and supports shall be listed and approved for such application.

2.3 JOINING MATERIALS

A. Furnish in accordance with NFPA 13.

2.4 SPRINKLERS

A. Fire sprinklers shall be of one manufacturer throughout the building. No mixing of sprinkler brands shall be permitted. Sprinklers shall be of all brass frame construction with a quick response frangible bulb type fusible element.

B. Automatic Sprinklers: With heat-responsive element complying with the following:

1. UL 199, for applications except residential.
2. UL 1767, for early suppression, fast-response applications.

C. Sprinkler Types and Categories: Nominal 1/2-inch orifice for "Ordinary" temperature classification rating, unless otherwise indicated or required by application.

D. Provide quick response sprinklers.

E. Sprinkler Escutcheons: Materials, types, and finishes of sprinklers. Escutcheons for concealed, flush, and recessed-type sprinklers are specified with sprinklers.

2.5 SPRINKLER SPECIALTY FITTINGS

A. Sprinkler specialty fittings shall be UL listed or FMG approved, with 175-psig minimum working-pressure rating, and made of materials compatible with piping.

B. Sprinkler Branch-Line Test Fittings: Brass body with threaded inlet, capped drain outlet, and threaded outlet for sprinkler.

C. Drop-Nipple Fittings: UL 1474, adjustable with threaded inlet and outlet, and seals.

2.6 VALVES

A. Valves shall be UL listed and FMG approved

PART 3 - EXECUTION

3.1 PREPARATION

A. The nature of the work requires coordination with other trades. Shop fabrication shall be done at the Contractor’s risk. Relocation of piping and components to avoid obstructions may be necessary. Relocation, if required, shall be done at the Contractor’s expense. The installation shall be performed in a workmanlike manner as determined by the Owner’s Representative and in accordance with the Contract Documents, manufacturer’s printed installation instructions, and submitted and Owner’s Representative reviewed drawings.

B. Existing Sprinkler System Shutdown:

1. Follow NFPA 13 recommendations.
2. Before shutting down the sprinkler system to perform the Work, notify the Owner's Representative in writing, and the local fire department that the system is to be shut down temporarily. Give schedule which states date and time of proposed shut down and the approximate length of time that the system will be out of service. Request instructions for precautions that should be taken during the shut down period.
3. Do not shut down the system until schedule is approved by the Owner's Representative.
4. Return the existing system to pre-shutdown operation immediately after the Work has been completed. Give written notice to the Director's Representative that the system has been returned to pre-shutdown operation.

3.2 SPRINKLER APPLICATIONS

A. General: Use sprinklers according to the following applications:

1. Rooms/spaces without Ceilings: Upright sprinklers.
2. All occupied rooms with Finished Ceilings: Concealed

B. Finishes

a. Unfinished spaces not exposed to view: rough bronze.
b. Concealed Sprinklers: White
c. Provide escutcheons with matching color for finished spaces.

3.3 SYSTEM INSTALLATIONS

A. Earthquake Protection: Install piping according to NFPA 13 to protect from earthquake damage.

B. A sprinkler head wrench of each style and model installed shall be provided to the owner at the completion of the project. A representative sampling of each sprinkler head style and model shall be provided to the owner and housed in a sprinkler head cabinet at or near the sprinkler riser. The number of sprinkler heads provided to the owner shall be in accordance with NFPA 13.

3.4 SPRINKLER INSTALLATION

A. Install sprinklers in suspended ceilings in center of 2 X 2 ceiling tiles (not required for 2 X 4). Proposed sprinkler locations are shown on the architectural reflected ceiling plan. Sprinkler shall confirm these locations, provide additional heads and correct the spacing if needed as per NFPA 13.

B. Install sprinkler piping with drains for complete system drainage.

C. Hangers and Supports: Comply with NFPA 13 for hanger materials.

3.5 LABELING AND IDENTIFICATION

A. Install labeling and pipe markers on equipment and piping according to requirements in NFPA 13.

3.6 FIELD QUALITY CONTROL

A. Flush, test, and inspect sprinkler piping according to NFPA 13, "System Acceptance" Chapter.

B. Verify that specialty valves, trim, fittings, controls, and accessories are installed and operate correctly.

C. Verify that specified tests of piping are complete.

D. Verify that damaged sprinklers and sprinklers with paint or coating not specified are replaced with new, correct type.

E. Verify that sprinklers are correct types, have correct finishes and temperature ratings, and have guards as required for each application.

F. Replace piping system components that do not pass test procedures and retest to demonstrate compliance. Repeat procedure until satisfactory results are obtained.

G. Fill wet-pipe sprinkler piping with water.

H. Coordinate with fire alarm tests. Operate as required.

3.7 CLEANING

A. Clean dirt and debris from sprinklers.

B. Remove and replace sprinklers having paint other than factory finish.

3.8 PROTECTION

A. Protect sprinklers from damage until Substantial Completion.

END OF SECTION 21 10 00

SECTION 22 05 00 – COMMON WORK RESULTS FOR PLUMBING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Refer to Section 23 05 00, common work results for plumbing are included in this section.

END OF SECTION 22 05 00

SECTION 22 05 29 - HANGERS AND SUPPORTS FOR PLUMBING PIPING AND EQUIPMENT

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Refer to Section 23 05 29 for hangers and supports for plumbing piping and equipment.

END OF SECTION 22 05 29

SECTION 22 05 53 – IDENTIFICATION FOR PLUMBING PIPING & EQUIPMENT

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Refer to Section 23 05 53 for identification for plumbing piping and equipment.

END OF SECTION 22 05 53

SECTION 22 07 00 - PLUMBING INSULATION

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Refer to Section 23 07 00 for plumbing insulation.

END OF SECTION 22 07 00

SECTION 22 11 16 - DOMESTIC WATER PIPING

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.

B. Related Sections include the following:

1. Division 22 Section “Common Work Results for Plumbing”
2. Division 22 Section “Hangers and Supports”
3. Division 22 Section "Plumbing Specialties" for water distribution piping specialties.

1.2 SUMMARY

A. This Section includes tempered water, domestic water, and non-potable water.

B. Drawings show the general layout of piping and accessories but do not show all required fittings and offsets that may be necessary to connect piping to equipment and to coordinate with other trades. Fabricate piping based on field measurements. Provide all necessary fittings and offsets.

1.3 SUBMITTALS

A. Product Data: For the following products:

1. Specialty valves.
2. Transition fittings.
3. Dielectric fittings.
4. Escutcheons.

1.4 QUALITY ASSURANCE

A. Piping materials shall bear label, stamp, or other markings of specified testing agency.

B. Comply with the UPC 2009 edition, subject to the exclusions and amendments set forth by the Maine Plumbers Examining Board.

C. Comply with NSF 61, "Drinking Water System Components-Health Effects; Sections 1 through 9," for potable domestic water piping and components.

PART 2 - PRODUCTS

2.1 COPPER TUBING

A. Hard Copper Tube: ASTM B 88, Types L and M, water tube, drawn temper.

1. Copper Pressure Fittings: ASME B16.18, cast-copper-alloy or ASME B16.22, wrought- copper, solder-joint fittings. Furnish wrought-copper fittings if indicated.
2. Bronze Flanges: ASME B16.24, Class 150, with solder-joint end. Furnish Class 300 flanges if required to match piping.
3. Copper Unions: MSS SP-123, cast-copper-alloy, hexagonal-stock body, with ball-and-socket, metal-to-metal seating surfaces and solder-joint or threaded ends.
4. Copper-Tubing, Keyed Couplings: Copper-tube dimensions and design similar to AWWA C606. Include ferrous housing sections, gasket suitable for hot water, and bolts and nuts.

B. Mechanically formed copper or steel tee connections are not acceptable.

2.2 VALVES

A. Ball Valves

1. Soldered Ends 3" and Smaller: 600# W.O.G. forged brass or cast bronze two piece body, hard chrome plated forged brass ball, true adjustable packing nut ("O"-ring only type stem seal not acceptable), blow-out proof stem: Hammond 8511, Nibco S-585-70,Watts B6001 or FBVS-3C series, Milwaukee BA150, Apollo 70-Series, approved or equal.
2. Comply with MSS SP-110.

B. Refer to Division 22 Section "Plumbing Specialties" for balancing and drain valves.

PART 3 - EXECUTION

3.1 PIPING APPLICATIONS

A. Transition and special fittings with pressure ratings at least equal to piping rating may be used in applications below, unless otherwise indicated.

B. Mechanically formed tee-branch outlets and brazed joints shall not be used.

C. Use the following piping materials for each size range: Hard copper tube, Type L; copper pressure fittings; and soldered joints.

3.2 VALVE APPLICATIONS

A. Drawings indicate valve types to be used. Where specific valve types are not indicated, the following requirements apply:

1. Shutoff Duty: Use bronze ball valves.
2. Drain Duty: Hose-end drain valves.

3.3 VALVE INSTALLATION

A. Install sectional valve close to water main on each branch and riser serving plumbing fixtures or equipment.

B. Install shutoff valve on each water supply to equipment and on each water supply to plumbing fixtures without supply stops.

C. Install hose end drain valves for equipment, at base of each water riser, at low points in horizontal piping, and where required to drain water piping.

3.4 PIPING INSTALLATION

A. Refer to Division 22 Section “Common Work Results for Plumbing” for basic piping installation.

B. Install aboveground water piping level and plumb.

C. Fill water piping. Check components to determine that they are not air bound and that piping is full of water.

D. Check plumbing equipment and verify proper settings, adjustments, and operation. Do not operate water heaters before filling with water.

E. Check plumbing specialties and verify proper settings, adjustments, and operation.

3.5 JOINT CONSTRUCTION

A. Refer to Division 22 Section “Common Work Results for Plumbing” for basic piping joint construction.

B. Soldered Joints: Use ASTM B 813, water-flushable, lead-free flux; ASTM B 32, lead-free-alloy solder; and ASTM B 828 procedure, unless otherwise indicated.

3.6 HANGER AND SUPPORT INSTALLATION

A. Hanger, support, and anchor devices are specified in Division 22 Section "Hangers and Supports."

3.7 CONNECTIONS

A. Drawings indicate general arrangement of piping, fittings, and specialties.

B. Install piping adjacent to equipment and machines to allow service and maintenance.

C. Connect water piping in sizes indicated, but not smaller than sizes of unit connections.

D. Provide shutoff valve and union for each connection.

3.8 FIELD QUALITY CONTROL

A. Follow local code requirements.

B. Inspect water piping as follows:

1. Do not enclose, cover, or put piping into operation until it is inspected and approved by authorities having jurisdiction.
2. During installation, notify authorities having jurisdiction at least 24 hours before inspection must be made. Perform tests specified below in presence of authorities having jurisdiction:

    a. Roughing-in Inspection: Arrange for inspection of piping before concealing or closing-in after roughing-in and before setting fixtures.
    b. Final Inspection: Arrange for final inspection by authorities having jurisdiction to observe tests specified below and to ensure compliance with requirements.

3. Reinspection: If authorities having jurisdiction find that piping will not pass test or inspection, make required corrections and arrange for reinspection.
4. Reports: Prepare inspection reports and have them signed by authorities having jurisdiction.

C. Test water piping as follows:

1. Test for leaks and defects in new piping and parts of existing piping that have been altered, extended, or repaired. If testing is performed in segments, submit separate report for each test, complete with diagram of portion of piping tested.
2. Leave uncovered and unconcealed new, altered, extended, or replaced water piping until it has been tested and approved. Expose work that was covered or concealed before it was tested.
3. Cap and subject piping to static water pressure of 50 psig above operating pressure, without exceeding pressure rating of piping system materials. Isolate test source and allow to stand for four hours. Leaks and loss in test pressure constitute defects that must be repaired.
4. Repair leaks and defects with new materials and retest piping or portion thereof until satisfactory results are obtained.
5. Prepare reports for tests and required corrective action.

3.9 CLEANING

A. Clean interior of water piping system. Remove dirt and debris as work progresses. Clean and disinfect water piping per code requirements or administrative authority requirements. Sample procedure as indicated:

1. Purge new piping and parts of existing water piping that have been altered, extended, or repaired before using.
2. Use purging and disinfecting procedures prescribed by authorities having jurisdiction or, if methods are not prescribed, procedures described in either AWWA C651 or AWWA C652 or as described below:

    a. Flush piping system with clean, potable water until dirty water does not appear at outlets.
    b. Fill and isolate system according to either of the following: Fill system or part thereof with water/chlorine solution with at least 50 ppm of chlorine. Isolate with valves and allow to stand for 24 hours. Fill system or part thereof with water/chlorine solution with at least 200 ppm of chlorine. Isolate and allow to stand for three hours.
    c. Flush system with clean, potable water until no chlorine is in water coming from system after the standing time.

d. Submit water samples in sterile bottles to authorities having jurisdiction. Repeat procedures if biological examination shows contamination.

B. Prepare and submit reports of purging and disinfecting activities.

END OF SECTION 22 11 16

SECTION 22 11 19 - PLUMBING SPECIALTIES

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 Related Sections include the following:

1. Division 22 Section "Common Work Results for Plumbing"

1.3 SUMMARY

A. This Section includes plumbing specialties.

1.4 PERFORMANCE REQUIREMENTS

A. Provide components and installation capable of producing piping systems with following minimum working-pressure ratings, unless otherwise indicated:

1. Domestic Water Piping: 125 psig.
2. Sanitary Waste and Vent Piping: 10-foot head of water.

1.5 SUBMITTALS

A. Product Data: Include rated capacities and shipping, installed, and operating weights. Indicate materials, finishes, dimensions, required clearances, and methods of assembly of components; and piping and wiring connections.

B. Field test reports.

C. Maintenance Data: For plumbing specialties to include in maintenance manuals. Include the following:

1.6 QUALITY ASSURANCE

A. Plumbing specialties shall bear label, stamp, or other markings of specified testing agency.

B. Comply with the UPC 2009 edition, subject to the exclusions and amendments set forth by the Maine Plumbers Examining Board.

C. ASME Compliance: Comply with ASME B31.9, "Building Services Piping," for piping materials and installation.

D. NSF Compliance: Comply with NSF 14, "Plastics Piping Components and Related Materials," for plastic domestic water piping components. Include marking "NSF-pw" on plastic potable-water piping and

"NSF-dwv" on plastic drain, waste, and vent piping. Comply with NSF 61, "Drinking Water System Components--Health Effects, Sections 1 through 9," for potable domestic water plumbing specialties.

PART 2 - PRODUCTS

2.1 ACCESS PANELS

A. Provide access panels to concealed valves, cleanouts, and components that require service access. All components shall have proper access in accordance with manufactures' recommendations. Refer to Section 22 05 00.

2.2 BALANCING VALVES

A. Calibrated Balancing Valves: Adjustable, with two readout ports and memory setting indicator. Include manufacturer's standard hoses, fittings, valves, differential pressure meter, and carrying case.

1. Manufacturers:

   a. Amtrol, Inc.
   b. Armstrong Pumps, Inc.
   c. Flow Design, Inc.
   d. ITT Industries; Bell & Gossett Div.
   e. Taco, Inc.
   f. Tour & Andersson, Inc.
   g. Watts

2. NPS 2 and Smaller: Bronze body with brass ball, adjustment knob, calibrated nameplate, and threaded or solder-joint ends.

2.3 THERMOSTATIC WATER MIXING VALVE STATION TMV-1

A. Manufacturers:

1. Armstrong International, Inc.
2. Lawler Manufacturing Company, Inc.
3. Leonard Valve Company.
4. Powers; a division of Watts Water Technologies, Inc.
5. Symmons Industries, Inc.

B. Basis of Design: Leonard Eco-Mix XL-82-LF High Low Thermostatic Mixing Valve. Set to supply 120°F hot water. Furnished complete with:
1. 1" inlets and 1 ¼" outlet
2. 1 GPM (3.7 l/m) minimum flow capacity
3. Integral combination checkstops with strainers and wall support
4. Copper encapsulated thermostatic assembly with Teflon coated stainless steel shuttle.
5. Maximum operating pressure 125 PSI (860 KPA)
6. Temperature adjustment range, 90-140F
7. ASSE 1017 Certified.
8. Locking temperature regulating handle set at 120F
9. Factory assembled and tested

2.4 STRAINERS

A. Strainers: Y-pattern, unless otherwise indicated, and full size of connecting piping. Include ASTM A 666, Type 304, stainless-steel screens with 3/64-inch round perforations, unless otherwise indicated.

1. Pressure Rating: 125-psig minimum working pressure, unless otherwise indicated.
2. Screwed screen retainer with centered blow-down. Drain: Field-installed, hose-end drain valve.
3. Bronze body, with female threaded ends.

2.5 MISCELLANEOUS PIPING SPECIALTIES

A. Hose-End Drain Valves: MSS SP-110, NPS 3/4 ball valve, rated for 400-psig minimum CWP. Include two-piece, copper-alloy body with standard port, chrome-plated brass ball, replaceable seats and seals, blowout-proof stem, and vinyl-covered steel handle.

1. Inlet: Threaded or solder joint.
2. Outlet: Short-threaded nipple with ASME B1.20.7, garden-hose threads and cap.

2.6 CLEANOUTS

A. Refer to Section 22 66 00.

B. Cleanouts shall be easily accessible and shall be gastight and watertight. Provide a minimum clearance of 24 inches for the rodding. Size of cleanout shall be same as pipe size through 4”. Pipes 4” and larger shall have 4” cleanouts.

C. Cleanouts shall consist of "Y" fittings and (1/8 inch) bends with brass or bronze screw plugs.

D. Provide cleanouts at or near the base of the vertical stacks with the cleanout plug located approximately 24 inches above the floor. If there are no fixtures installed on the lowest floor, the cleanout shall be installed at the base of the stack Cleanout shall consist of sanitary tees. Extend the cleanouts to the wall access cover; Mifab 1400 Series.

2.7 FLOOR DRAINS

A. Refer to Section 22 66 00.

2.8 TRAP SEAL PRIMER VALVES

A. Manufacturers:

1. Precision Plumbing Products, Inc.
2. Josam Co.
3. Watts Industries, Inc.; Water Products Div.
4. Zurn Industries, Inc.; Jonespec Div.

B. Water-saver trap primer designed to be used in conjunction with a 1-1/4” sink outlet, to divert drain water: Zurn Z1021, chrome-plated polished cast brass body with cleanout, ground joint elbow with 1-1/2” NPT outlet, 1-1/2” slip nuts and washers, flexible primer tubing and compression fitting, and escutcheons.

C. Supply-Type Trap Seal Primer Valves **(TP)**: Mifab Model MR-500 pressure drop activated, brass, trap seal primer.

1. Tested and Certified: ASSE 1018.
2. Listed: IAPMO and CSA.
3. Operating Range: 20 to 125 psi.
4. Line Pressure Drop to Activate: 3 psi.
5. Inlet Opening: 1/2-inch male NPT.
6. Outlet Opening: 1/2-inch female NPT.
7. View Holes: 4.
8. Filter Screen: Removable, fine mesh brass.
9. Seals: O-rings.
10. Floor Drain Traps Served: Maximum of 6
11. Requires no adjustments and no air pre-charge.
12. Can be disassembled in field.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Refer to Division 22 Section "Common Work Results for Plumbing" for piping joining materials, joint construction, and basic installation requirements.

B. Trap primers:

1. Inspect and test the existing trap seal primers in accordance with manufacturer's instructions.
2. Cycle trap seal primers a minimum of 6 times to ensure optimum performance.

C. Install individual shutoff valve in each water supply to plumbing specialties. Install shutoff valves in accessible locations.

D. Install air vents at piping high points. Include ball valve in inlet.

E. Install traps on plumbing specialty drain outlets.

F. Install escutcheons at wall, floor, and ceiling penetrations in exposed finished locations and within cabinets and millwork. Use deep-pattern escutcheons if required to conceal protruding pipe fittings.

3.2 CONNECTIONS

A. Piping installation requirements are specified in other Division 22 Sections. Drawings indicate general arrangement of piping, fittings, and specialties.

B. Install piping adjacent to equipment to allow service and maintenance.

C. Connect plumbing specialties to piping specified in other Division 22 Sections.

3.3 PROTECTION

A. Protect drains during remainder of construction period to avoid clogging with dirt and debris and to prevent damage from traffic and construction work.

B. Place plugs in ends of uncompleted piping at end of each day or when work stops.

END OF SECTION 22 11 19

SECTION 22 13 16 – PLUMBING SANITARY AND STORM PIPING

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.

B. Related Sections include the following:

1. Division 22 Section "Common Work Results for Plumbing"
2. Division 22 Section "Plumbing Specialties" for soil, waste, and vent piping systems specialties.

1.2 SUMMARY

A. This Section includes soil and waste, sanitary drainage and vent piping inside the building and to locations indicated.

B. This Section includes storm-drainage piping inside the building and to locations indicated.

C. Drawings show the general layout of piping and accessories but do not show all required fittings and offsets that may be necessary to connect piping to equipment and to coordinate with other trades. Fabricate piping based on field measurements. Provide all necessary fittings and offsets.

D. General layout shown, provide piping to fixtures as required by the Maine Plumbing Code. A licensed master plumber shall perform or supervise the work and provide layouts, piping, and fittings as required by code.

1.3 PERFORMANCE REQUIREMENTS

A. Comply with the utility requirements for the connection of to the municipal utility services. Obtain and pay for all necessary permits from the applicable municipal department. Obtain authority to connect to their existing mains.

B. Provide components and installation capable of producing piping systems with working-pressure ratings per local plumbing code.

1.4 SUBMITTALS

A. Product Data: For pipe, tube, fittings, and couplings.

B. Field Test Reports: Indicate and interpret test results for compliance with performance requirements.

1.5 QUALITY ASSURANCE

A. Piping materials shall bear label, stamp, or other markings of specified testing agency.

B. Comply with the UPC 2009 edition, subject to the exclusions and amendments set forth by the Maine Plumbers Examining Board.

C. Comply with local building and plumbing codes.

D. Comply with NSF 14, "Plastics Piping Systems Components and Related Materials," for plastic piping components. Include marking with "NSF-DWV" for plastic drain, waste, and vent piping; "NSF-drain" for plastic drain piping; "NSF-tubular" for plastic continuous waste piping; and "NSF-sewer" for plastic sewer piping.

PART 2 - PRODUCTS

2.1 PIPING MATERIALS

A. Refer to Part 3 "Piping Applications" Article for applications of pipe, tube, fitting, and joining materials.

2.2 CAST-IRON SOIL PIPING

A. Hubless

1. Hubless Cast Iron pipe and fittings shall be manufactured from gray cast iron and shall conform to ASTM A-888 and CISPI Standard 301. All pipe and fittings shall be marked with the collective trademark of the Cast Iron Soil Pipe Institute.
2. Hubless couplings shall conform to CISPI Standard 310 for standard couplings or ASTM C-1540 for heavy duty couplings where indicated. Gaskets shall conform to ASTM C-564. All pipe and fittings to be produced by a single manufacturer and are to be installed in accordance with manufacturer’s recommendations and local code requirements. Couplings shall be installed in accordance with the manufacturer’s band tightening sequence and torque. Tighten bands with a properly calibrated torque limiting device.

B. Hub and Spigot Cast Iron Soil Pipe and Fittings:

1. Hub and Spigot Cast Iron pipe and fittings shall be manufactured from gray cast iron and shall conform to ASTM A-74. All pipe and fittings shall be marked with the collective trademark of the Cast Iron Soil Pipe Institute. Pipe and fittings to be Service (SV) Extra Heavy (XH)
2. Joints can be made using a compression gasket manufactured from a neoprene elastomer meeting the requirements of ASTM C-564 or lead and oakum. All pipe and fittings to be produced by a single manufacturer and are to be installed in accordance with manufacturer’s recommendations and local code requirements. The system shall be hydrostatically tested after installation to 10 ft. of head (4.3 psi maximum).

2.3 PVC DRAINAGE PIPING

A. Pipe and fittings shall be manufactured from PVC compound with a cell class of 12454 per ASTM D-1784 and conform with National Sanitation Foundation (NSF) standard 14. Pipe shall be iron pipe size (IPS) conforming to ASTM D-1785 and ASTM D-2665. Fittings shall conform to ASTM D-2665.

B. All pipe and fittings to be produced by a single manufacturer and to be installed in accordance with manufacturer's recommendations and local code requirements. Solvent cements shall conform to ASTM D-2564, primer shall conform to ASTM F-656. The system to be manufactured by Charlotte Pipe and Foundry Co. or approved equal; and shall be intended for non-pressure drainage applications where the temperature will not exceed 140°F.

2.4 PVC PRESSURE PIPING

A. All pipe and fittings to be produced by a single manufacturer and to be installed in accordance with manufacturer's recommendations and local code requirements. Solvent cements shall conform to ASTM D-2564, primer shall conform to ASTM F-656. The system to be manufactured by Charlotte Pipe and Foundry Co. and is intended for pressure applications where the temperature will not exceed 140°F.

B. Solid Wall: Pipe and fittings shall be manufactured from PVC compound with a cell class of 12454 per ASTM D-1784 and conform with National Sanitation Foundation (NSF) standards 14 and 61. Pipe shall be iron pipe size (IPS) conforming to ASTM D-1785. Fittings shall conform to ASTM D-2466.

C. Foam Core: Pipe and fittings shall be manufactured from PVC compound with a cell class of 11432 per ASTM D-4396 for pipe and 12454 per ASTM D-1784 for fittings and conform with National Sanitation Foundation (NSF) standard 14. Pipe shall be iron pipe size (IPS) conforming to ASTM F-891. Fittings shall conform to ASTM D-2665.

2.5 FIRESTOP PROTECTION FOR DWV AND STORMWATER PIPING

A. All piping penetrations of fire-resistant rated construction shall be protected in accordance with the plumbing code.

B. Use ProSet, or approved equal, "Firestop Penetrators", Warnock Hersey classified and listed in the building materials directory.

C. Products shall be tested in accordance with the ASTM E-814 standards and shall be selected for all applicable pipe penetrations and plumbing fixture floor openings through Fire-Rated floors, walls or floor/ceiling assemblies, in accordance with the Manufacturer's instructions.

1. Use ProSet System "B" penetrators for cast iron DWV pipes for stacks and drains penetrating floors and walls.
2. Use ProSet System "C" penetrators for plastic DWV pipes for stacks and drains penetrating floors and walls.

PART 3 - EXECUTION

3.1 EXCAVATION

A. Refer to Division 31 for excavating, trenching, and backfilling.

3.2 PIPING APPLICATIONS

A. Transition and special fittings with pressure ratings at least equal to piping pressure ratings may be used in applications below, unless otherwise indicated.

B. Flanges may be used on aboveground pressure piping, unless otherwise indicated.

C. Aboveground and Underground, Soil, Waste, and Vent Piping: Use any of the following piping materials for each size range:

1. Cast iron

a. Risers/stacks
b. Kitchen drains
c. Boiler room drains – within 40 feet of boiler drains
d. Exposed to finished space
e. Underground, Soil, Waste, and Vent Piping located in Kitchens, Boiler Rooms, or similar spaces where hot water (<140°F) may be dumped down the drain
f. Piping in return air plenums.

2. PVC or Cast iron

a. Exposed to garage ceiling
b. Under slab
c. Concealed
d. Vents

D. Vent Piping through roof/exposed above roof: Use any of the following piping materials for each size range:

1. Cast iron
2. Schedule 40 PVC DWV
3. ABS

E. Sanitary-Sewage Force Mains: Type L sweated copper or PVC pressure piping.

F. Elevator sump pump discharge piping: Type L sweated copper.

G. Storm Drain Piping:

1. Cast iron
2. Schedule 40 PVC DWV

H. Storm Drain Piping, heat traced: Cast iron

3.3 PIPING INSTALLATION

A. Comply with requirements for excavating, trenching, and backfilling specified in Division 31.

B. Refer to Division 22 Section "Common Work Results for Plumbing" for basic piping installation.

C. Install cleanouts at grade and extend to where building drains connect to site piping.

D. Install cleanout fitting with closure plug inside the building in force-main piping.

E. Provide firestopping as per Section 23 05 00 “Common Work Results for HVAC”.

F. Install wall penetration system at each service pipe penetration through foundation wall. Make installation watertight. Refer to Division 22 Section "Common Work Results for Plumbing" for wall penetration systems.

G. Install cast-iron soil piping according to CISPI's "Cast Iron Soil Pipe and Fittings Handbook," Chapter IV, "Installation of Cast Iron Soil Pipe and Fittings."

H. Install PVC soil and waste drainage and vent piping according to ASTM D 2665.

I. Install underground PVC soil and waste drainage piping according to ASTM D 2321.

J. Make changes in direction for soil and waste drainage and vent piping using appropriate branches, bends, and long-sweep bends. Sanitary tees and short-sweep 1/4 bends may be used on vertical stacks if change in direction of flow is from horizontal to vertical. Use long-turn, double Y-branch and 1/8-bend fittings if 2 fixtures are installed back to back or side by side with common drain pipe. Straight tees, elbows, and crosses may be used on vent lines. Do not change direction of flow more than 90 degrees. Use proper size of standard increasers and reducers if pipes of different sizes are connected. Reducing size of drainage piping in direction of flow is prohibited.

K. Lay buried building drainage piping beginning at low point of each system. Install true to grades and alignment indicated, with unbroken continuity of invert. Place hub ends of piping upstream. Install required gaskets according to manufacturer's written instructions for use of lubricants, cements, and other installation requirements. Maintain swab in piping and pull past each joint as completed.

L. Install drainage and vent piping at the minimum slopes as required by the local plumbing code.

M. Sleeves are not required for cast-iron soil piping passing through concrete slabs-on-grade if slab is without membrane waterproofing.

N. Do not enclose, cover, or put piping into operation until it is inspected and approved by authorities having jurisdiction.

3.4 JOINT CONSTRUCTION

A. Refer to Division 22 Section “Common Work Results for Plumbing" for basic piping joint construction.

B. Cast-Iron, Soil-Piping Joints: Make joints according to CISPI's "Cast Iron Soil Pipe and Fittings Handbook," Chapter IV, "Installation of Cast Iron Soil Pipe and Fittings." Gasketed Joints: Make with rubber gasket matching class of pipe and fittings. Hubless Joints: Make with rubber gasket and sleeve or clamp.

3.5 VALVE INSTALLATION

A. Shutoff Valves: Install full-port ball valve on each pump discharge.

B. Check Valves: Install swing check valve, downstream from shutoff valve, on each pump discharge.

C. Backwater Valves: Install backwater valves in piping subject to sewage backflow.

1. Horizontal Piping: Horizontal backwater valves. Use normally closed type, unless otherwise indicated.
2. Floor Drains: Drain outlet backwater valves, unless drain has integral backwater valve.
3. Install backwater valves in accessible locations.
4. Refer to Division 22 Section "Plumbing Specialties" for backwater valves.

3.6 HANGER AND SUPPORT INSTALLATION

A. Hanger, support, and anchor devices are specified in Division 22 Section "Hangers and Supports."

3.7 CONNECTIONS

A. Drawings indicate general arrangement of piping, fittings, and specialties.

B. Connect interior storm drainage piping to exterior storm drainage piping. Use transition fitting to join dissimilar piping materials. Connect storm drainage piping to roof drains and storm drainage specialties.

C. Connect soil and waste piping to exterior sanitary sewerage piping. Use transition fitting to join dissimilar piping materials. Connect drainage and vent piping to fixtures and equipment as shown on the plans. Connect drainage piping in sizes indicated, but not smaller than required by plumbing code.

3.8 FIELD QUALITY CONTROL

A. During installation, notify authorities having jurisdiction at least 24 hours before inspection must be made. Perform tests specified below in presence of authorities having jurisdiction.

1. Roughing-in Inspection: Arrange for inspection of piping before concealing or closing-in after roughing-in and before setting fixtures.
2. Final Inspection: Arrange for final inspection by authorities having jurisdiction to observe tests specified below and to ensure compliance with requirements.

B. Test piping according to procedures of authorities having jurisdiction or, in absence of published procedures, as follows:

1. Test for leaks and defects in new piping and parts of existing piping that have been altered, extended, or repaired. If testing is performed in segments, submit separate report for each test, complete with diagram of portion of piping tested.
2. Leave uncovered and unconcealed new, altered, extended, or replaced drainage and vent piping until it has been tested and approved. Expose work that was covered or concealed before it was tested.
3. Roughing-in Plumbing Test Procedure: Test piping on completion of roughing-in. Close openings in piping system and fill with water to point of overflow, but not less than 10-foot head of water. From 15 minutes before inspection starts to completion of inspection, water level must not drop. Inspect joints for leaks.
4. Finished Plumbing Test Procedure: After plumbing fixtures have been set and traps filled with water, test connections and prove they are gastight and watertight. Plug vent-stack openings on roof and building drains where they leave building. Introduce air into piping system equal to pressure of 1-inch wg. Use U-tube or manometer inserted in trap of water closet to measure this pressure. Air pressure must remain constant without introducing additional air throughout period of inspection. Inspect plumbing fixture connections for gas and water leaks.
5. Repair leaks and defects with new materials and retest piping, or portion thereof, until satisfactory results are obtained.

C. Test force-main piping according to procedures of authorities having jurisdiction or, in absence of published procedures, as follows:

1. Leave uncovered and unconcealed new, altered, extended, or replaced force-main piping until it has been tested and approved. Expose work that was covered or concealed before it was tested.
2. Cap and subject piping to static-water pressure of 50 psig above operating pressure, without exceeding pressure rating of piping system materials. Isolate test source and allow to stand for four hours. Leaks and loss in test pressure constitute defects that must be repaired.
3. Repair leaks and defects with new materials and retest piping, or portion thereof, until satisfactory results are obtained.

D. Re-inspection: If authorities having jurisdiction find that piping will not pass test or inspection, make required corrections and arrange for re-inspection.

E. Reports: Prepare inspection reports and have them signed by authorities having jurisdiction.

3.9 CLEANING

A. Clean interior of piping. Remove dirt and debris as work progresses.

B. Protect drains during remainder of construction period to avoid clogging with dirt and debris and to prevent damage from traffic and construction work.

C. Place plugs in ends of uncompleted piping at end of day and when work stops.

END OF SECTION 22 13 16

SECTION 22 40 00 - PLUMBING FIXTURES

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.

B. Related Sections include the following:

1. Division 11
2. Division 12
3. Division 22 Section "Common Work Results for Plumbing"
4. Section 22 11 16 - Domestic Water Piping: Material and installation of piping systems, valves, and piping specialties.
5. Division 22 Section "Plumbing Specialties" for backflow preventers and specialty fixtures not in this Section.

1.2 SUMMARY

A. Plumbing Fixtures

B. Lab Fixtures

C. Emergency Plumbing Fixtures.

1.3 SUBMITTALS

A. Product Data: Include selected fixture and trim, fittings, accessories, appliances, appurtenances, equipment, and supports and indicate materials and finishes, dimensions, construction details, and flow-control rates for each type of fixture indicated.

B. Maintenance Data: For plumbing fixtures to include in maintenance manuals specified in Division 1.

1.4 QUALITY ASSURANCE

A. Source Limitations: Obtain plumbing fixtures, faucets, and other components of each category through one source from a single manufacturer. Exception: If fixtures, faucets, or other components are not available from a single manufacturer, obtain similar products from other manufacturers specified for that category.

B. Comply with the UPC 2009 edition, subject to the exclusions and amendments set forth by the Maine Plumbers Examining Board.

C. Regulatory Requirements: Comply with requirements in ICC A117.1, "Accessible and Usable Buildings and Facilities"; Public Law 90-480, "Architectural Barriers Act"; and Public Law 101-336, "Americans with Disabilities Act"; about plumbing fixtures for people with disabilities.

D. Regulatory Requirements: Comply with requirements in Public Law 102-486, "Energy Policy Act," about water flow and consumption rates for plumbing fixtures.

E. NSF Standard: Comply with NSF 61, "Drinking Water System Components--Health Effects," for fixture materials that will be in contact with potable water.

1.5 COORDINATION

A. Coordinate roughing-in and final plumbing fixture locations, and verify that fixtures can be installed to comply with original design and referenced standards.

B. Coordinate with fume hood and casework supplier.

PART 2 - PRODUCTS

2.1 GENERAL

A. Common Plumbing Fixture Requirements

1. Provide combinations of fixtures and trim, faucets, fittings, and other components that are compatible.
2. Fixtures shall be equipped with appurtenances such as traps, faucets, stop valves, and drain fittings.

2.2 LAB FIXTURES – P-1, P-2, P-3, Turrets

A. Bowls and grid drains to be furnished with casework. Plumber shall provide rough in and faucets.

B. General

1. All laboratory service fixtures and safety equipment shall be ColorTech fixtures manufactured by WaterSaver Faucet Co. or approved equal by Chicago.
2. All laboratory service fixtures and safety equipment shall be the product of one service fixture manufacturer to assure uniform appearance and ease of maintenance of the laboratory facility. Remote control valves and fittings furnished with fume hoods shall be the product of the same fixture manufacturer.
3. All service fixtures shall be factory assembled (including the assembly of valves and shanks to turrets, flanges and other mounting accessories), and each fixture shall be individually factory tested in the manner and at the pressures set forth below.
4. All service fixtures shall be designed to minimize exposed surfaces on which dust, dirt and airborne contaminants may collect, and to facilitate cleaning and maintenance of the service fixture. Faucet and valve handles shall be hooded to cover the valve stem and top surface of the packing nut or bonnet. The valve stem shall not be exposed to view as the faucet or valve is opened and closed.
5. Faucet and valve handles shall be molded nylon hooded type and shall be color-coded per service index color

    a. Cold Water – CW: green
    b. Hot Water – HW: red
    c. Gas – GAS: blue

d. Vacuum – VAC: yellow
e. Air – AIR: orange

C. All laboratory service fixtures (except fittings inside fume hoods) and safety equipment shall be furnished with ColorTech powder coated finish in white. Coating material shall be electrostatically applied to all exposed surfaces. After application, coating shall be fully baked to permit curing.

D. Water Faucets and Valves

1. Renewable Unit. Faucets and valves for water service shall have a renewable unit or cartridge containing all working components subject to wear.
2. Compression Unit with Adjustable Volume Control: Renewable units shall be compression valve design with an integral adjustable volume control device. Units shall have a high durometer nitrile valve disc and replaceable stainless steel seat. The renewable unit shall be broached for position locking in the valve body. The unit shall have a molded TFE stem packing and adjustable packing nut. The unit shall be capable of being readily converted from compression to self-closing control, and vice versa, without disturbing the faucet body.
3. P-1 and P-2, Basis of Design: Water Saver CT414BH, 6” convertible rigid/swing gooseneck with integral vacuum breaker, (2) 1 3/8” male shanks with 3/8” OD flexible copper tube inlets. Center fitting has 3/8” IPS male shank. Furnish complete with locknuts, washers and (2) flexible PVC hoses. Outlet shall be 3/8” IPS with removable aerator. Handles are 4” forged brass wrist blade handles with color-coded index discs.
4. P-3, Basis of Design: Water Saver CT611VB-BH, 6” rigid goosenecks furnished in right hand configuration unless left hand is specified, with integral vacuum breaker, 3/8” IPS male inlet, 3/8” IPS female outlet with removable seven serration hose end. Handles are 4” forged brass wrist blade handles with a color-coded index disc.
5. Vacuum Breakers shall be provided integral with the gooseneck. Vacuum breakers shall have a forged brass body, a renewable seat and an ultralight float cup with silicone gasket for fine flow control. Vacuum breakers shall not spill over at low water volume. Vacuum breakers shall be certified by the American Society of Sanitary Engineers (ASSE) under Standard 1001.
6. Certification. All fixtures for water service shall meet the requirements of ANSI/ASME A112.18.1M-1989 and be certified by the Canadian Standards Association (CSA) under Standard CAN/CSA B.125.M89.
7. Testing. Water faucets and valves shall be fully assembled and individually tested at 80 pounds per square inch (PSI) water pressure.

E. Gas Turrets, Basis of Design: Water Saver CT2280-232SWSA, 180° double, fine control needle valves shall have a forged brass valve body with a 3/8” IPS female outlet for attachment of serrated hose ends, quick connects or other outlet fittings. Valves shall have a self-centering replaceable stainless steel floating cone and a replaceable stainless steel valve seat with a .125” diameter orifice. The floating cone shall be tapered with a maximum diameter of .125”. The valve shall have a molded TFE stem packing with an externally adjustable packing nut. The valve shall go from closed to fully open in 6 full revolutions of the handle. Fine control needle valves shall be fully assembled and individually tested at 375 PSI nitrogen pressure. Maximum working pressure shall be 250 PSI.

2.3 EMERGENCY PLUMBING FIXTURES

A. Manufacturers

1. Bradley Corporation
2. Encon Safety Products
3. Guardian Equipment Co.
4. Haws Corporation.
5. Speakman Co.
6. Chicago Faucets

B. Emergency Shower Station (SS-1) Basis-of-Design Product: Subject to compliance with requirements, provide Guardian Model # GSC2650A or a comparable product by one of the following:

a. Guardian Equipment Co.
b. Haws Corporation.
c. Encon Safety Products.

1. Description: Recessed safety center with barrier-free eye/face wash and shower safety matching fire extinguisher housing, ceiling mounted exposed shower head, and drain pan. When activated, cover serves as pan to collect waste water and return it into unit for drainage. When installed at recommended mounting heights, unit complies with ADA requirements for accessibility by handicapped persons.
2. Shower head assembly: 10" diameter stainless steel. Configuration GSC2650A.
3. Valve: 1" IPS brass stay-open ball valve with stainless steel “panic bar” actuator.
4. Drain Pan: 16 gauge stainless steel combination cover and drain pan. Grasping “panic bar” handle and opening cover pulls spray head assembly down from vertical to horizontal position, activating water flow. While unit is in operation, waste water is collected in drain pan and returned into cabinet for drainage. Unit remains in operation until cover is returned to closed position.
5. Spray head assembly: Two FS-Plus™ spray heads mounted on supply arms. Each spray head has individually adjustable flow control and filter to remove impurities from water.

a. Valve: 1/2" IPS brass plug-type valve with O-ring seals. Furnished with in-line strainer to protect valve from debris and foreign matter.
b. Hose: 8' reinforced PVC hose. 300 PSI maximum working pressure.
c. Mounting: 16 gauge stainless steel cabinet with flanged rim for recessed mounting in wall. Unit fits in standard 3 5/8" deep wall.
d. Temperature Mixing Valve (TMV-2): Guardian Model TMV G3800

2.4 Drench Hose (DH-1) Basis-of-Design Product: Subject to compliance with requirements, provide Guardian Model # G5022 or a comparable product by one of the following:

a. Guardian Equipment Co.
b. Haws Corporation.
c. Encon Safety Products.

2. Description: Dual purpose eye wash/drench hose for deck mounting. Unit meets the provisions of ANSI Z358.1 - 2009 as both an eye wash and a drench hose. Unit may be left in the deck flange for use as a fixed eye wash, leaving user’s hands free. Alternatively, unit may be removed for use as a drench hose to rinse any part of user’s eyes, face or body.

a. Spray head assembly: Two GS-Plus™ spray heads mounted side-by-side. Each head has a “flip top” dust cover, internal flow control and filter to remove impurities from the water flow.
b. Valve: Forged brass squeeze valve activated by stainless steel lever handle. Valve has replaceable stainless steel seat for exceptional durability. Locking clip engages when handle is depressed, providing “hands free” operation. Valve stays open until locking clip is released.
c. Hose: 8' reinforced PVC hose. 300 PSI maximum working pressure.
d. Mounting: Deck flange for countertop mounting. Flange has handle locator guide to position spray heads and handle facing forward at all times.
e. Temperature Mixing Valve (TMV-3): Guardian Model TMV G3600

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine roughing-in for water soil and for waste piping systems and supports to verify actual locations and sizes of piping connections and that locations and types of supports match those indicated, before plumbing fixture installation. Use manufacturer's roughing-in data if roughing-in data are not indicated.

B. Examine walls, floors, and cabinets for suitable conditions where fixtures are to be installed.

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

3.2 FIXTURE INSTALLATION - GENERAL

A. Assemble and support fixtures, trim, fittings, and other components according to manufacturers' written instructions.

B. Install fixtures level and plumb according to manufacturers' written instructions and roughing-in drawings.

C. Install water-supply piping with stop on each supply to each fixture to be connected to water distribution piping. Attach supplies to supports or substrate within pipe spaces behind fixtures. Install stops in locations where they can be easily reached for operation.

D. Install traps on fixture outlets as required.

3.3 LAB FIXTURES & DISHWASHER

A. Provide rough-in piping, traps, tailpieces, and make final and necessary connections. Install faucets and equipment furnished by Division 11 and 12. Make all final and necessary plumbing connections.

3.4 CONNECTIONS

A. Piping installation requirements are specified in other Division 22 Sections. Drawings indicate general arrangement of piping, fittings, and specialties.

B. Supply and Waste Connections to Plumbing Fixtures: Connect fixtures with water supplies, stops, risers, traps, and waste piping. Use size fittings required to match fixtures. Connect to plumbing piping.

C. Supply and Waste Connections to Fixtures and Equipment Specified in Other Sections: Connect fixtures and equipment with water supplies, stops, risers, traps, and waste piping specified. Use size fittings required to match fixtures and equipment. Connect to plumbing piping.

3.5 FIELD QUALITY CONTROL

A. Verify that installed fixtures are categories and types specified for locations where installed.

B. Check that fixtures are complete with trim, faucets, fittings, and other specified components.

C. Inspect installed fixtures for damage. Replace damaged fixtures and components.

D. Test installed fixtures after water systems are pressurized for proper operation. Replace malfunctioning fixtures and components, then retest. Repeat procedure until units operate properly.

3.6 ADJUSTING

A. Operate and adjust fixtures. Replace damaged and malfunctioning fixtures.

B. Adjust water pressure to produce proper flow and stream.

C. Replace washers and seals of leaking and dripping faucets and stops.

END OF SECTION 22 40 00

SECTION 22 61 13 - COMPRESSED-AIR PIPING FOR LABORATORY FACILITIES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section Includes:

1. Laboratory air piping

1.3 DEFINITIONS

A. Laboratory air piping systems.

1.4 ACTION SUBMITTALS

A. Product Data: For each type of product.

1.5 INFORMATIONAL SUBMITTALS

A. Material Certificates: Signed by Installer certifying that compressed-air piping materials comply with requirements in NFPA 99.

PART 2 - PRODUCTS

2.1 PIPES, TUBES, AND FITTINGS

A. Comply with NFPA 99 for piping materials.

B. Comply with ASME B31.9, "Building Services Piping".

C. Copper Gas Tube: ASTM B 819, Type L, seamless, drawn temper that has been manufacturer cleaned, purged, and sealed for medical gas service or according to CGA G-4.1 for oxygen service.

D. Wrought-Copper Fittings: ASME B16.22, solder-joint pressure type that has been manufacturer cleaned, purged, and bagged for oxygen service according to CGA G-4.1.

E. Copper Unions: ASME B16.22 or MSS SP-123, wrought-copper or cast-copper alloy.

2.2 JOINING MATERIALS

A. Brazing Filler Metals: AWS A5.8/A5.8M, BCuP Series, copper-phosphorus alloys.

2.3 VALVES

A. General Requirements for Valves: Manufacturer cleaned, purged, and bagged according to CGA G-4.1 for oxygen service.

B. Ball Valves:

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

    a. Allied Healthcare Products Inc.; Chemetron Division.
    b. Amico Corporation.
    c. BeaconMedaes.
    d. Conbraco Industries, Inc.
    e. NIBCO INC.
    f. Ohio Medical Corporation.
    g. Tri-Tech Medical Inc.

2. Standard: MSS SP-110.
3. Description: Three-piece body, brass or bronze.
4. Pressure Rating: 300 psig minimum.
5. Ball: Full-port, chrome-plated brass.
6. Seats: PTFE or TFE.
7. Handle: Lever.
8. Stem: Blowout proof with PTFE or TFE seal.

C. Pressure Regulators:

1. Bronze body and trim.
2. Spring-loaded, diaphragm-operated, relieving type.
3. Manual pressure-setting adjustment.
4. Rated for 250-psig minimum inlet pressure.
5. Capable of controlling delivered air pressure within 0.5 psig for each 10-psig inlet pressure.

2.4 NITROGEN

A. Comply with USP 32 - NF 27 for oil-free dry nitrogen.

PART 3 - EXECUTION

3.1 PREPARATION

A. Cleaning of Tubing: If manufacturer-cleaned and -capped fittings or tubing is not available or if precleaned fittings or tubing must be recleaned because of exposure, have supplier or separate agency acceptable to authorities having jurisdiction perform the following procedures:

1. Clean tube and fittings, valves, gages, and other components of oil, grease, and other readily oxidizable materials as required for oxygen service according to CGA G-4.1.
2. Wash gas tubing and components in hot, alkaline-cleaner-water solution of sodium carbonate or trisodium phosphate in proportion of 1 lb of chemical to 3 gal. of water.

a. Scrub to ensure complete cleaning.
b. Rinse with clean, hot water to remove cleaning solution.

3.2 PIPING INSTALLATION

A. Comply with NFPA 99 for installation of compressed-air piping.

B. Install piping concealed from view and protected from physical contact by building occupants unless otherwise indicated and except in equipment rooms and service areas.

C. Install piping indicated to be exposed and piping in equipment rooms and service areas at right angles or parallel to building walls. Diagonal runs are prohibited unless specifically indicated otherwise.

D. Install piping above accessible ceilings to allow sufficient space for ceiling panel removal and coordinate with other services occupying that space.

E. Install piping adjacent to equipment and specialties to allow service and maintenance.

F. Install compressed-air piping with 1 percent slope downward in direction of flow.

G. Install nipples, unions, special fittings, and valves with pressure ratings same as or higher than system pressure rating used in applications specified in "Piping Schedule" Article unless otherwise indicated.

H. Install eccentric reducers, if available, where compressed-air piping is reduced in direction of flow, with bottoms of both pipes and reducer fitting flush.

I. Install branch connections to compressed-air mains from top of main. Provide drain leg and drain trap at end of each main and branch and at low points.

J. Install piping to permit valve servicing.

K. Install piping free of sags and bends.

L. Install fittings for changes in direction and for branch connections.

M. Install unions in copper compressed-air tubing adjacent to each valve and at final connection to each machine, specialty, and piece of equipment.

3.3 VALVE INSTALLATION

A. Install shutoff valve at each connection to and from compressed-air equipment and specialties.

B. Install pressure regulators on compressed-air piping where reduced pressure is required.

3.4 JOINT CONSTRUCTION

A. Remove scale, slag, dirt, and debris from outside of cleaned tubing and fittings before assembly.

B. Threaded Joints: Apply appropriate tape to external pipe threads.

C. Brazed Joints: Join copper tube and fittings according to CDA's "Copper Tube Handbook," "Brazed Joints" chapter. Continuously purge joint with oil-free dry nitrogen during brazing.

3.5 HANGER AND SUPPORT INSTALLATION

A. Comply with requirements in Section 22 05 29 "Hangers and Supports for Plumbing Piping and Equipment" for pipe hanger and support devices.

B. Vertical Piping: MSS Type 8 or Type 42, clamps.

C. Individual, Straight, Horizontal Piping Runs: MSS Type 1, adjustable, steel, clevis hangers.

D. Support horizontal piping within 12 inches of each fitting and coupling.

E. Rod diameter may be reduced one size for double-rod hangers, with 3/8-inch- minimum rods.

F. Install hangers for copper tubing with the following maximum horizontal spacing and minimum rod diameters:

1. NPS 1/2: 72 inches with 3/8-inch rod.
2. NPS 3/4: 84 inches with 3/8-inch rod.

G. Install supports for vertical copper tubing every 10 feet.

3.6 IDENTIFICATION

A. Install identifying labels and devices for laboratory-air piping, valves, and specialties. Comply with requirements in Section 22 05 53 "Identification for Plumbing Piping and Equipment."

B. Install identifying labels and devices according to NFPA 99. Use the following or similar captions and color-coding for piping products where required by NFPA 99:

1. Laboratory Air: Black letters on yellow-and-white checkerboard background.

3.7 FIELD QUALITY CONTROL

A. Testing Agency: Engage a qualified testing agency to perform tests and inspections of piping and to prepare test and inspection reports.

B. Tests and Inspections:

1. Piping Leak Tests for Compressed-Air Piping: Test new and modified parts of existing piping. Cap and fill compressed-air piping with oil-free dry nitrogen to pressure of 50 psig above system operating pressure, but not less than 150 psig. Isolate test source and let stand for four hours to equalize temperature. Refill system, if required, to test pressure; hold for two hours with no drop in pressure.
2. Repair leaks and retest until no leaks exist.
3. Inspect pressure regulators for proper operation.

C. Remove and replace components that do not pass tests and inspections and retest as specified above.

3.8 PROTECTION

A. Protect tubing from damage.

B. Retain sealing plugs in tubing, fittings, and specialties until installation.

C. Clean tubing not properly sealed, and where sealing is damaged, according to "Preparation" Article.

END OF SECTION 22 61 13

SECTION 22 62 13 - VACUUM PIPING FOR LABORATORY FACILITIES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section Includes:

1. Laboratory vacuum piping

B. Related Requirements:

1. Division 12 "Laboratory Casework" for vacuum inlets in laboratory casework.

1.3 ACTION SUBMITTALS

A. Product Data: For each type of product.

PART 2 - PRODUCTS

2.1 VACUUM TURRETS

A. Provide in accordance with Section 22 40 00.

2.2 PIPES, TUBES, AND FITTINGS

A. Copper Water Tube: ASTM B 88, Type M, seamless, drawn temper that has been manufacturer cleaned, purged, and sealed for medical gas service or according to CGA G-4.1 for oxygen service.

B. Wrought-Copper Fittings: ASME B16.22, solder-joint pressure type that has been manufacturer cleaned, purged, and sealed for medical gas service or according to CGA G-4.1 for oxygen service.

C. Copper Unions: ASME B16.22 or MSS SP-123, wrought-copper or cast-copper alloy.

2.3 JOINING MATERIALS

A. Brazing Filler Metals: AWS A5.8/A5.8M, BCuP Series, copper-phosphorus alloys.

2.4 VALVES

A. General Requirements for Valves: Manufacturer cleaned, purged, and bagged according to CGA G-4.1 for oxygen service.

B. Copper-Alloy Ball Valves:

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

a. Allied Healthcare Products Inc.; Chemetron Division.
b. Amico Corporation.
c. BeaconMedaes.
d. Conbraco Industries, Inc.
e. NIBCO INC.
f. Ohio Medical Corporation.
g. Tri-Tech Medical Inc.

2. Standard: MSS SP-110.
3. Description: Three-piece body, brass or bronze.
4. Pressure Rating: 300 psig minimum.
5. Ball: Full-port, chrome-plated brass.
6. Seats: PTFE or TFE.
7. Handle: Lever.
8. Stem: Blowout proof with PTFE or TFE seal.
9. Ends: Manufacturer-installed ASTM B 819, copper-tube extensions.

C. Check Valves:

1. Description: In-line pattern, bronze.
2. Pressure Rating: 300 psig minimum.
3. Operation: Spring loaded.
4. Ends: Manufacturer-installed ASTM B 819, copper-tube extensions.

2.5 NITROGEN

A. Comply with USP 32 - NF 27 for oil-free dry nitrogen.

PART 3 - EXECUTION

3.1 PIPING INSTALLATION

A. Drawing plans, schematics, and diagrams indicate general location and arrangement of vacuum piping. Indicated locations and arrangements were used to size pipe and calculate friction loss, expansion, vacuum producer sizing, and other design considerations. Install piping as indicated unless deviations to layout are approved on coordination drawings.

B. Comply with NFPA 99 for installation of vacuum piping.

C. Install piping concealed from view and protected from physical contact by building occupants unless otherwise indicated and except in equipment rooms and service areas.

D. Install piping indicated to be exposed and piping in equipment rooms and service areas at right angles or parallel to building walls. Diagonal runs are prohibited unless specifically indicated otherwise.

E. Install piping above accessible ceilings to allow sufficient space for ceiling panel removal and coordinate with other services occupying that space.

F. Install piping adjacent to equipment and specialties to allow service and maintenance.

G. Install vacuum piping with 1 percent slope downward in direction of flow.

H. Install nipples, unions, special fittings, and valves with pressure ratings same as or higher than piping pressure rating used in applications specified in "Piping Schedule" Article unless otherwise indicated.

I. Install eccentric reducers, if available, where vacuum piping is reduced in direction of flow, with bottoms of both pipes and reducer fitting flush.

J. Provide drain leg and drain trap at end of each main and branch and at low points.

K. Install piping to permit valve servicing.

L. Install piping free of sags and bends.

M. Install fittings for changes in direction and for branch connections. Extruded-tee branch outlets in copper tubing may be made where specified.

N. Install vacuum piping from vacuum service connections specified in this Section, to equipment as shown on the plans.

O. Install unions in copper vacuum tubing adjacent to each valve and at final connection to each machine, specialty, and piece of equipment.

3.2 VALVE INSTALLATION

A. Install shutoff valve at each connection to and from vacuum equipment and specialties.

3.3 JOINT CONSTRUCTION

A. Ream ends of pipes and tubes and remove burrs.

B. Remove scale, slag, dirt, and debris from outside of cleaned tubing and fittings before assembly.

C. Remove scale, slag, dirt, and debris from inside and outside of pipe and fittings before assembly.

D. Brazed Joints: Join copper tube and fittings according to CDA's "Copper Tube Handbook," "Brazed Joints" chapter. Do not use flux. Continuously purge joint with oil-free dry nitrogen during brazing.

3.4 HANGER AND SUPPORT INSTALLATION

A. Comply with requirements in Section 22 05 29 "Hangers and Supports for Plumbing Piping and Equipment" for pipe hanger and support devices.

B. Vertical Piping: MSS Type 8 or Type 42, clamps.

C. Individual, Straight, Horizontal Piping Runs: MSS Type 1, adjustable, steel, clevis hangers.

D. Support horizontal piping within 12 inches of each fitting and coupling.

E. Rod diameter may be reduced one size for double-rod hangers, with 3/8-inch- minimum rods.

F. Install hangers for copper tubing with the following maximum horizontal spacing and minimum rod diameters:

1. NPS 3/8 and NPS 1/2: 72 inches with 3/8-inch rod.
2. NPS 3/4: 84 inches with 3/8-inch rod.

G. Install supports for vertical copper tubing every 10 feet.

3.5 FIELD QUALITY CONTROL FOR LABORATORY FACILITY NONMEDICAL VACUUM PIPING

A. Tests and Inspections:

1. Piping Leak Tests for Vacuum Piping: Test new and modified parts of existing piping. Cap and fill vacuum piping with oil-free, dry nitrogen. Isolate test source and let stand for four hours to equalize temperature. Refill system, if required, to test pressure; hold for two hours with no drop in pressure. Test Pressure for Copper Tubing: 100 psig.
2. Repair leaks and retest until no leaks exist.
3. Inspect filters for proper operation.

B. Remove and replace components that do not pass tests and inspections and retest as specified above.

3.6 PROTECTION

A. Protect tubing from damage.

B. Retain sealing plugs in tubing, fittings, and specialties until installation.

C. Clean tubing not properly sealed, and where sealing is damaged, according to "Preparation" Article.

END OF SECTION 22 62 13

SECTION 22 63 13 - GAS PIPING FOR LABORATORY AND HEALTHCARE FACILITIES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section Includes:

1. Helium piping
2. Hydrogen piping
3. Compressed air piping
4. Acetylene piping.

B. Owner-Furnished Material:

1. Gas cylinders
2. Gas

C. Related Requirements:

1. Division 11 "Laboratory Fume Hoods" for gas outlets in laboratory fume hoods.
2. Division 12 "Laboratory Casework" for gas outlets in casework.

1.3 ACTION SUBMITTALS

A. Product Data: For each type of product.

B. Shop Drawings: Include diagrams for power, signal, and control wiring.

1.4 QUALITY ASSURANCE

A. Brazing: Qualify processes and operators according to ASME Boiler and Pressure Vessel Code, Section IX, "Welding and Brazing Qualifications"; or AWS B2.2, "Standard for Brazing Procedure and Performance Qualification."

B. CGA G4.1 “Cleaning Equipment for Oxygen Service”

C. NFPA 51: “Standard for the Design and Installation of Oxygen-Fuel Gas Systems for Welding, Cutting, and Allied Processes”

PART 2 - PRODUCTS

2.1 PIPING: COMPRESSED AIR

A. Comply with NFPA 99.

B. Material shall be domestic hard drawn virgin Copper. Purity to be 99.90 with .02% Phosphorus; ASTM B88. All surfaces (O.D. & I.D.) of all tube and fittings shall be mechanically/chemically polished to remove tarnish, stains and discoloration. After chemical polishing, all components are to be rinsed in D/I water for final cleaning to remove any trace of hydrocarbon residue and particulate contamination. All surfaces are to retain a uniform matte finish that resists re-tarnishing. Tubing shall be purged with filtered (.2 micron absolute) nitrogen from a cryogenic source.

C. Tubing shall be O.D. capped while under filtered nitrogen purge. Tube end caps of hard urethane are to be color coded RED. Tubes are to be packaged in clean 6 mil polyethylene sleeve; ends folded and heat sealed. Fittings and other components are to be heat sealed in 6 mil polyethylene bags.

D. A product certification is available with each shipment to identify compliance with NFPA 99, CGA-G4.1, specifications and ASTM B-280 and ASTM B-819 specifications.

E. Wrought-Copper Fittings: ASME B16.22, solder-joint pressure type that has been manufacturer cleaned, purged, and bagged for oxygen service according to CGA G-4.1.

F. Copper Unions: ASME B16.22 or MSS SP-123, wrought-copper or cast-copper alloy.

G. Valves: Manufacturer cleaned, purged, and bagged according to CGA G-4.1 for oxygen service.

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

    a. Allied Healthcare Products Inc.; Chemetron Division.
    b. Amico Corporation.
    c. BeaconMedaes.
    d. Conbraco Industries, Inc.
    e. NIBCO INC.
    f. Ohio Medical Corporation.
    g. Tri-Tech Medical Inc.

2. Standard: MSS SP-110.
3. Description: Three-piece body, brass or bronze.
4. Pressure Rating: 300 psig minimum.
5. Ball: Full-port, chrome-plated brass.
6. Seats: PTFE or TFE.
7. Handle: Lever.
8. Stem: Blowout proof with PTFE or TFE seal.
9. Ends: Manufacturer-installed ASTM B 819, copper-tube extensions.

H. Check Valves:

1. Description: In-line pattern, bronze.
2. Pressure Rating: 300 psig minimum.
3. Operation: Spring loaded.
4. Ends: Manufacturer-installed ASTM B 819, copper-tube extensions.

2.2 PIPING: HYDROGEN, HELIUM, & ACETYLENE

A. Stainless Steel Instrumentation Tubing,

1. Type 316L: chemically cleaned and passivated, ASTM G-93, Level A requirement for non-volatile residue levels and shall meet the requirements of CGA G4.1.
2. Tubing ends shall be protected with polyamide nylon film and polyethylene caps.
3. Tubing shall be packed in single polyethylene, heat-sealed bags.
4. A product certification is available with each shipment to identify compliance with CGA-G4.1.

B. Tube Fittings - Swagelok

1. The tube fitting will be a controlled-phased, sequential-gripping device consisting of four machined components – the body, front ferrule, back ferrule, and nut – that are produced by a single manufacturer and engineered to work in a wide range of system conditions.
2. The back ferrule will have a uniform surface hardening. This surface hardening will be a low-temperature carburization, avoiding carbide formation. It will follow a disclosed and auditable process procedure.
3. There will be no machined ferrule stops. Assembly of parts will provide for ferrule movement during tightening. The tube fitting components will be engineered to provide appropriate controlled phased sequential ferrule movement during tightening. Upon proper installation, the tube fitting will be capable of disassembly and reassembly, producing a leak-tight seal.
4. The back ferrule of stainless steel fittings will hold the tube with a hinging colleting action. This radial hinging colleting action of the back ferrule will grip the tube adjacent to and outboard from the swaging point to enhance the vibration endurance.
5. The hinging colleting action will cause the mid portion of the back ferrule to press onto the tube while keeping the back end of the back ferrule away from the tube surface. The back ferrule will not bow during assembly.
6. The sealing and gripping actions of the fitting will provide a compensating action between ferrules that will accommodate the allowed ranges of tube wall thickness, diameter, and material hardness. For example: on thin wall tubing, the back ferrule will grip the wall of the tube with less indentation than is necessary on heavy wall tube. The front ferrule will move farther down the body ramp to burnish or polish a seal on the tube more than is needed on heavy wall tube.
7. The stainless steel material, from which tube fitting bodies and components are made, will be restricted to a minimum chromium content of 17.0 % and a minimum nickel content of 12.0 % for improved corrosion resistance, and to a maximum carbon content of 0.05 %, which provides better corrosion-resistant weldability.
8. The tube fitting nut will be internally plated with a high-purity silver to eliminate galling during assembly.
9. The tube seat counter-bore in the body will be faced flat 90° to the axis of the tubing.

10. Performance

    a. The tube fitting will produce a leak-tight seal in pressure or vacuum service.
    b. The tube fitting manufacturer will specify the allowed ranges of tube wall thickness, diameter, and material hardness.
    c. The tube fitting will function on standard ASTM stainless steel tubing, fully annealed according to ASTM A269 or A213 (standard 90 HRB max hardness per ASTM).

11. Installation

    a. The manufacturer will provide clear instructions for proper tube fitting installation.
    b. The tube fitting will not require special tools beyond the use of hand wrenches for tube fitting installation.

c. The tube fitting will not apply torque to or twist the tubing during original or subsequent assembly of the connection. The fitting should use geometry or defined axial movement of the nut for assembly.
d. The tube fitting will not require fitting disassembly for inspection after assembly.
e. The tube fitting will have independent approval, which is accomplished by third party witnessed performance testing by an outside agency acceptable to the customer, such as ASTM F-1387, TÜV Automotive ECE Nr. 110, Det Norske Veritas, METI/KHK, Lloyd's Register, and The American Bureau of Shipping.

12. Quality Assurance

a. All tube fitting components will be stamped to identify manufacturer and material.
b. All tube fittings will have a gaugeable shoulder to check for sufficient pull-up on initial installation. The gaugeable shoulder will allow a gap inspection gauge to be inserted between the hex of the nut and hex of the body shoulder. Consistently, the gap inspection gauge will not fit between the nut and shoulder hexes of a sufficiently tightened fitting on the initial installation.
c. The tube fitting manufacturer will be certified to produce fittings under an N Stamp Program accredited by ASME.
d. The tube fitting manufacturer will have a Statistical Quality Control program, which will have an AQL level of 1.5. Note: Additional information may be referenced in Zero Acceptance Number Sampling Plans, 4th Edition, written by N.L. Squiglia, published by ASQ Press.
e. The tube fitting manufacturer will be committed to Statistical Control of Processes for manufacture of all critical dimensions.
f. The tube fittings will be procured from the tube fitting manufacturer's distribution network supported and trained by the manufacturer.

13. Standards

a. Under no circumstances will a tube fitting of another manufacturer be substituted without the written approval of our Engineering Department.
b. No component of any other tube fitting manufacturer will be interchanged or intermixed with the four components (body, nut, front ferrule, and back ferrule) of the tube fitting.

C. Pipe Supports: Swagelok channel mounted tube supports with clamps, electro-dichromate finished carbon steel and thermoplastic cushion; run ¼" piping exposed along wall behind bench. Maximum spacing between supports: 5 feet.

D. Valves: SS Quarter-Turn Instrument Plug Valve, Swagelok.

2.3 REGULATOR ASSEMBLY

A. Mathesontrigas GasTrak Delivery/Control System.

1. Ideal for High (UHP 99.999%+) or Low Purity Gas Delivery
2. Control features include: Pressure Regulation, Purification and Flow Control.
3. Provides individual gas control/delivery stations for "point-of-use" delivery to analytical instruments.
4. Gas specific labeling for each individual control/delivery station.
5. 1/4" Compression Fitting Standard inlet & outlet connections.
6. Design allows convenient access to all components.
7. Pre-assembled system design prior to shipment.
8. Wall mounted U-Channel frames make it easy to install.

B. Provide regulator, purifier, and pressure range compatible with gas type.

2.4 NITROGEN

A. Comply with USP 32 - NF 27 for oil-free dry nitrogen.

PART 3 - EXECUTION

3.1 PREPARATION

A. Cleaning of Gas Tubing: If manufacturer-cleaned and -capped fittings or tubing is not available or if precleaned fittings or tubing must be recleaned because of exposure, have supplier or separate agency acceptable to authorities having jurisdiction perform the following procedures:

1. Clean gas tube and fittings, valves, gages, and other components of oil, grease, and other readily oxidizable materials as required for oxygen service according to CGA G-4.1.
2. Wash gas tubing and components in hot, alkaline-cleaner-water solution of sodium carbonate or trisodium phosphate in proportion of 1 lb of chemical to 3 gal. of water.

    a. Scrub to ensure complete cleaning.
    b. Rinse with clean, hot water to remove cleaning solution.

3.2 PIPING INSTALLATION

A. Drawing plans, schematics, and diagrams indicate general location and arrangement of gas piping. Indicated locations and arrangements were used to size pipe and calculate friction loss, expansion, and other design considerations. Install piping as indicated unless deviations to layout are approved on coordination drawings.

B. Comply with NFPA 99 for installation of gas piping.

C. Install piping concealed from view and protected from physical contact by building occupants unless otherwise indicated and except in equipment rooms and service areas.

D. Install piping indicated to be exposed and piping in equipment rooms and service areas at right angles or parallel to building walls.

E. Install piping to permit valve servicing.

F. Install piping free of sags and bends.

3.3 VALVE INSTALLATION

A. Install shutoff valve at each connection to gas laboratory equipment and specialties.

B. Install pressure regulators on gas piping where reduced pressure is required.

3.4 JOINT CONSTRUCTION

A. Provide per fitting manufacturers requirements.

3.5 GAS SERVICE COMPONENT INSTALLATION

A. Install gas cylinders and connect to piping.

3.6 HANGER AND SUPPORT INSTALLATION

A. Provide tubing supports per tubing manufactures requirements.

3.7 FIELD QUALITY CONTROL FOR LABORATORY FACILITY SPECIALTY GAS

A. Tests and Inspections:

1. Piping Leak Tests for Specialty Gas Piping: Test new and modified parts of existing piping. Cap and fill specialty gas piping with oil-free, dry nitrogen to pressure of 50 psig above system operating pressure, but not less than 150 psig. Isolate test source and let stand for four hours to equalize temperature. Refill system, if required, to test pressure; hold for two hours with no drop in pressure.
2. Repair leaks and retest until no leaks exist.
3. Inspect specialty gas regulators for proper operation.

B. Remove and replace components that do not pass tests and inspections and retest as specified above.

C. Prepare test and inspection reports.

3.8 PROTECTION

A. Protect tubing from damage.

B. Retain sealing plugs in tubing, fittings, and specialties until installation.

C. Clean tubing not properly sealed, and where sealing is damaged, according to "Preparation" Article.

END OF SECTION 22 63 13

SECTION 23 05 00 – COMMON WORK RESULTS FOR MECHANICAL

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.

B. This section applies to all other mechanical and plumbing sections.

1.2 GENERAL

A. This Section includes mechanical items common to all of this division specification sections.

B. Provide services, skilled and common labor, and all apparatus and materials required for the complete installation as shown and within the intent of the contract documents, field conditions, and code requirements.

C. The intention of these Contract Documents is to call for finished work, fully tested and ready for operation. Any components or labor not mentioned in the Contract Documents but required for functioning systems shall be provided. Should there appear to be any discrepancies or questions of intent, the Contractor shall refer the matter to the Architect/Engineer for decision before start of any related work.

D. The drawings show the general arrangement of systems and equipment but do not show all required fittings and offsets that may be necessary to connect pipes and ductwork to equipment, and to coordinate with other trades. Provide all necessary fittings, offsets and runs based on field measurements and at no additional cost. Coordinate with other trades for space available and relative location of equipment and accessories. Pipe and duct location on the drawings shall be altered by contractor where necessary to avoid interferences and clearance difficulties.

E. This contractor will be responsible to carry out the commissioning requirements specified. Refer to Division 1 for additional requirements.

1.3 DEFINITIONS

A. “Furnish": Supply and deliver to Project site, ready for unloading, unpacking, assembly, installation, and similar operations.

B. "Install": Operations at Project site including unloading, temporarily storing, unpacking, assembling, erecting, placing, anchoring, applying, working to dimension, finishing, curing, protecting, cleaning, and similar operations. Installation shall be complete and tested ready for intended use, in accordance with code and manufacturers recommendations.

C. "Provide": Furnish and install.

D. “Shall”: The word shall is used to indicate mandatory requirements strictly to be followed in order to conform to the standard and procedures and from which no deviation is permitted.

E. Finished Spaces: Spaces other than mechanical and electrical equipment rooms, furred spaces, pipe and duct shafts, unheated spaces immediately below roof, spaces above ceilings, unexcavated spaces, crawlspaces, and attics.

F. Exposed, Interior Installations: Exposed to view indoors. Examples include finished occupied spaces and mechanical equipment rooms.

G. Concealed, Interior Installations: Concealed from view and protected from physical contact by building occupants. Examples include above ceilings and in duct shafts.

H. Terminal: A point where the controlled medium, such as fluid or energy, enters or leaves the distribution system.

1.4 SUBMITTALS

A. Provide in accordance with Division 1 of the specifications.

1.5 SUBSTITUTIONS

A. Provide in accordance with Division 1 of the specifications.

1.6 QUALITY ASSURANCE

A. All work, materials, and equipment shall comply with the rules and regulations of all codes and ordinances of the local, state, and federal authorities. Such codes, when more restrictive, shall take precedence over these plans and specifications.

B. Multiple Units: When two or more units of materials or equipment of the same type or class are required, these units shall be products of one manufacturer.

C. Steel Support Welding: Qualify processes and operators according to AWS D1.1, "Structural Welding Code--Steel."

D. Electrical Characteristics for Equipment: Equipment of higher electrical characteristics may be furnished provided such proposed equipment is approved in writing and connecting electrical services, circuit breakers, and conduit sizes are appropriately modified. If minimum energy ratings or efficiencies are specified, equipment shall comply with requirements.

E. The Contractor shall hold a license to perform the work as issued by the local jurisdiction.

F. Plumbing work shall be performed by, or under, the direct supervision of a licensed master plumber.

G. Electrical work shall be performed by, or under, the direct supervision of a licensed electrician.

1.7 DELIVERY, STORAGE, AND HANDLING OF PIPING

A. Pipe and tube required by the applicable standard to be cleaned and capped shall be delivered to the job site with factory-applied end-caps. Maintain end-caps through shipping, storage, and handling to prevent pipe-end damage and prevent entrance of dirt, debris, and moisture.

B. Protect stored pipe and tube from moisture and dirt. Elevate above grade. When stored inside, do not exceed the structural capacity of the floor.

C. Protect fittings, flanges, and piping specialties from moisture and dirt.

D. Store plastic pipes protected from direct sunlight. Support to prevent sagging and bending.

1.8 COORDINATION

A. Coordinate use of project space and sequence of installation of mechanical and electrical work, which is indicated diagrammatically on drawings. Follow routings shown for pipes, ducts, and conduits as closely as practicable, with due allowance for available physical space; make runs parallel with lines of building. Utilize space efficiently to maximize accessibility for other installations, for maintenance, and for repairs.

B. Coordinate use of project space and sequence of installation of work.

C. Arrange for pipe spaces, chases, slots, and openings in building structure during progress of construction, to allow for installations. Coordinate installation of required supporting devices and set sleeves in poured-in-place concrete and other structural components as they are constructed.

D. Access panels shall be provided for concealed valves and controls, or any item requiring inspection or maintenance. Access panels shall be of sufficient size and located so that the concealed items may be serviced, maintained, or replaced.

E. Coordinate requirements for access panels and doors for items requiring access that are concealed behind finished surfaces. Access panels and doors are specified in Division 8.

PART 2 - PRODUCT

2.1 PRODUCT CRITERIA

A. Standard Products: Material and equipment shall be the standard products of a manufacturer regularly engaged in the manufacture of the products for at least 3 years. See other specification sections for any exceptions.

B. Equipment Service: Products shall be supported by a service organization that maintains a complete inventory of repair parts and is located reasonably close to the site.

C. Multiple Units: When two or more units of materials or equipment of the same type or class are required, these units shall be products of one manufacturer.

D. Assembled Units: Manufacturers of equipment assemblies, which use components made by others, assume complete responsibility for the final assembled product.

E. Nameplates: Nameplate bearing manufacturer's name or identifiable trademark shall be securely affixed in a conspicuous place on equipment, or name or trademark cast integrally with equipment, stamped or otherwise permanently marked on each item of equipment.

F. Asbestos products or equipment or materials containing asbestos shall not be used.

2.2 PIPE JOINING MATERIALS

A. Refer to individual Division 22 and 23 piping Sections for pipe, tube, and fitting materials and joining methods. Refer to individual piping Sections for special joining materials not listed below.

B. Pipe Threads: ASME B1.20.1 for factory-threaded pipe and pipe fittings.

C. Pipe-Flange Gasket Materials: Suitable for chemical and thermal conditions of piping system contents.

1. ASME B16.21, nonmetallic, flat, asbestos-free, 1/8-inch maximum thickness unless thickness or specific material is indicated. Full-Face Type: For flat-face, Class 125, cast-iron and cast-bronze flanges. Narrow-Face Type: For raised-face, Class 250, cast-iron and steel flanges.
2. AWWA C110, rubber, flat face, 1/8 inch thick, unless otherwise indicated; and full-face or ring type, unless otherwise indicated.

D. Plastic, Pipe-Flange Gasket, Bolts, and Nuts: Type and material recommended by piping system manufacturer, unless otherwise indicated.

E. Solder Filler Metals: ASTM B 32, lead-free alloys. Include water-flushable flux according to ASTM B 813.

F. Brazing Filler Metals: AWS A5.8, BCuP Series, copper-phosphorus alloys for general-duty brazing, unless otherwise indicated; and AWS A5.8, BAg1, silver alloy for refrigerant piping, unless otherwise indicated.

G. Welding Filler Metals: Comply with AWS D10.12 for welding materials appropriate for wall thickness and chemical analysis of steel pipe being welded.

H. Solvent Cements for Joining Plastic Piping: CPVC Piping: ASTM F 493. PVC Piping: ASTM D 2564. Include primer according to ASTM F 656.

2.3 TRANSITION FITTINGS

A. Aboveground Pressure Piping: Pipe fitting.

B. Plastic-to-Metal Transition Fittings: one-piece fitting with manufacturer's Schedule 80 equivalent dimensions; one end with threaded brass insert, and one solvent-cement-joint end.

C. Flexible Transition Couplings for Underground Non-pressure Drainage Piping: ASTM C 1173 with elastomeric sleeve; ends same size as piping to be joined, and corrosion-resistant metal band on each end.

2.4 DIELECTRIC FITTINGS

A. Provide where copper tubing and ferrous metal pipe are joined.

B. Fittings shall match piping specifications. Threaded dielectric union, ANSI B16.39. Watts Series 3000 or approved equal. Flange union with dielectric gasket and bolt sleeves, ANSI B16.42.

C. Dielectric Nipples: Electroplated steel or ductile-iron nipple with inert and noncorrosive, thermoplastic lining; plain, threaded, or grooved ends; and 300-psig maximum working pressure at 230 deg F. Victaulic Style 47.

2.5 ESCUTCHEONS

A. Escutcheons shall be manufactured from nonferrous metals and shall be chrome-plated. Metals and finish shall conform to ASME A112.19.2. Escutcheons shall be one-piece type where mounted on chrome-plated pipe or tubing, and one-piece of split-pattern type elsewhere. ID shall closely fit around pipe, tube, and insulation of insulated piping and an OD that completely cover the opening.

B. All escutcheons shall have setscrews for maintaining a fixed position against a surface.

2.6 GROUT

A. Description: ASTM C 1107, Grade B, non-shrink and nonmetallic, dry hydraulic-cement grout. Characteristics: Post-hardening, volume adjusting, non-staining, non-corrosive, nongaseous, and recommended for interior and exterior applications. Design Mix: 5000-psi, 28-day compressive strength. Packaging: Premixed and factory packaged.

2.7 VIBRATION ISOLATION

A. All equipment shall be isolated to prevent vibration transmission to the building structure.

PART 3 - EXECUTION

3.1 DEMOLITION AND REMOVALS

A. Refer to Division 1 for general demolition requirements and procedures.

3.2 COMMON REQUIREMENTS

A. Install piping, ductwork, and equipment to allow maximum possible headroom unless specific mounting heights are indicated. Install equipment level and plumb, parallel and perpendicular to other building systems and components in exposed interior spaces, unless otherwise indicated.

B. Install equipment to facilitate service, maintenance, and repair or replacement of components. Connect equipment for ease of disconnecting, with minimum interference to other installations. Extend grease fittings to accessible locations.

C. Coordinate location of piping, sleeves, inserts, hangers, ductwork and equipment. Locate piping, sleeves, inserts, hangers, ductwork and equipment clear of windows, doors, openings, light outlets, and other services and utilities. Follow manufacturer's published recommendations for installation methods not otherwise specified.

D. Any structural member weakened or impaired by cutting, notching, or otherwise shall be reinforced, repaired, or replaced so as to be left in safe structural condition in accordance with the local building code requirements.

E. Install piping and ductwork in concealed locations, unless otherwise indicated and except in equipment rooms and service areas.

F. Install piping indicated to be exposed and piping in equipment rooms and service areas at right angles or parallel to building walls. Diagonal runs are prohibited unless specifically indicated otherwise.

G. Install systems above accessible ceilings to allow sufficient space for ceiling panel removal.

H. Install piping to permit valve servicing.

I. Install equipment and other components to allow right of way for piping installed at required slope.

J. Install free of sags and bends.

K. Provide unions or flanges at connections to equipment.

L. Install fittings for changes in direction and branch connections.

M. Make allowances for application of insulation.

N. Select system components with pressure rating equal to or greater than system operating pressure.

O. Verify final equipment locations for roughing-in.

P. Protection and Cleaning: Equipment and materials shall be carefully handled, properly stored, and adequately protected to prevent damage before and during installation, in accordance with the manufacturer's recommendations. Damaged or defective items shall be replaced. Protect all finished parts of equipment. Close duct and pipe openings with caps or plugs during installation. Tightly cover and protect fixtures and equipment against dirt, water, chemical, or mechanical injury. At completion of all work thoroughly clean fixtures, exposed materials and equipment.

3.3 PIPING JOINT CONSTRUCTION

A. Join pipe and fittings according to the following requirements and the relevant specification section specifying piping systems.

B. Ream ends of pipes and tubes and remove burrs. Bevel or groove plain ends of steel pipe.

C. Remove scale, slag, dirt, and debris from inside and outside of pipe and fittings before assembly.

D. Soldered Joints: Apply ASTM B 813, water-flushable flux, unless otherwise indicated, to tube end. Construct joints according to ASTM B 828 or CDA's "Copper Tube Handbook," using lead-free solder alloy complying with ASTM B 32.

E. Brazed Joints: Construct joints according to AWS's "Brazing Handbook," "Pipe and Tube" Chapter, using copper-phosphorus brazing filler metal complying with AWS A5.8. Only brazing alloys having a liquid temperature above 1000°F shall be used.

F. Welded Joints: Construct joints according to AWS D10.12, using qualified processes and welding operators according to Part 1 "Quality Assurance" Article.

G. Plastic Piping Solvent-Cement Joints: Clean and dry joining surfaces. Join pipe and fittings according to the following:

1. Comply with ASTM F 402 for safe-handling practice of cleaners, primers, and solvent cements.
2. CPVC Piping: Join according to ASTM D 2846/D 2846M Appendix.
3. PVC Pressure Piping: Join schedule number ASTM D 1785, PVC pipe and PVC socket fittings according to ASTM D 2672. Join other-than-schedule-number PVC pipe and socket fittings according to ASTM D 2855.
4. PVC Non-pressure Piping: Join according to ASTM D 2855.

H. Plastic Pressure Piping Gasketed Joints: Join according to ASTM D 3139.

I. Plastic Non-pressure Piping Gasketed Joints: Join according to ASTM D 3212.

3.4 PIPING CONNECTIONS

A. Make connections according to the following, unless otherwise indicated: Install unions, in piping NPS 2 and smaller, adjacent to each valve and at final connection to each piece of equipment. Install flanges or Victaulic couplings, in piping NPS 2-1/2 and larger, adjacent to flanged or grooved-ended valves and at final connection to each piece of equipment. Provide dielectric fittings at connection between copper and ferrous metal.

B. Swing Connections for Expansion: Connect risers and branch connections to mains with at least five pipe fittings, including tee in main. Connect mains and branch connections to terminal units with at least four pipe fittings, including tee in main.

3.5 ERECTION OF WOOD SUPPORTS AND ANCHORAGES

A. Cut, fit, and place wood grounds, nailers, blocking, and anchorages to support, and anchor materials and equipment.

B. Select fastener sizes that will not penetrate members if opposite side will be exposed to view or will receive finish materials. Tighten connections between members. Install fasteners without splitting wood members.

C. Attach to substrates as required to support applied loads.

3.6 GROUTING

A. Mix and install grout for equipment base bearing surfaces, pump and other equipment base plates, and anchors. Clean surfaces that will come into contact with grout. Provide forms as required for placement of grout. Avoid air entrapment during placement of grout. Place grout, completely filling equipment bases. Place grout on concrete bases and provide smooth bearing surface for equipment. Place grout around anchors. Cure placed grout.

3.7 ERECTION OF METAL SUPPORTS AND ANCHORAGES

A. Cut, fit, and place miscellaneous metal supports accurately in location, alignment, and elevation to support and anchor materials and equipment. Field Welding: Comply with AWS D1.1.

3.8 PIPE PENETRATIONS

A. Provide sealants for all pipe penetrations. All pipe penetrations shall be sealed.

B. Refer to Section 23 07 00 “Mechanical Insulation”.

C. Sleeve Clearance: Sleeve through floors, walls, partitions, and beam flanges shall be one inch greater in diameter than external diameter of pipe. Sleeve for pipe with insulation shall be large enough to accommodate the insulation.

D. Escutcheons: Provide for penetrations in finished spaces where pipes are exposed.

E. Plastic and copper piping penetrating framing members, and within one-inch of the framing, shall be protected with 10-gauge steel nailing plates. The steel plate shall extend along the framing member a minimum of 1.5” beyond the OD of the pipe or tubing.

3.9 FIRESTOPPING

A. Provide through-penetration firestop systems to comply with firestop system manufacturer's written installation instructions and published drawings for products and applications indicated. Provide in accordance with Section 07 84 13.

END OF SECTION 23 05 00

SECTION 23 05 29 - HANGERS AND SUPPORTS FOR PIPING AND EQUIPMENT

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.

B. Related Sections include the following:

1. Division 23 Section "Common Work Results for Mechanical"
2. Division 23 Section “Mechanical Insulation”
3. Division 23 Section “Ductwork”

1.2 SUMMARY

A. This Section includes hangers and supports for piping and equipment.

1.3 SUBMITTALS

A. Submit product data on all hanger and support devices, including shields and attachment methods. Product data to include, but not limited to materials, finishes, approvals, load ratings, and dimensional information.

1.4 QUALITY ASSURANCE

A. Install in accordance with MSS SP69 - Manufacturers Standardization Society: Pipe Hangers and Supports- Selection and Application

B. Steel pipe hangers and supports shall have the manufacturer’s name, part number, and applicable size stamped in the part itself for identification.

C. Pipe Hangers, Supports, and Components: The materials of all pipe hanging and supporting elements shall be in accordance with MSS SP-58.

D. Welding: Qualify processes and operators according to ASME Boiler and Pressure Vessel Code: Section IX, "Welding and Brazing Qualifications."

PART 2 - PRODUCTS

2.1 MANUFACTURERS

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

1. Pipe Hangers and Supports:

a. B-Line Systems, Inc.
b. Carpenter & Patterson, Inc.
c. Grinnell Corp.
d. Hubbard Enterprises/Holdrite®
e. National Pipe Hanger Corp.
f. Piping Technology & Products, Inc.
g. Unistrut
h. Anvil International, Inc.
i. Empire

2.2 HANGERS

A. Hanger "Types" listed below are from Table 1 of MSS SP-69.

B. The material in contact with the pipe shall be compatible with the piping material so that neither will have a deteriorating action on the other. Provide means of preventing dissimilar metal contact such as plastic coated hangers, copper colored epoxy paint, or non-adhesive isolation tape- B-Line Iso-pipe. Galvanized felt isolators sized for copper tubing may also be used, B-Line B3195CT.

C. Uninsulated pipes 2 inch and smaller:

1. Type 10: Adjustable steel swivel ring (band type) hanger, B-Line B3170.
2. Type 10, copper tubing; Adjustable steel swivel ring (band type) hanger, B-Line B3170CT.
3. Type 12: Malleable iron ring hanger, B-Line B3198R or hinged ring hanger, B3198H.
4. Type 1: Adjustable steel clevis hanger, B-Line B3100.
5. Type 1: Adjustable steel clevis hanger, copper piping, B-Line B3104CT.

D. Uninsulated pipes 2-1/2 inch and larger: Type 1: Adjustable steel clevis hanger, B-Line B3100.

E. Insulated pipe- carrying fluid temperature of 60°F or warmer: Use adjustable steel clevis with galvanized sheet metal shield. Type 1 with Type 40 (B-Line B3151) series insulation protection shield. Anvil International Figure 260 insulation saddle system may be utilized (200°F maximum temperature).

F. Insulated pipe- Coldwater piping: Use adjustable steel clevis with galvanized sheet metal shield. Type 1 with Type 40 (B-Line B3151 series) insulation protection shield. Anvil International Figure 260 insulation saddle system may be utilized (200°F maximum temperature).

G. Shields shall be 180 degree galvanized sheet metal, 18 gauge minimum thickness, designed to match outside diameter of the insulated pipe, B-Line B3151. Refer to Section 23 07 00 "Mechanical Insulation" for shield and insert lengths.

H. Pipe Clamps

1. Type 4: When flexibility in the hanger assembly is required due to horizontal movement, use pipe clamps with weld-less eye nuts, B-Line B3140.
2. Type 3: For insulated lines use double bolted pipe clamps, B-Line B3144.
3. For copper piping, Type 12: Malleable iron ring hanger, B-Line B3198RCT or hinged ring hanger B3198HCT.

I. Vertical Supports

1. Type 8: Steel riser clamp sized to fit outside diameter of pipe, B-Line B3373.
2. Type 8: For supporting vertical runs of copper tubing, use epoxy painted or plastic coated riser clamps, B-Line B3373CT or B3373CTC.

2.3 UPPER ATTACHMENTS

A. Beam Clamps

1. Beam clamps shall be used where piping is to be suspended from building steel. Clamp type shall be selected on the basis of load to be supported, and load configuration.
2. Type 23 C-Clamps shall have locknuts and cup point set screws, B-Line B351L, or B3036L.
3. Type 19 Top flange c-clamps shall be used when attaching a hanger rod to the top flange of structural shapes, B-Line B3034 or B3033.
4. Refer to manufacturer's recommendation for setscrew torque.
5. Retaining straps shall be used to maintain the clamps position on the beam where required.

2.4 ACCESSORIES

A. Hanger Rods shall be threaded both-ends, or continuous threaded rods of circular cross section. Use adjusting locknuts at upper attachments and hangers. No wire, chain, or perforated straps are allowed.

B. Pipe protection saddles shall be formed from carbon steel, 1/8 inch minimum thickness, sized for insulation thickness. Saddles for pipe sizes greater than 12 inch shall have a center support rib.

C. Structural Steel: ASTM A 36/A 36M, steel plates, shapes, and bars, black and galvanized.

D. Design and fabricate supports using structural quality steel bolted framing materials as manufactured by Cooper B-Line. Channels shall be roll formed, 12 gauge ASTM A1011 SS Grade 33 steel, 1-5/8 inch by 1-5/8 inch or greater as required by loading conditions. Submit designs for pipe tunnels, pipe galleries, etc., to engineer for approval. Use clamps and fittings designed for use with the strut system.

2.5 FINISHES

A. Indoor Finishes

1. Hangers and clamps for support of bare copper piping shall be coated with copper colored epoxy paint, B-Line Dura-Copper®. Additional PVC coating of the epoxy painted hanger shall be used where necessary.
2. Hangers for other than bare copper pipe shall be zinc plated in accordance with ASTM B633 OR shall have an electro-deposited green epoxy finish, B-Line Dura-Green®.
3. Strut channels shall be pre-galvanized in accordance with ASTM A653 SS Grade 33 G90 OR have an electro-deposited green epoxy finish, B-Line Dura-Green®.

PART 3 - EXECUTION

3.1 HANGER AND SUPPORT APPLICATIONS

A. Specific hanger requirements are specified in Sections specifying equipment and systems. Hangers shall be as recommended by manufacturer of piping.

B. Comply with MSS SP-69 for pipe hanger selections and applications that are not specified in piping system Specification Sections.

C. Use nonmetallic coatings on attachments for electrolytic protection where attachments are in direct contact with copper tubing.

D. Support of pipe, tubing and equipment shall be accomplished by means of engineered products, specific to each application. Makeshift, field devised methods shall not be allowed.

3.2 HANGER SPACING

A. Support piping and tubing not listed below according to MSS SP-69 and manufacturer's written instructions.

B. Install hangers for drawn-temper copper piping with the following maximum horizontal spacing and minimum rod sizes:

1. NPS ¾ and smaller: Maximum span, 5 feet; minimum rod size, 3/8 inch.
2. NPS 1: Maximum span, 6 feet; minimum rod size, 3/8 inch.
3. NPS 1-1/4: Maximum span, 7 feet; minimum rod size, 3/8 inch.
4. NPS 1-1/2 to 2: Maximum span, 8 feet; minimum rod size, 3/8 inch.
5. Maximum vertical steel and copper pipe attachment spacing: 10 feet.

C. Piping Hangers for Plastic Piping:

1. Space hangers according to pipe manufacturer's written instructions for service conditions. Avoid point loading. Space and install hangers with the fewest practical rigid anchor points.
2. In systems where large fluctuations in temperature occur, allowances must be made for expansion and contraction of the piping system. Since changes in direction in the system are usually sufficient to allow for expansion and contraction, hangers must be placed so as not to restrict this movement.
3. Hangers shall not compress, distort, cut or abrade the piping. All piping shall be supported at intervals sufficiently close to maintain correct pipe alignment and to prevent sagging or grade reversal. Pipe should also be supported at all branch ends and at all changes of direction.
4. Install hangers for piping with the following maximum horizontal spacing and minimum rod diameters (pipe temperature 100°F or lower).

    a. NPS 1 and smaller: 4 feet with 3/8-inch rod.
    b. NPS 1-1/4 and 1-1/2 and NPS 2: 5 feet with 3/8-inch rod.

5. Install supports for vertical piping every 10 feet.
6. Refer to Section 22 66 00forchemicalwastesupportspacing.
7. Refer to Section 22 67 00 for RO water support spacing.

D. Support vertical piping independently of connected horizontal piping. Support vertical pipes at base and at every floor. Wherever possible, locate riser clamps directly below pipe couplings or shear lugs.

E. Place a hanger within 12 inches of each horizontal elbow.

3.3 HANGER AND SUPPORT INSTALLATION

A. Pipe Hanger and Support Installation: Comply with MSS SP-69 and MSS SP-89. Install hangers, supports, clamps, and attachments as required to properly support piping from building structure.

B. Install building attachments within concrete slabs or attach to structural steel. Space attachments within maximum piping span length indicated in MSS SP-69. Install additional attachments at concentrated loads, including valves, flanges, guides, strainers, and expansion joints, and at changes in direction of piping.

C. Install hangers and supports complete with necessary inserts, bolts, rods, nuts, washers, and other accessories.

D. Install hangers and supports to allow controlled thermal and seismic movement of piping systems, to permit freedom of movement between pipe anchors, and to facilitate action of expansion joints, expansion loops, expansion bends, and similar units.

E. Load Distribution: Install hangers and supports so that piping live and dead loads and stresses from movement will not be transmitted to connected equipment.

F. Pipe Slopes: As per local code. Install hangers and supports to provide indicated pipe slopes and so maximum pipe deflections allowed by ASME B31.9, "Building Services Piping," is not exceeded.

G. Install hangers to provide a minimum of 1/2-inch space between finished covering and adjacent work.

H. Do not support piping from other pipes, ductwork or other equipment that is not building structure.

3.4 ADJUSTING

A. Adjust hangers and supports to distribute loads equally on attachments and to achieve indicated slope of pipe. Ensure that rods are vertical under operating conditions. Equalize loads. Tighten all nuts and screws after adjustment.

B. Follow manufacturer’s recommended written instructions and torque values when tightening C-clamps to flange of beam.

END OF SECTION 23 05 29

SECTION 23 05 48 - SEISMIC CONTROLS FOR HVAC & PLUMBING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. This Section includes seismic controls for HVAC and plumbing.

1.3 DEFINITIONS

A. IBC: International Building Code.

B. ICC-ES: ICC-Evaluation Service.

C. Importance Factor: A factor assigned to each structure according to its occupancy category as prescribed in Section 11 .5 .1 of ASCE/SEI 7-05.

1.4 PERFORMANCE REQUIREMENTS

A. Seismic-Restraint Loading:

1. Occupancy Category as defined in the IBC: III
2. Component Importance Factor: 1.5.
3. Site Class: D

1.5 ACTION SUBMITTALS

A. Product Data: For the following:

1. Illustrate and indicate style, material, strength, fastening provision, and finish for each type and size of seismic-restraint component used.

    a. Tabulate types and sizes of seismic restraints, complete with report numbers and rated strength in tension and shear as evaluated by an evaluation service member of ICC-ES.
    b. Annotate to indicate application of each product submitted and compliance with requirements.

B. Delegated-Design Submittal: For seismic-restraint details indicated to comply with performance requirements and design criteria, including analysis data signed and sealed by the qualified professional engineer responsible for their preparation.

1. Design Calculations: Calculate static and dynamic loading due to equipment weight and operation, seismic forces required to select seismic restraints.

a. Coordinate design calculations with wind load calculations required for equipment mounted outdoors. Comply with requirements in other Sections for equipment mounted outdoors.

2. Seismic- Restraint Details:

a. Design Analysis: To support selection and arrangement of seismic and wind restraints. Include calculations of combined tensile and shear loads.
b. Details: Indicate fabrication and arrangement. Detail attachments of restraints to the restrained items and to the structure. Show attachment locations, methods, and spacings. Identify components, list their strengths, and indicate directions and values of forces transmitted to the structure during seismic events.
c. Preapproval and Evaluation Documentation: By an evaluation service member of ICC-ES, showing maximum ratings of restraint items and the basis for approval (tests or calculations).

1.6 INFORMATIONAL SUBMITTALS

A. Coordination Drawings: Show coordination of seismic bracing for HVAC piping and equipment with other systems and equipment in the vicinity, including other supports and seismic restraints.

B. Qualification Data: For professional engineer and testing agency.

C. Welding certificates.

D. Field quality-control test reports.

1.7 QUALITY ASSURANCE

A. Comply with seismic-restraint requirements in the IBC unless requirements in this Section are more stringent.

B. Welding: Qualify procedures and personnel according to AWS D1.1/D1.1M, "Structural Welding Code - Steel."

C. Seismic-restraint devices shall have horizontal and vertical load testing and analysis and shall bear anchorage preapproval OPA number from OSHPD, preapproval by ICC-ES, or preapproval by another agency acceptable to authorities having jurisdiction, showing maximum seismic-restraint ratings. Ratings based on independent testing are preferred to ratings based on calculations. If preapproved ratings are not available, submittals based on independent testing are preferred. Calculations (including combining shear and tensile loads) to support seismic-restraint designs must be signed and sealed by a qualified professional engineer.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

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

1. Novia Associates
2. Kinetics Noise Control.

3. Mason Industries.
4. Vibration Eliminator Co., Inc.
5. Vibration Mountings & Controls, Inc.

2.2 SEISMIC-RESTRAINT DEVICES

A. General Requirements for Restraint Components: Rated strengths, features, and applications shall be as defined in reports by an evaluation service member of ICC-ES.

1. Structural Safety Factor: Allowable strength in tension, shear, and pullout force of components shall be at least four times the maximum seismic forces to which they will be subjected.

B. Snubbers: Factory fabricated using welded structural-steel shapes and plates, anchor bolts, and replaceable resilient isolation washers and bushings.

1. Anchor bolts for attaching to concrete shall be seismic-rated, drill-in, and stud-wedge or female-wedge type.
2. Resilient Isolation Washers and Bushings: Oil- and water-resistant neoprene.
3. Maximum 1/4-inch air gap, and minimum 1/4-inch- thick resilient cushion.

C. Restraint Cables: ASTM A 603 galvanized or ASTM A 492 stainless-steel (match adjacent duct type) cables with end connections made of steel assemblies with thimbles, brackets, swivel, and bolts designed for restraining cable service; and with a minimum of two clamping bolts for cable engagement.

D. Hanger Rod Stiffener: Steel tube or steel slotted-support-system sleeve with internally bolted connections to hanger rod.

E. Resilient Isolation Washers and Bushings: One-piece, molded, oil- and water-resistant neoprene, with a flat washer face.

F. Mechanical Anchor Bolts: Drilled-in and stud-wedge or female-wedge type in zinc-coated steel for interior applications and stainless steel for exterior applications. Select anchor bolts with strength required for anchor and as tested according to ASTM E 488. Minimum length of eight times diameter.

G. Expansion-type anchor bolts are not permitted for non-isolated equipment in excess of 10 hp

H. Adhesive Anchor Bolts: Drilled-in and capsule anchor system containing polyvinyl or urethane methacrylate-based resin and accelerator, or injected polymer or hybrid mortar adhesive. Provide anchor bolts and hardware with zinc-coated steel for interior applications and stainless steel for exterior applications. Select anchor bolts with strength required for anchor and as tested according to ASTM E 488.

2.3 FACTORY FINISHES

A. Finish: Manufacturer's standard paint applied to factory-assembled and -tested equipment before shipping.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine areas and equipment to receive seismic-control devices for compliance with requirements for installation tolerances and other conditions affecting performance.

B. Examine roughing-in of reinforcement and anchors to verify actual locations before installation.

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

3.2 APPLICATIONS

A. Hanger Rod Stiffeners: Install hanger rod stiffeners where indicated or scheduled on Drawings to receive them and where required to prevent buckling of hanger rods due to seismic forces.

B. Strength of Support and Seismic-Restraint Assemblies: Where not indicated, select sizes of components so strength will be adequate to carry present and future static and seismic loads within specified loading limits.

3.3 SEISMIC-RESTRAINT DEVICE INSTALLATION

A. Piping:

1. Seismically restrain all piping listed below.

    a. Natural gas piping equal to or greater than 1 inch in inside diameter.
    b. Trapeze/unistrut racks of multiple pipes.
    c. Brace remainder of piping to code requirements (IBC) or in conformance with SMACNA “Seismic Restraint Manual Guidelines for Mechanical Systems”, Second Edition.

2. Comply with requirements in MSS SP-127.
3. Space lateral supports a maximum of 40 feet o.c., and longitudinal supports a maximum of 80 feet o.c.
4. Brace a change of direction longer than 12 feet.

B. Install cables so they do not bend across edges of adjacent equipment or building structure.

C. Install seismic-restraint devices using methods approved by an evaluation service member of ICC-ES providing required submittals for component.

D. Attachment to Structure: If specific attachment is not indicated, anchor bracing to structure at flanges of beams, at upper truss chords of bar joists, or at concrete members.

E. Drilled-in Anchors:

1. Identify position of reinforcing steel and other embedded items prior to drilling holes for anchors. Do not damage existing reinforcing or embedded items during coring or drilling. Notify the structural engineer if reinforcing steel or other embedded items are encountered during drilling. Locate and avoid prestressed tendons, electrical and telecommunications conduit, and gas lines.
2. Do not drill holes in concrete or masonry until concrete, mortar, or grout has achieved full design strength.

3. Wedge Anchors: Protect threads from damage during anchor installation. Heavy-duty sleeve anchors shall be installed with sleeve fully engaged in the structural element to which anchor is to be fastened.
4. Adhesive Anchors: Clean holes to remove loose material and drilling dust prior to installation of adhesive. Place adhesive in holes proceeding from the bottom of the hole and progressing toward the surface in such a manner as to avoid introduction of air pockets in the adhesive.
5. Set anchors to manufacturer's recommended torque, using a torque wrench.
6. Install zinc-coated steel anchors for interior and stainless-steel anchors for exterior applications.

3.4 FIELD QUALITY CONTROL

A. Perform tests and inspections. Testing Agency Qualifications: An independent agency, with the experience and capability to conduct the testing indicated, that is a nationally recognized testing laboratory (NRTL) as defined by OSHA in 29 CFR 1910.7, and that is acceptable to authorities having jurisdiction.

B. Tests and Inspections:

1. Provide evidence of recent calibration of test equipment by a testing agency acceptable to authorities having jurisdiction.
2. Schedule test with Owner, through Architect, before connecting anchorage device to restrained component (unless post connection testing has been approved), and with at least seven days' advance notice.
3. Obtain Architect's approval before transmitting test loads to structure. Provide temporary load-spreading members.
4. Test at least four of each type and size of installed anchors and fasteners selected by Architect.
5. Test to 90 percent of rated proof load of device.
6. If a device fails test, modify all installations of same type and retest until satisfactory results are achieved.

C. Remove and replace malfunctioning units and retest as specified above.

D. Prepare test and inspection reports.

3.5 ADJUSTING

A. Adjust restraints to permit free movement of equipment within normal mode of operation.

END OF SECTION 23 05 48

SECTION 23 05 53 – IDENTIFICATION FOR MECHANICAL

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.

B. Division 23 Section "Common Work Results for Mechanical”

1.2 SUMMARY

A. This Section includes the following mechanical identification materials and their installation.

1.3 SUBMITTALS

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

1.4 QUALITY ASSURANCE

A. ASME Compliance: Comply with ASME A13.1, "Scheme for the Identification of Piping Systems," for letter size, length of color field, colors, and viewing angles of identification devices for piping.

1.5 COORDINATION

A. Coordinate installation of identifying devices with completion of covering and painting of surfaces where devices are to be applied.

B. Coordinate installation of identifying devices with location of access panels and doors.

C. Install identifying devices before installing acoustical ceilings and similar concealment.

PART 2 - PRODUCTS

2.1 EQUIPMENT IDENTIFICATION DEVICES

A. Equipment Markers: Engraved, color-coded laminated plastic OR stenciled paint; attach with screws or contact-type, permanent adhesive. Size: 2-1/2” x 1” or as applicable.

1. Terminology: Match schedules as closely as possible.
2. Data: Name and plan number, equipment service, design capacity, and other design parameters such as pressure drop, entering and leaving conditions, and speed.

B. Equipment located above the ceiling that requires servicing shall be labeled on the ceiling using a labeling machine.

2.2 PIPING IDENTIFICATION DEVICES

A. Manufactured Pipe Markers, General: Seton, Brady, or approved equal; preprinted, color-coded, with lettering indicating service, and showing direction of flow.

1. Colors: Comply with ASME A13.1, unless otherwise indicated.

2. Lettering: Use piping system terms indicated and abbreviate only as necessary for each application length. Size of letters and length of color field per ASME A13.1.
3. Pipes with OD, Including Insulation; Full-band snap-around pipe markers extending 360 degrees around pipe at each location.
4. Arrows: Integral with piping system service lettering to accommodate both directions; or as separate unit on each pipe marker to indicate direction of flow.
5. Minimum length of color field and size of letters shall be in accordance with Uniform Plumbing Code requirements.

B. Types:

1. Self-adhesive type: Seton Opti-Code.
2. Snap-around type: Seton Setmark.
3. Wrap-around type: Seton Ultra-mark; PVF over-laminated polyester construction seals in and protects graphics; suitable for outdoor or harsh environments.

PART 3 - EXECUTION

3.1 APPLICATIONS, GENERAL

A. Products specified are for applications referenced in other Division 22 or 23 Sections. If more than single-type material, device, or label is specified for listed applications, selection is Installer's option.

3.2 EQUIPMENT IDENTIFICATION

A. Install equipment markers with permanent adhesive on or near each major item of mechanical equipment. Data required for markers may be included on signs, and markers may be omitted if both are indicated.

1. Letter Size: Minimum 1/4 inch for name of units if viewing distance is less than 24 inches, 1/2 inch for viewing distances up to 72 inches, and proportionately larger lettering for greater viewing distances. Include secondary lettering two-thirds to three-fourths the size of principal lettering.
2. Data: Distinguish among multiple units, indicate operational requirements, indicate safety and emergency precautions, warn of hazards and improper operations, and identify units.
3. Locate markers where accessible and visible. Include markers for the following general categories of equipment:

a. All scheduled equipment.

3.3 PIPING IDENTIFICATION

A. Piping Identification Types: Snap-around marker or self-adhesive marker.

1. Fire Sprinkler: safety red background, white letters.
2. Natural Gas and other flammable fluids: safety yellow background, black letters.
3. Water and other similar piping: safety green with white letters.

B. Install manufactured pipe markers indicating service on each piping system.

1. Install pipe markers to manufacturer's instructions.
2. Identify piping, concealed or exposed. Include service and flow direction.
3. Install in clear view and align with axis of piping.
4. Locate identification at maximum 20 feet centers on straight runs including risers and drops, adjacent to each valve and tee, at each side of penetration of structure or enclosure, and at each obstruction.
5. At access doors and similar access points that permit view of concealed piping.
6. At least one per room.

C. Equipment located above the ceiling that requires servicing shall be labeled on the ceiling using a labeling machine.
1. Ceilings 10 feet and lower: Letters shall be ¼” high, black.
2. Ceilings higher than 10 feet: Letters shall be 3/8” high, black.
3. Label all equipment above ceiling that requires servicing or access.
4. Locate labels on the ceiling grid, adjacent to the ceiling tile that provides the best access to the valve or item that requires servicing.

3.4 ADJUSTING

A. Relocate mechanical identification materials and devices that have become visually blocked by other work.

3.5 CLEANING

A. Clean faces of mechanical identification devices.

END OF SECTION 23 05 53

SECTION 23 05 93 - TESTING, ADJUSTING, AND BALANCING FOR HVAC

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section Includes:

1. Balancing Air Systems
2. Testing, Adjusting, and Balancing Equipment
3. Control system verification.
4. Fume Hood Testing

B. Equipment Requiring Testing, Adjusting, and Balancing:

1. Air Terminal Units
2. Air Inlets and Outlets
3. Fume Hoods
4. Lab pressurization and CFM offset
5. Terminal Transfer Units (radiant panel)
6. HW duct coils

1.3 QUALITY ASSURANCE

A. Instrumentation Type, Quantity, Accuracy, and Calibration: Comply with requirements in ASHRAE 111, Section 4, "Instrumentation."

B. ASHRAE Compliance: Applicable requirements in ASHRAE 62.1, Section 7.2.2 - "Air Balancing."

C. ASHRAE/IESNA Compliance: Applicable requirements in ASHRAE/IESNA 90.1, Section 6.7.2.3 - "System Balancing."

1.4 FIELD CONDITIONS

A. Full Owner Occupancy: Owner will occupy the site and existing building during entire TAB period. Cooperate with Owner during TAB operations to minimize conflicts with Owner's operations.

PART 2 - PRODUCTS (Not Applicable)

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine the Contract Documents to become familiar with Project requirements and to discover conditions in systems designs that may preclude proper TAB of systems and equipment.

B. Examine installed systems for balancing devices, such as test ports, gage cocks, thermometer wells, flow-control devices, balancing valves and fittings, and manual volume dampers. Verify that locations of these balancing devices are applicable for intended purpose and are accessible.

C. Examine the approved submittals for HVAC systems and equipment.

D. Examine design data including HVAC system descriptions, statements of design assumptions for environmental conditions and systems output, and statements of philosophies and assumptions about HVAC system and equipment controls.

E. Examine equipment performance data.

1. Relate performance data to Project conditions and requirements, including system effects that can create undesired or unpredicted conditions that cause reduced capacities in all or part of a system.
2. Calculate system-effect factors to reduce performance ratings of HVAC equipment when installed under conditions different from the conditions used to rate equipment performance. To calculate system effects for air systems, use tables and charts found in AMCA 201, "Fans and Systems," or in SMACNA's "HVAC Systems - Duct Design." Compare results with the design data and installed conditions.

F. Examine system and equipment installations and verify that field quality-control testing, cleaning, and adjusting specified in individual Sections have been performed.

G. Examine test reports specified in individual system and equipment Sections.

H. Examine HVAC equipment and verify that bearings are greased, belts are aligned and tight, filters are clean, and equipment with functioning controls is ready for operation.

I. Examine terminal units and verify that they are accessible and their controls are connected and functioning.

J. Examine strainers. Verify that startup screens have been replaced by permanent screens with indicated perforations.

K. Examine heat-transfer coils for correct piping connections and for clean and straight fins.

L. Examine operating safety interlocks and controls on HVAC equipment.

M. Report deficiencies discovered before and during performance of TAB procedures. Observe and record system reactions to changes in conditions. Record default set points if different from indicated values.

3.2 PREPARATION

A. Prepare a TAB plan that includes the following:

1. Equipment and systems to be tested.
2. Strategies and step-by-step procedures for balancing the systems.
3. Instrumentation to be used.
4. Sample forms with specific identification for all equipment.

B. Perform system-readiness checks of HVAC systems and equipment to verify system readiness for TAB work. Include, at a minimum, the following:

1. Airside:

a. Verify that leakage and pressure tests on air distribution systems have been satisfactorily completed.
b. Duct systems are complete with terminals installed.
c. Volume, smoke, and fire dampers are open and functional.
d. Clean filters are installed.
e. Automatic temperature-control systems are operational.
f. Ceilings are installed.
g. Windows and doors are installed.
h. Suitable access to balancing devices and equipment is provided.

3.3 GENERAL PROCEDURES FOR TESTING AND BALANCING

A. Perform testing and balancing procedures on each system according to the procedures contained in NEBB's "Procedural Standards for Testing, Adjusting, and Balancing of Environmental Systems" and in this Section.

B. Cut insulation, ducts, pipes, and equipment cabinets for installation of test probes to the minimum extent necessary for TAB procedures.

1. After testing and balancing, patch probe holes in ducts with same material and thickness as used to construct ducts.
2. Install and join new insulation that matches removed materials. Restore insulation, coverings, vapor barrier, and finish.

C. Mark equipment and balancing devices, including damper-control positions, valve position indicators, and similar controls and devices, with paint or other suitable, permanent identification material to show final settings.

D. Take and report testing and balancing measurements in inch-pound (IP) units.

3.4 GENERAL PROCEDURES FOR BALANCING AIR SYSTEMS

A. Obtain manufacturer's outlet factors and recommended testing procedures.

B. Prepare schematic diagrams of systems' "as-built" duct layouts.

C. For variable-air-volume systems, develop a plan to simulate diversity.

D. Determine the best locations in main and branch ducts for accurate duct-airflow measurements.

E. Locate start-stop and disconnect switches, electrical interlocks, and motor starters.

F. Check dampers for proper position to achieve desired airflow path.

G. Check for airflow blockages.

H. Verify that air duct system is sealed as specified in Section 23 31 13 "Metal Ducts."

3.5 PROCEDURES FOR VARIABLE-AIR-VOLUME SYSTEMS

A. Adjust the variable-air-volume systems as follows:

1. After fume hoods have been calibrated and balanced, test and adjust system for total airflow.
2. Verify final system conditions as follows:

    a. Re-measure and confirm that outdoor airflows are within design. Readjust to match design if necessary.
    b. Re-measure and confirm that total airflow is within design.
    c. Mark final settings.
    d. Test system in economizer mode. Verify proper operation and adjust if necessary. Measure and record all operating data.

3.6 PROCEDURES FOR VARIABLE-FLOW HYDRONIC SYSTEMS

A. Balance systems with automatic control valves by setting systems at maximum flow through heat-exchange terminals, and proceed as specified above for hydronic systems.

B. Adjust the variable-flow hydronic system as follows:

1. Adjust flow-measuring devices installed in mains and branches to design water flows.

    a. Measure flow in main and branch pipes.
    b. Adjust main and branch balance valves for design flow.
    c. Re-measure each main and branch after all have been adjusted.

2. Adjust flow-measuring devices installed at terminals for each space to design water flows.

    a. Measure flow at terminals.
    b. Adjust each terminal to design flow.
    c. Re-measure each terminal after it is adjusted.
    d. Position control valves to bypass the coil and adjust the bypass valve to maintain design flow.
    e. Perform temperature tests after flows have been balanced.

3. Mark final settings and verify that all memory stops have been set.

3.7 PROCEDURES FOR LABORATORY FUME HOODS

A. Before performing laboratory fume hood testing, measure, adjust and record the supply airflow and airflow patterns of each supply air outlet that is located in the same room as the hood. Adjust the air outlet flow pattern to minimize turbulence and to achieve the desired airflow patterns at the face and inside the hood. Verify that adequate makeup air is available to achieve the indicated flow of the hood.

B. Measure, adjust, and record the airflow of each laboratory fume hood by duct Pitot-tube traverse with the laboratory fume hood sash in the design open position.

C. Measure, adjust, and record the hood exhaust airflow at maximum and at minimum airflow conditions.

D. After balancing is complete, do the following:

1. Measure and record the static pressure at the hood duct connection with the hood operating at indicated airflow.
2. Measure and record the face velocity across the open sash face area. Measure the face velocity at each point in a grid pattern. Face velocity testing shall follow ASHRAE 110 standard requirements.
3. Perform a VAV linearity test as per ASHRAE 110. The average velocity at the three sash positions shall be calculated and recorded on the test reports. A graph of average velocity vs. sash position shall be provided. If any of the readings vary more than 10% from the mean of the three face velocity averages corrective action shall be taken by calibrating/repairing.
4. Calculate and report the exhaust airflow by multiplying the calculated average face velocity by the sash open area. Compare this quantity with the exhaust airflow measured by duct Pitot-tube traverse. Report differences.
5. If the average face velocity is less than the indicated face velocity, retest the average face velocity and adjust hood baffles, and other parts of the system to provide the indicated average face velocity.

3.8 FUME HOOD TESTING

A. Equipment and Supplies.

1. The testing contractor shall be properly equipped to perform this testing including, but not limited to: the equipment specified in section 4 of the ASHRAE 110 standard plus an automated data acquisition system capable of reading data from an analog velocity transducer and the tracer gas detector and producing graphical output.
2. All instruments used shall have been calibrated within the last year or within the time period specified by the instrument manufacturer.
3. The calibration gases used shall have certificates of analysis.

B. Test Conditions.

1. The test conditions outlined in section 5 of the ASHRAE standard shall be observed.

C. Exhaust System Stability Test.

1. This test shall be performed at least once on all manifolded exhaust systems to which fume hoods which are to be commissioned are connected.
2. Insert the velocity transducer into the exhaust duct (preferred) or insert it into the middle baffle slot of the hood normal to the back of the hood.
3. Orient the probe window parallel to the duct centerline if inserted into the duct or vertical if it is inserted into the baffle slot.
4. Take velocity readings to determine if the velocity is in the range of the transducer. If not, change the range of the transducer or relocate it to another location.
5. If excessive (high frequency) turbulence is experienced, relocate the transducer farther downstream from the nearest obstruction.
6. Start velocity acquisition and accumulate velocity data for 5-10 minutes.
7. Calculate the standard deviation of the velocity data and normalize by the mean to get the coefficient of variation (COV).

8. Analyze the velocity plot graphically and determine if system instability exists. Instability is normally manifested by large velocity variations (>10% above and below the mean) with a relatively low frequency (>10 seconds). The variations may be random or periodic.
9. If instability exists, investigate and correct the problem and repeat the stability test before proceeding with further testing.
10. Record the final COV data and the plot of the velocity on the test report.

D. Local Visualization Challenge (Low-Volume Smoke Test)

1. This test is to be performed per section 6.1.1. of the ASHRAE 110 standard.
2. The observations shall be classified using the following criteria and recorded on the test report.

    a. Fail: Smoke observed escaping from the hood.
    b. Poor: Reverse flow of smoke near opening. Lazy flow into opening along boundary. Observed potential for escape.
    c. Fair: Some reverse flow, not necessarily at the opening. No visible escape.
    d. Good: No reverse flows. Active flow streams into hood around boundary.

3. If smoke escapes from the hood during this test it indicates a gross leak and testing shall be terminated until the cause of the leakage is determined and corrected.

E. Large-Volume Smoke Visualization Challenge (High-Volume Smoke Test)

1. This test is to be performed per section 6.1.2 of the ASHRAE 110 standard.
2. The observations shall be classified using the following criteria and recorded on the test report.

    a. Fail: Smoke observed escaping from the hood.
    b. Poor: Reverse flow of smoke near opening. Slow capture and clearance. Observed potential for escape.
    c. Fair: Some reverse flow, not necessarily at the opening.
    d. Limited turbulent vortex in hood. All smoke captured and cleared readily. No visible escape.
    e. Good: Good capture and quick clearance. Limited hood roll vortex. No reverse flows. No visible escape.

3. If smoke escapes from the hood during this test it indicates a gross leak and testing shall be terminated until the cause of the leakage is determined and corrected.

F. Face Velocity Measurements

1. Face velocity testing shall be performed per section 6.2 of the ASHRAE 110 standard with the following exceptions:

    a. The instrument shall be a velocity transducer with a continuous analog output interfaced to a data acquisition system and a computer with software capable of reading, storing and displaying graphically the velocity data.
    b. Velocity data shall be taken at a frequency not less than the response time of the instrument and not greater than once per second.
    c. Velocity data shall be taken for a minimum of 30 seconds at each traverse point.
    d. The average, minimum, maximum, standard deviation, and grid coordinates for each traverse point shall be calculated and recorded on the test report.
    e. The average face velocity shall be calculated from the data above and recorded on the test report.

f. The Turbulence shall be calculated by averaging the standard deviations of each traverse point and normalizing by the mean face velocity. Record this data on the test report.
g. The Profile shall be calculated by determining the standard deviation of the traverse point means and normalizing by the average face velocity. Record this data on the test report.

G. Tracer Gas Containment Test.

1. This test shall be performed per section 7 of the ASHRAE 110 standard with the following exception.
2. If the tracer gas detector has a detection limit below 0.01 ppm, a lower supply concentration of tracer gas may be substituted for pure gas. The concentration of the tracer gas in percent shall not be lower than:

a. Tracer Gas Supply Concentration >= (Detection Limit / 0.01) x 100

3. If the tracer gas detector cannot be programmed for the tracer gas supply concentration, the instrument output needs to be scaled. The scale factor is calculated as follows:

a. Scale Factor = 100 / Tracer Gas Supply Concentration
b. The actual control level is calculated as follows:
c. Actual Control Level = Instrument Control Level x Scale Factor

4. If the tracer gas detector can be programmed for the tracer gas concentration, it will automatically perform the calculations in 5.5.3 above and the instrument readings should not be adjusted.

3.9 PROCEDURES FOR SPACE PRESSURIZATION MEASUREMENTS AND ADJUSTMENTS

A. Before testing for space pressurization, observe the space to verify the integrity of the space boundaries. Verify that windows and doors are closed and applicable safing, gaskets, and sealants are installed. Report deficiencies and postpone testing until after the reported deficiencies are corrected.

B. Observe and adjust the controls to achieve the desired CFM offset

1. Compare the values of the measurements taken to the measured values of the control system instruments and report findings.
2. Check the repeatability of the controls by successive tests designed to temporarily alter the ability to achieve space pressurization. Test over-pressurization and under-pressurization, and observe and report on the system's ability to revert to the set point.
3. Measure space pressurization at maximum airflow and minimum airflow conditions.

C. Record indicated conditions and corresponding initial and final measurements. Report deficiencies.

3.10 CONTROLS VERIFICATION

A. In conjunction with system balancing, perform the following:

1. Verify temperature control system is operating within the design limitations.
2. Confirm that the sequences of operation are in compliance with Contract Documents.
3. Verify that controllers are calibrated and function as intended.
4. Verify that controller set points are as indicated.
5. Verify the operation of valve and damper actuators.
6. Verify that controlled devices are properly installed and connected to correct controller.

7. Verify that controlled devices travel freely and are in position indicated by controller: open, closed, or modulating.
8. Verify location and installation of sensors to ensure that they sense only intended temperature, humidity, or pressure.

B. Reporting: Include a summary of verifications performed, remaining deficiencies, and variations from indicated conditions.

3.11 TOLERANCES

A. Set HVAC system's airflow rates and water flow rates within the following tolerances:

1. Air Outlets and Inlets: Plus or minus 10 percent.
2. Water Flow Rate: Plus or minus 10 percent.

B. Maintaining pressure relationships as designed shall have priority over the tolerances specified above.

3.12 FINAL REPORT

A. General: Prepare a certified written report; tabulate and divide the report into separate sections for tested systems and balanced systems.

1. Include a certification sheet at the front of the report's binder, signed and sealed by the certified testing and balancing engineer.
2. Include a list of instruments used for procedures, along with proof of calibration.
3. Certify validity and accuracy of field data.

B. Final Report Contents: In addition to certified field-report data, include the following:

1. Manufacturers' test data.
2. Field test reports prepared by system and equipment installers.
3. Other information relative to equipment performance; do not include Shop Drawings and Product Data.

C. General Report Data: In addition to form titles and entries, include the following data:

1. Title page.
2. Name and address of the TAB specialist.
3. Project name.
4. Project location.
5. Architect's name and address.
6. Engineer's name and address.
7. Contractor's name and address.
8. Report date.
9. Signature of TAB supervisor who certifies the report.
10. Table of Contents with the total number of pages defined for each section of the report. Number each page in the report.
11. Summary of contents including the following:

    a. Indicated versus final performance.
    b. Notable characteristics of systems.
    c. Description of system operation sequence if it varies from the Contract Documents.

12. Nomenclature sheets for each item of equipment.
13. Data for terminal units, including manufacturer's name, type, size, and fittings.
14. Notes to explain why certain final data in the body of reports vary from indicated values.

D. System Diagrams: Include schematic layouts of air and hydronic distribution systems. Present each system with single-line diagram and include the following:

1. Quantities of outdoor, supply, return, and exhaust airflows.
2. Water and steam flow rates.
3. Duct, outlet, and inlet sizes.
4. Pipe and valve sizes and locations.
5. Terminal units.
6. Balancing stations.
7. Position of balancing devices.

E. Duct Traverse Reports: Include a diagram with a grid representing the duct cross-section and record the following:

1. Report Data:

a. System and air-handling-unit number.
b. Location and zone.
c. Traverse air temperature in deg F.
d. Duct static pressure in inches wg.
e. Duct size in inches.
f. Duct area in sq. ft..
g. Indicated airflow rate in cfm.
h. Indicated velocity in fpm.
i. Actual airflow rate in cfm.
j. Actual average velocity in fpm.

F. Air-Terminal-Device Reports:

1. Unit Data:

a. System and air-handling unit identification.
b. Location and zone.
c. Apparatus used for test.
d. Area served.
e. Make.
f. Number from system diagram.
g. Type and model number.
h. Size.
i. Effective area in sq. ft.

2. Test Data (Indicated and Actual Values):

a. Airflow rate in cfm.
b. Air velocity in fpm.
c. Preliminary airflow rate as needed in cfm.
d. Preliminary velocity as needed in fpm.
e. Final airflow rate in cfm.
f. Final velocity in fpm.
g. Space temperature in deg F.

G. Terminal Unit Coil Reports: For coils of terminal units, include the following:

1. Unit Data:

a. System and air-handling-unit identification.
b. Location and zone.
c. Room or riser served.
d. Coil make and size.
e. Flowmeter type.

2. Test Data (Indicated and Actual Values):

a. Airflow rate in cfm.
b. Entering-water temperature in deg F.
c. Leaving-water temperature in deg F.
d. Water pressure drop in feet of head or psig.
e. Entering-air temperature in deg F.
f. Leaving-air temperature in deg F.

3.13 ADDITIONAL TESTS

A. Within 90 days of completing TAB, perform additional TAB to verify that balanced conditions are being maintained throughout and to correct unusual conditions.

B. Seasonal Periods: If initial TAB procedures were not performed during near-peak summer and winter conditions, perform additional TAB during near-peak summer and winter conditions.

END OF SECTION 23 05 93

SECTION – 23 07 00 - MECHANICAL INSULATION

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.

B. Related Sections include the following:

1. Division 23 Section "Common Work Results for Mechanical"
2. Division 23 Section "Hangers and Supports for Piping and Equipment" for pipe insulation shields and protection saddles.

1.2 SUMMARY

A. This Section includes insulation; insulating cements; field-applied jackets; accessories and attachments; and sealing compounds.

1.3 SUBMITTALS

A. Product Data: Identify thermal conductivity, Greenguard Certification, thickness, and jackets (both factory and field applied, if any), for each type of product indicated.

B. Material Test Reports: From a qualified testing agency acceptable to authorities having jurisdiction indicating, interpreting, and certifying test results for compliance of insulation materials, sealers, attachments, cements, and jackets with requirements indicated. Include dates of tests.

1.4 QUALITY ASSURANCE

A. Installer Qualifications: Skilled mechanics who have successfully completed an apprenticeship program or another craft training program certified by the U.S. Department of Labor, Bureau of Apprenticeship and Training.

1.5 DELIVERY, STORAGE, AND HANDLING

A. Ship insulation materials in containers marked by manufacturer with appropriate ASTM specification designation, type and grade, and maximum use temperature.

B. All of the insulation materials and accessories covered by this specification shall be delivered to the job site and stored in a safe, dry place with appropriate labels and/or other product identification.

C. Store tapes, adhesives, mastics, cements, and insulation materials in ambient conditions in accordance with the recommendations of the manufacturer.

D. Follow manufacturer’s recommended handling practices.

E. The contractor shall use whatever means are necessary to protect the insulation materials and accessories before, during, and after installation. No insulation material shall be installed that has become damaged in any way. The contractor shall also use all means necessary to protect work and materials installed by other trades.

F. Fiber Glass and Mold: Contractor shall take precaution to protect insulation. Any fiber glass insulation that becomes wet or torn should be replaced at no additional cost. Air handling insulation used in the air stream must be discarded if exposed to water.

1.6 COORDINATION

A. Coordinate size and location of supports, hangers, and insulation shields. Coordinate clearance requirements with other trades for insulation application.

B. Schedule insulation application after testing systems. Insulation application may begin on segments of systems that have satisfactory test results.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

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

1. Certainteed
2. Knauf
3. Owens-Corning
4. John Mansville
5. Armstrong
6. Aeroflex USA
7. Nomaco K-Flex
8. Pabco.
9. Schuller International, Inc.

2.2 PIPING INSULATION MATERIALS

A. General

1. Supply fiber glass products that have achieved GREENGUARD Children & Schools Certification.
2. Surface Burning Characteristics: Insulation and related materials shall have surface burning characteristics determined by test performed on identical products per ASTM E 84 mounted and installed as per ASTM E 2231. All testing shall be performed by a testing and inspecting agency acceptable to authorities having jurisdiction. Insulation, jacket materials, adhesives, mastics, tapes and cement material containers shall be labeled with appropriate markings of applicable testing and inspecting agency. Flame-spread index of 25 or less, and smoke-developed index of 50 or less.
3. Supply fiber glass products that are manufactured using a minimum of 40% “post-consumer” recycled material.

B. Glass Fiber:

1. Knauf 1000° Pipe Insulation with ECOSE Technology meeting ASTM C547 Type IV Grade A, ASTM C585, and ASTM C795; rigid, molded, noncombustible per ASTM E136; k value: ASTM C335, 0.23 at 75°F mean temperature. Maximum Service Temperature: 1000°F. Vapor Retarder Jacket: ASJ/SSL conforming to ASTM C1136 Type I, secured with self-sealing longitudinal laps and butt strips.
2. PVC Fitting Covers: The Proto Fitting Cover System shall consist of one piece and two piece pre-molded high impact UV-resistant PVC fitting covers with fiberglass inserts and accessories, which include elbows, tee/valves, end caps, mechanical line couplings, and specialty fittings. Fittings shall be made of LoSMOKE® grade PVC, 25/50 rated per ASTM E-84. Thermal Value of fiberglass insert: K value of .26 at 75°F; resistance to fungi and bacteria. (ASTM G 21, ASTM G 22): does not promote growth of fungi or bacteria.

2.3 DUCTWORK INSULATION MATERIALS

A. Flexible Fiber Glass Blanket: Knauf Friendly Feel® Duct Wrap with ECOSE Technology meeting ASTM C553 Types I, II and III, and ASTM C1290; GREENGUARD certified; flexible, limited combustible; k value: ASTM C177, 0.29 at 75°F mean temperature. Maximum Service Temperature: faced: 250°F; unfaced: 350°F. Vapor Retarder Jacket: FSK conforming to ASTM C1136 Type II. Installation: Maximum allowable compression is 25%. Securement: Secured in place using outward cinching staples in combination with appropriate pressure-sensitive aluminum foil or PSK tape, or in combination with glass fabric and vapor retarder mastic. Density: concealed areas: Minimum 0.75 PCF; exposed areas: Minimum 1.0 PCF.

2.4 ACCESSORY MATERIALS

A. Accessory materials installed as part of insulation work under his section shall include (but not be limited to):

1. Closure Materials - Butt strips, bands, wires, staples, mastics, adhesives; pressure-sensitive tapes.
2. Adhesive: As recommended by insulation material manufacturer. Materials shall be compatible with insulation materials, jackets, and substrates and for bonding insulation to itself and to surfaces to be insulated
3. Support Materials - Hanger straps, hanger rods, saddles, support rings

B. All accessory materials shall be installed in accordance with manufacturer's instructions.

C. Mastics: Materials recommended by insulation material manufacturer that are compatible with insulation materials, jackets, and substrates.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates and conditions for compliance with requirements for installation and other conditions affecting performance of insulation application.

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

C. Before starting work under this section, carefully inspect the site and installed work of other trades and verify that such work is complete to the point where installation of materials and accessories under this section can begin.

3.2 PREPARATION

A. Ensure that all pipe and fitting surfaces over which insulation is to be installed are clean and dry. Ensure that insulation is clean, dry, and in good mechanical condition with all factory-applied vapor or weather barriers intact and undamaged. Wet, dirty, or damaged insulation shall not be acceptable for installation. Ensure that pressure testing of piping and fittings has been completed prior to installing insulation.

3.3 GENERAL APPLICATION REQUIREMENTS

A. Apply insulation materials, accessories, and finishes according to the manufacturer's written instructions; with smooth, straight, and even surfaces; free of voids throughout, including fittings, valves, and specialties.

B. Refer to schedules at the end of this Section for materials, forms, jackets, and thicknesses required for each system. Use accessories compatible with insulation materials and suitable for the service. Use accessories that do not corrode, soften, or otherwise attack insulation or jacket in either wet or dry state.

C. Apply insulation with longitudinal seams at top and bottom of horizontal pipe runs and equipment.

D. Apply multiple layers of insulation with longitudinal and end seams staggered.

E. Do not weld brackets, clips, or other attachment devices to piping, fittings, and specialties.

F. Seal joints and seams with vapor-retarder mastic on insulation indicated to receive a vapor retarder.

G. Keep insulation materials dry during application and finishing.

H. Apply insulation with tight longitudinal seams and end joints. Bond seams and joints with adhesive recommended by the insulation material manufacturer. Apply insulation with the least number of joints practical.

I. Apply insulation over fittings, valves, and specialties, with continuous thermal and vapor-retarder integrity, unless otherwise indicated. Refer to special instructions for applying insulation over fittings, valves, and specialties.

J. Insulation Terminations: For insulation application where vapor retarders are indicated, taper insulation ends. Seal tapered ends with a compound recommended by the insulation material manufacturer to maintain vapor retarder.

K. Apply adhesives and mastics at the manufacturer's recommended coverage rate.

L. Maintain manufacturer's recommended temperatures and conditions for tapes, adhesives, mastics and cements.

M. Interior Wall and Partition Penetrations: Apply insulation continuously through walls and floors.

N. Fire-Rated Wall and Partition Penetrations: Apply insulation continuously through penetrations of fire-rated walls and partitions. Firestopping and fire-resistive joint sealers are specified in Section 23 05 00.

O. Floor Penetrations: Apply insulation continuously through floor assembly. For systems below ambient temperature, seal insulation with vapor-retarder mastic where floor supports penetrate vapor retarder.

3.4 GLASS FIBER PIPING INSULATION

A. Locate all seams in the least visible location.

B. Insulation installed on piping operating below ambient temperatures must have a continuous vapor retarder. All joints, seams and fittings must be sealed. On systems operating above ambient, the butt joints should not be sealed.

C. Metal shields shall be installed between hangers or supports and the piping insulation. Rigid insulation inserts shall be installed as required between the pipe and the insulation shields. Inserts shall be of equal thickness to the adjacent insulation and shall be vapor sealed as required. Insulation inserts shall be no less than the following lengths:

1. 1½″ to 2½″ IPS: 10″ long

3.5 FLEXIBLE FIBER GLASS BLANKET

A. Install Duct Wrap using manufacturer's stretch-out tables to obtain specified R-value using a maximum compression of 25%.

B. Firmly butt all joints.

C. The longitudinal seam of the vapor retarder must be overlapped a minimum of 2 inches. A 2-inch tab is provided on Knauf Friendly Feel® Duct Wrap for the circumferential seam.

D. Where vapor retarder performance is required, all penetrations and damage to the facing shall be repaired using pressure-sensitive tape matching the facing, or mastic prior to system startup. Pressure-sensitive tapes shall be a minimum 3 inches wide and shall be applied with moving pressure using a squeegee or other appropriate sealing tool. Closure shall have a 25/50 Flame Spread/Smoke Developed Rating per UL 723.

E. Duct Wrap shall be additionally secured to the bottom of rectangular ductwork over 24 inches wide using mechanical fasteners on 18-inch centers. Care should be exercised to avoid over-compression of the insulation during installation. Unfaced Duct Wrap shall be overlapped a minimum of 2 inches and fastened using 4-inch to 6-inch nails or skewers spaced 4 inches apart, or secured with a wire/banding system. Care should be exercised to avoid damage to the Duct Wrap.

3.6 GENERAL PIPE INSULATION INSTALLATION

A. Requirements in this article generally apply to all insulation materials except where more specific requirements are specified in various pipe insulation material installation articles.

B. Insulation Installation on Fittings, Valves, Strainers, Flanges, and Unions:

1. Install insulation over fittings, valves, strainers, flanges, unions, and other specialties with continuous thermal and vapor-retarder integrity unless otherwise indicated.
2. Insulate pipe elbows using preformed fitting insulation or mitered fittings made from same material and density as adjacent pipe insulation. Each piece shall be butted tightly against adjoining piece and bonded with adhesive. Fill joints, seams, voids, and irregular surfaces with

insulating cement finished to a smooth, hard, and uniform contour that is uniform with adjoining pipe insulation.

3. Insulate tee fittings with preformed fitting insulation or sectional pipe insulation of same material and thickness as used for adjacent pipe. Cut sectional pipe insulation to fit. Butt each section closely to the next and hold in place with tie wire. Bond pieces with adhesive.
4. Insulate valves using preformed fitting insulation or sectional pipe insulation of same material, density, and thickness as used for adjacent pipe. Overlap adjoining pipe insulation by not less than two times the thickness of pipe insulation, or one pipe diameter, whichever is thicker. For valves, insulate up to and including the bonnets, valve stuffing-box studs, bolts, and nuts. Fill joints, seams, and irregular surfaces with insulating cement.
5. Insulate strainers using preformed fitting insulation or sectional pipe insulation of same material, density, and thickness as used for adjacent pipe. Overlap adjoining pipe insulation by not less than two times the thickness of pipe insulation, or one pipe diameter, whichever is thicker. Fill joints, seams, and irregular surfaces with insulating cement. Insulate strainers so strainer basket flange or plug can be easily removed and replaced without damaging the insulation and jacket. Provide a removable reusable insulation cover. For below-ambient services, provide a design that maintains vapor barrier.
6. Insulate flanges and unions using a section of oversized preformed pipe insulation. Overlap adjoining pipe insulation by not less than two times the thickness of pipe insulation, or one pipe diameter, whichever is thicker.
7. Cover segmented insulated surfaces with a layer of finishing cement and coat with a mastic. Install vapor-barrier mastic for below-ambient services and a breather mastic for above-ambient services. Reinforce the mastic with fabric-reinforcing mesh. Trowel the mastic to a smooth and well-shaped contour.
8. For services not specified to receive a field-applied jacket except for flexible elastomeric and polyolefin, install fitted PVC cover over elbows, tees, strainers, valves, flanges, and unions. Terminate ends with PVC end caps. Tape PVC covers to adjoining insulation facing using PVC tape.

3.7 PIPING INSULATION APPLICATION SCHEDULE

A. Application schedules identify piping system and indicate pipe size ranges and material, thickness, and jacket requirements. For piping systems not indicated, insulate to with a similar thickness and type as those specified.

B. All cold surfaces that may “sweat” must be insulated. Vapor barrier must be maintained, insulation shall be applied with a continuous, unbroken moisture and vapor seal. All hangers, supports, anchors, or other projections that are secured to cold surfaces shall be insulated and vapor sealed to prevent condensation.

C. Insulation thicknesses and installations shall meet or exceed the requirements of ASHRAE Standard 90.1-2007, or thicknesses indicated, whichever is of superior insulating performance.

D. If piping type is omitted from list below, provide insulation as per similar duty.

E. Domestic hot and recirculated hot water, PHWS, PHWR:

1. Pipe size 1-1/4” and less: Glass Fiber, ½” thickness.
2. Pipe size 1-1/2 and larger: Glass Fiber, 1” thickness.

F. Domestic cold water, PCW:

1. Pipe size 1-1/4” and less: Glass Fiber, 1/2” thickness.
2. Pipe size 1-1/2 and larger: Glass Fiber, 1” thickness.

G. Heating supply and return:

1. Glass Fiber; 1" thickness.
2. Insulation is not required for unions, flexible connectors, control valves, exposed piping through floor for convectors and radiators. Insulate piping to within approximately 1-inch of un-insulated items.

3.8 DUCT SYSTEM APPLICATIONS

A. Insulation materials and thicknesses are specified in schedules at the end of this Section. For duct systems not indicated, insulate to with a similar thickness and type as those specified.

B. Insulation thicknesses and installations shall meet or exceed the requirements of ASHRAE Standard 90.1-2007, or thicknesses indicated, whichever is of superior insulating performance.

C. Items Not Insulated: Unless otherwise indicated, do not apply insulation to the following systems, materials, and equipment:

1. Metal ducts with duct liner.
2. Factory-insulated flexible ducts.
3. Factory-insulated plenums, casings, and access doors.
4. Flexible connectors.

3.9 DUCT AND PLENUM APPLICATION SCHEDULE

A. Supply Ducts: Flexible Fiber Glass Blanket: R-6, 1.5" thickness.

B. Return/exhaust ducts: None required.

END OF SECTION 23 07 00

SECTION 23 09 95 - LABORATORY AIRFLOW CONTROL SYSTEM

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. A Laboratory Airflow Control System (LACS) shall be furnished and installed under this section. The LACS shall be capable of operating as a standalone system or as a system integrated with the Building Management System (BMS).

B. The LACS representative shall coordinate all details of the installation with the successful mechanical contractor. This effort shall include complete coordination of the sheet metal layout drawings to assure that the ductwork layout and sizing is based on the actual sizes of the airflow control valves for this project.

C. Preinstallation Meetings

1. The LACS representative shall review the proper installation of the system with the sheet metal contractor and the building management system (BMS) contractor.
2. Project Installation Phase – The LACS representative shall make periodic visits to the project jobsite to assure that the system is being installed properly to assure optimal performance and that the location and orientation of the control valves is consistent for proper operation and future owner maintenance. Any discrepancies shall first be brought to the attention of the appropriate subcontractor. If no action is taken by said contractor, the representative shall bring these issues to the project manager, engineer or owner's representative for resolution.

1.3 ACTION SUBMITTALS

A. General: Submit listed Submittals in accordance with Conditions of the General Contract and Division 1 Submittal Procedures Section. LACS submittals shall contain, at a minimum, the following information:

1. Product Data Sheets
2. Equipment Schedule Sheets containing Room#, Tag#, Min/Max flows, Catalog# and other configuration data as required to provide a fully engineered LACS.
3. Installation Instructions
4. Project-specific Wiring Diagrams
5. Points Lists

1.4 CLOSEOUT SUBMITTALS

A. Operation and maintenance manuals, including as-built wiring diagrams and component lists, shall be provided as closeout submittals.

B. Record Documents:

1. Submit complete point-to-point wiring diagrams for each applicable room configuration as shown on the Owner's Drawings.

1.5 QUALITY ASSURANCE

A. Reference Standards

1. Air Conditioning and Refrigeration Institute ARI 880 Performance Rating of Air Terminals
2. American Society of Heating, Refrigeration, and Air Conditioning Engineers / American National Standards Institute ASHRAE/ANSI Standard 130, Methods for Testing Air Terminal Units
3. American National Standards Institute / American Society of Heating, Refrigeration, and Air Conditioning Engineers ANSI/ASHRAE 135-2001: BACnet® - A Data Communication Protocol for Building Automation Systems (including Standard and all published Addenda)

1.6 DELIVERY, STORAGE, AND HANDLING

A. Storage and Handling Requirements

1. Prior to installation, the LACS shall be stored in dry conditions within an environment complying with LACS product specifications as shown on product data sheets within the submittals.
2. The LACS products shall be handled and transported in a manner consistent trade practices for control systems and instruments.
3. The ambient environmental conditions during installation and operation shall comply with LACS product specifications as shown on the product data sheets within the submittals.

1.7 WARRANTY

A. Warranty on equipment shall commence upon the date of shipment and extend for a period of 36 months, wherein any defects in materials or LACS performance shall be repaired by the supplier at no cost to the owner.

PART 2 - PRODUCTS

2.1 ACCEPTABLE MANUFACTURERS

A. Triatek – IB Controls

2.2 VOLUMETRIC OFFSET CONTROLLER

A. The closed loop Volumetric Offset Controller shall be used to maintain an offset between the supply and exhaust airflows. The space is to be maintained under negative or positive pressure, as determined by a programmed differential pressure between the total Exhaust CFM and the Supply CFM, termed Offset.

B. The Volumetric Controller used to combine airflow components shall have the following functionality:

1. Exhaust

a. Shall provide a minimum of three (3) analog inputs, available for volumetric summing in increments of three inputs optionally up to twenty-one inputs.

b. Each input shall be scaleable for CFM range
c. Multi-point exhaust inputs, (i.e. general exhaust, fume hoods, etc) shall be summed to a single value, using the scaled value of each input.

2. Supply Air

a. System shall provide three (3) analog inputs, available for volumetric summing in increments of three inputs optionally up to twenty-one inputs.
b. Each input shall be scalable for CFM range.
c. Where multiple inputs for Supply are provided, they shall be summed to a single linear cfm value.

3. Offset

a. System shall provide means for setting an offset value in cfm as a set point for a PID control output.
b. CFM offset shall be accomplished by the control output driving the supply air to the value needed to meet the requirement of the all exhaust devices and meet the difference (offset) that is programmed as a Set point.
c. Combine Airflow Sums
d. The exhaust sums shall be subtracted from the supply sum to yield a "Net cfm".
e. The Net cfm shall be used to control an analog output, against the Set point

C. The Volumetric Controller shall have a precision four (4) analog outputs derived from twelve (12) bit conversion and true floating point math functions. This output shall be field selectable as either a linear signal directly relating to face velocity or as a PID control output. The output shall be selectable as either mADC or voltage. This output shall be field scaleable to provide the exact offset and span required to yield the best operating results, e.g., compressed span for quick operation.

D. The Volumetric Controller shall have a LON based communications protocol; for each space program the following points and graphics into the existing Delta BMS:

1. Supply Airflow
2. Exhaust Airflow
3. Volumetric Offset Set point
4. Sum of Supply and Exhaust
5. Analog Outputs (Controlled by Net CFM)

2.3 SAFETY ALARM CONTROLLER/MONITOR/ALARM

1. The Fume Hood Controllers shall be capable of measuring the sash position on the fume hood as well as the face velocity of fume hood. It shall have a standard calibration range of 0 to 100% and 0-200 FPM. Hood Controller shall be factory calibrated with NIST traceable standards and shall have an accuracy of ± 2 FPM.
2. The Fume Hood Controller flow velocity sensor technology shall be thermal anemometry and shall have a small micro-area flow path to provide for high sensitivity and for the precision accuracy shown above. Sensor shall constantly monitor bi-directional flow using the patented flow-through sensor. The flow measuring assembly including necessary fittings and cover shall be provided with the controller as a complete unit.
3. The Fume Hood Controller shall provide immediate (10 time per second) response to sash position, face velocity changes or other factors. It shall alarm out-of-spec face velocities, be they too high or too low, and shall modulate the hood exhaust to maintain the desired face velocity set point (set per Fume Hood installation instructions). The controller shall be capable of producing a correction signal to the hood exhaust control mechanism within one second after a step change in

face velocity has occurred. The hood exhaust control mechanism response shall respond fast enough to prevent spilling fumes due to low face velocity. It must be damped sufficiently to avoid producing excessive turbulence inside the hood such as might result in fume spillage hazards.

4. The Fume Hood Controller shall have a LCD alphanumeric display capable of showing actual face velocity readings in FPM or in metric units up to five digits. The controller shall be capable of displaying both English and Metric readings simultaneously on separate lines of the display. Where other variables are displayed on the additional display lines included with the controller, each of these shall provide means to include up to a seven -character descriptor. Display update time shall be one second maximum.
5. The Fume Hood Controller shall have four (4) precision analog outputs derived from twelve (12) bit conversion and true floating point math functions. This output shall be field selectable as either a linear signal directly relating to face velocity or as a PID control output. The output shall be selectable as either mADC or voltage. This output shall be field scaleable to provide the exact offset and span required to yield the best operating results, e.g., compressed span for quick operation.
6. The Fume Hood Controller shall have four (4) precision analog inputs. All inputs shall have twelve (12) bit analog-to-digital conversion and be processed using true floating-point math functions to provide maximum scaling accuracy. All four inputs are scaleable to standard input signals including 4-20 mADC, 0-5VDC, or 0-10VDC. (W/dropping resistor). Inputs are dedicated as follows

    a. Face velocity sensor
    b. Sash position sensor
    c. Auxiliary
    d. Auxiliary

7. The Fume Hood Controller shall have four (4) digital inputs. Inputs are dedicated as follows:

    a. Auxiliary
    b. Auxiliary
    c. Auxiliary
    d. Auxiliary

8. The Fume Hood Controller shall have both audible and visual alarms having adjustable set points. Alarm sequence shall be such that face velocity readings and alarm status lights have instantaneous response to insufficient and excessive face velocity. Audible alarm shall have a programmable time delay to provide a time lag before the audible alarm is activated. This programmable delay shall be adjustable from instantaneous (no delay) to at least 3600 seconds in one-second increments. An input for an optional switch or personnel sensor shall be provided and can be user selected to activate a second time delay for the audible alarm. The ALARM SILENCE keypad on the face of the controller shall be used to silence the audible alarm. Dual alarm output relays shall be furnished to transmit alarms to remote monitoring equipment. Both alarm output relays and flow status indicators shall have user adjustable low and high alarm set points and shall be individually adjustable. Alarm annunciation shall be menu selectable by the user for Automatic Reset or Manual Reset. Under Automatic Reset any alarm condition sensed after the time delay will be reset automatically when the alarm condition goes away and adequate face velocity has been restored. That is, the alarm is not latched in and the alarms shall be annunciated only as long as the alarm condition exists. Under Manual Reset any alarm condition sensed after the time delay will be latched on and held, even after the face velocity has returned to normal, until someone manually resets it by depressing the Alarm Silence keypad on the face of the controller. This will allow for logging of the alarm when it is reset. In either Automatic or Manual Reset the audible alarm can be acknowledged, or silenced, at any time, leaving the visual alarm to reflect the actual face velocity status.

9. The Fume Hood Controller shall have three LED face velocity status indicators that have adjustable ON and OFF set points. These shall have colors of green, amber, and red indicating NORMAL, CAUTION, and ALARM condition, respectively. When the Hood Monitor System detects an alarm condition, the red alarm indicator shall blink until the Silence keypad is depressed and then goes to a steady on condition if the alarm condition persists.
10. The Fume Hood Controller shall have all set points stored in nonvolatile memory to avoid loss of information when power is removed from the controller.
11. The Fume Hood controller shall have Max flow feature the commands the controller to a flow control device, (i.e., Venturi air valve, damper, etc) to a maximum flow condition upon initiation by the operator in an emergency situation.
12. The Fume Hood Controller shall have LON based communications protocol, and shall have isolated RS-485 serial communication port, which can support daisy chain connection of up to 255 controllers, and alternatively supports connection directly to a central remote monitoring and data logging system.
13. For each fume hood controller, program the following points and graphics into the existing Delta BMS:

    a. Flow Rate
    b. Relay output statuses
    c. Face velocity set point
    d. Operation Mode (Normal or low flow operation)
    e. Airflow Status (Normal, warning, alarm)
    f. Sash position
    g. Alarm time

2.4 LABORATORY SUPPLY/ EXHAUST VALVES

A. The airflow device shall be shall be formed in a Venturi configuration to produce smooth variation in delivered airflow control.

B. The airflow control device shall be pressure independent over a 0.3” WC to 3.0” WC drop across the valve. An integral pressure independent assembly shall respond and maintain specified airflow within one second of a change in duct static pressure irrespective of the magnitude of pressure and or flow change or quality of airflow controllers on a manifold system.

C. All valves shall be factory calibrated and the CFM modulation range factory set for the maximum and minimum indicated on the schedule. The CFM setting shall be capable of being field adjusted by means of an external calibrated dial

D. Airflow device accuracy shall be ± 5% of reading (not full scale) over an airflow turndown range of no less than 16 to 1. No minimum exit diameters shall be required to ensure accuracy and or pressure independence. The valve shall require no periodic maintenance

E. Valves shall be insulated with ¾” high density closed cell polyethylene. Flame spread rating shall be no more than 25/50

F. Airflow device shall be constructed of one of the following:

1. Class A: The airflow device for non-corrosive airstreams such as supply and general exhaust shall be constructed of 16-gage aluminum. The devices shaft, shaft supports, and shall be made of 316 stainless steel. The pivot arm and connecting linkage shall be aluminum. All shaft and pivot arm bearing surfaces shall be made of Teflon, or polyester or equal.
2. Class B: The airflow device for corrosive airstreams such as fume hood exhaust and biosafety cabinets shall be constructed of 16-gage 316-stainless steel body and cone. The devices shaft, shaft

supports, and shall be made of 316-stainless steel, with Heresite coating. The pivot arm and connecting linkage shall be 316 or 303 Stainless steel. All shaft and pivot arm bearing surfaces shall be made of Teflon, or polyester or equal.

G. Air Flow sensors shall be located in the ductwork before or after the assembly. The sensor design shall have accuracy within 3% when installed per the manufactures instructions. Sensors on Class A supply/exhaust shall be constructed from aluminum. Sensors for Class B exhaust shall be constructed from 316 SS.

H. Valves shall be equipped with a factory mounted electronic actuators furnished by the valve manufacturer. Actuators shall be power by a 24 VAC transformer supplied by the valve manufacture. The actuator supply shall operate over the full range of the valve in 3.0 seconds maximum. Loss of power shall cause the valves to fail to their normal position. Supply valves shall fail to their normally closed or minimum position and exhaust valves shall fail to the normally open or maximum position.

I. Certification:

1. Each airflow control device shall be factory calibrated to the job specific airflows as detailed on the plans and specifications using NIST traceable air stations and instrumentation having a combined accuracy of ± 1% of signal over the entire range or measurement. Electronic airflow devices shall be calibrated and accuracy verified to ± 5% at a minimum of 8 different airflows across the operating range of the device.
2. All Air low devices shall be individually marked with devices specific calibration data including but not limited to tag number, serial number, model number, accuracy verification at 8 different airflows, date, and quality control inspectors' identification.
3. All certification information shall be provided in the as built documentation in written and electronic format.

J. Reheat coils shall be provided by mechanical contractor, see Section 23 82 16 and coil schedule.

2.5 COMPONENTS

A. Wall temperature sensors: Delta BACstat II: DNS-24L\H24LB

1. 10,000 Ohms thermistors
2. 4 programmable buttons
3. LCD display, adjustable setpoint and overrides

B. Transformers: Functional Devices, Inc., TR5VA005; 50VA single hub 120VAC TO 24 VAC transformer.

C. Duct temperature sensors: Greystone Model TE200B7B2

D. HW coil valves: Belimo B2 Series, characterized control valves, chrome-plated brass ball and brass stem. Belimo TR24-SR proportional actuators.

E. Radiant Panel valves: Belimo B2 Series, characterized control valves, chrome-plated brass ball and brass stem. Belimo TFX on/off actuators.

2.6 SEQUENCE OF OPERATIONS

A. The controller can be connected to the Building Automation System via LON 'FTT' communication network interface to provide remote monitoring.

B. Fail Save: All exhaust valves will fail to the full open position upon loss of power to either the controller or actuator, or loss of analog control signal from the controller to the actuator. All supply valves will fail to its minimum position upon loss of power to the controller or actuator, or loss of analog control signal from the controller to the actuator.

C. HMS – Fume Hood Monitoring System

1. The Fume Hood Controller will modulate the Fume Hood's exhaust air valve to maintain the desired face velocity set point. The System's speed of response to sash movement will provide adequate containment of hazardous fumes. Alarms will be enabled whenever the face velocity set point cannot be achieved by the exhaust system, or whenever face velocity rises above the high alarm limit. Audible and visual alarms will be provided locally.
2. The controller shall be connected to the Building Automation System to provide remote monitoring / setpoint adjust.
3. Emergency purge operation is via the 'MAX FLOW' touch-pad button. The Fume Hood's Exhaust valve maximum position will be equal to the Fume Hood's high CFM limit.

D. VAV Supply and General Exhaust

1. The Lab Flow Controller shall modulate the general exhaust air valve and/or the supply air valve, and stage the heating to maintain the room's desired CFM offset setpoint, satisfy room cooling/heating load, and maintain minimum supply air without exhausting excess air.
2. The controller shall be connected to the Building Automation System to provide remote monitoring / setpoint adjustment, and to provide occupied/unoccupied status indication.

E. VAV Supply, General Exhaust, and Fume Hood Exhaust

1. The laboratory control system shall control supply and auxiliary exhaust airflow devices in order to maintain a volumetric offset (negative). Offset shall be maintained regardless of any change in flow or static pressure. This offset shall be field adjustable and represents the volume of air, which will enter (or exit) the room from the corridor or adjacent spaces.
2. The pressurization control algorithm shall sum the flow values of all supply and exhaust airflow devices and command appropriate controlled devices to new set points to maintain the desired offset. The offset shall be adjustable.
3. The Lab Flow Controller will modulate the general exhaust air valve and/or the supply air valve, and stage the heating to maintain the room's desired CFM offset setpoint, satisfy room cooling/heating load, and maintain minimum supply air without exhausting excess air.
4. The System's speed of response to Fume Hood exhaust requirements will provide adequate containment of Room air.
5. The controller shall be connected to the Building Automation System to provide remote monitoring / setpoint adjustment, and to provide occupied/unoccupied status indication.

F. Heating staging:

1. Reheat coil modulate HW valve as required to maintain space setpoint.
2. HW Radiant panels, as a second heating stage, 2-position valve shall operate as required to maintain space setpoint. Panels shall be disabled and remain closed at OA temperatures above 40F.

G. Natural Gas Alarm: Monitor and alarm the gas detector alarm contact specified in Section 23 11 23.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Installation shall meet or exceed all applicable federal, state and local requirements, referenced standards and conform to codes and ordinances of authorities having jurisdiction.

B. All installation and wiring shall be in accordance with manufacturer's published recommendations.

C. Coordinate hood installation provisions with the project hood supplier.

D. Coordinate the placement and installation of the sash position sensor with Project hood supplier or manufacturer.

E. All cable shall be furnished and installed by the BMS contractor. The BMS contractor shall terminate and connect all cables as required. The BMS shall utilize cables specifically recommended by the laboratory airflow controls supplier.

F. Support air valve units individually from structure independent of duct system. Install units horizontal and level in both planes with control enclosures located on the side of the unit and easily accessible.

3.2 SYSTEM START UP

A. System start-up shall be provided by a factory-authorized representative of the LACS manufacturer. Start-up shall include calibrating the fume hood monitor and any combination sash sensing equipment, as required. Start-up shall also provide electronic verification of airflow (fume hood exhaust, supply, make-up, general exhaust or return), system programming and integration to BMS (when applicable).

B. Startup includes physical verification of airflow.

C. The balancing contractor shall be responsible for final verification and reporting of all airflows.

3.3 CLOSEOUT ACTIVITIES

A. Training: The LACS supplier shall furnish a minimum of eight hours of owner training by factory trained and certified personnel. The training will provide an overview of the job specific airflow control components, verification of initial fume hood monitor calibration, general procedures for verifying airflows of air valves and general troubleshooting procedures.

B. Refer to Section 01 79 00 Demonstration and Training.

C. Program: Develop an instruction program that includes individual training for each system and equipment not part of a system, as required by individual Specification Sections.

D. Include instruction for the following:

1. Basis of System Design, Operational Requirements, and Criteria: Include the following:

a. System, subsystem, and equipment descriptions.
b. Equipment function.
c. Operating characteristics.
d. Limiting conditions.

2. Documentation: Review the following items in detail:

    a. Operations and maintenance manuals.
    b. Project Record Documents.

3. Emergencies: Include the following:

    a. Instructions on meaning of warnings, trouble indications, and error messages.
    b. Operating instructions for conditions outside of normal operating limits.
    c. Sequences of operations.
    d. Special operating instructions and procedures.

4. Operations: Include the following, as applicable:

    a. Instructions on meaning of warnings, trouble indications, and error messages.
    b. Startup procedures.
    c. Routine and normal operating instructions.
    d. Control sequences.
    e. Safety procedures.
    f. Seasonal and weekend operating instructions.
    g. Special operating instructions and procedures.

5. Adjustments: Include the following:

    a. Checking adjustments.
    b. Economy and efficiency adjustments.

6. Troubleshooting: Include the following:

    a. Diagnostic instructions.
    b. Test and inspection procedures.

7. Maintenance: Include the following:

    a. Inspection procedures.
    b. Procedures for preventive maintenance.
    c. Procedures for routine maintenance.
    d. Instruction on use of special tools.

END OF SECTION 23 09 50

SECTION 23 11 23 – FACILITY FUEL GAS PIPING

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.

B. Related Sections include the following:

1. Division 2 Sections.
2. Division 23 Section "Common Work Results for HVAC"
3. Division 23 Section "Hangers and Supports" for pipe supports, product descriptions, and installation requirements.

1.2 SUMMARY

A. This Section includes fuel gas piping, specialties, and accessories.

1.3 SUBMITTALS

A. Product Data: For the following:

1. Corrugated, stainless-steel tubing systems. Include associated components.
2. Specialty valves. Include pressure rating, capacity, settings, and electrical connection data of selected models.

1.4 QUALITY ASSURANCE

A. All work shall be performed by technicians holding a Maine Propane and Natural Gas Technician License: “Large Equipment Connection and Service Technician”

B. Installations of natural gas must also comply with all other applicable statutes or rules of the State and all applicable ordinances, orders, rules, and regulations of local municipalities.

C. All work shall be per the following codes. Year edition of code shall be as recognized by the authority with jurisdiction

1. NFPA 54 "National Fuel Gas Code".
2. NFPA 30, Flammable and Combustible Liquids Code

D. FM Standard: Provide components listed in FM's "Fire Protection Approval Guide" if specified to be FM approved.

E. IAS Standard: Provide components listed in IAS's "Directory of A. G. A. and C. G. A Certified Appliances and Accessories" if specified to be IAS listed.

F. UL Standard: Provide components listed in UL's "Gas and Oil Equipment Directory" if specified to be UL listed.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

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

1. Corrugated, Stainless-Steel Tubing Systems:

   a. Omega Flex, Inc.
   b. Titeflex Corp.
   c. Tru-Flex Metal Hose Corp.
   d. Ward Manufacturing, Inc.

2. Valves:

   a. American Valve.
   b. B&K Industries, Inc.
   c. Brass Craft Manufacturing Co.
   d. Conbraco Industries, Inc.; Apollo Div.
   e. Crane Valves.
   f. Grinnell Corp.
   g. Honeywell, Inc.
   h. Key Gas Components, Inc.
   i. McDonald: A. Y. McDonald Mfg. Co.
   j. Milwaukee Valve Co., Inc.
   k. Nibco, Inc.
   l. Mueller Co.; Mueller Gas Products Div.
   m. Watts Industries, Inc.

3. Pressure Regulators:

   a. American Meter Co.
   b. Equimeter, Inc.
   c. Fisher Controls International, Inc.
   d. Maxitrol Co.
   e. National Meter.
   f. Richards Industries, Inc.; Jordan Valve Div.
   g. Schlumberger Industries; Gas Div.

2.2 GAS TURRETS

A. Provide in accordance with Section 22 40 00.

2.3 PIPING MATERIALS

A. Refer to Part 3 "Piping Applications" Article for applications of pipe, tube, fitting, and joining materials.

2.4 PIPES, TUBES, FITTINGS, AND JOINING MATERIALS

A. Steel Pipe: ASTM A 106, ANSI/ASME B36.10, ASTM A 53; Grade B; Schedule 40; black.

1. Malleable-Iron Threaded Fittings: ASME B16.3, Class 150, standard pattern, with threaded ends according to ASME B1.20.1.
2. Unions: ASME B16.39, Class 150, malleable iron with brass-to-iron seat, ground joint, and threaded ends according to ASME B1.20.1.
3. Cast-Iron Flanges and Flanged Fittings: ASME B16.1, Class 125.
4. Steel Threaded Fittings: ASME B16.11, forged steel with threaded ends according to ASME B1.20.1.
5. Joint Compound and Tape: Suitable for natural gas.
6. Gasket Material: Thickness, material, and type suitable for natural gas.

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

1. Striker Plates: Steel, designed to protect tubing from penetrations.
2. Manifolds: Malleable iron or steel with protective coating. Include threaded connections according to ASME B1.20.1 for pipe inlet and corrugated tubing outlets.

C. Transition Fittings: Type, material, and end connections to match piping being joined.

D. Common Joining Materials: Refer to Division 23 Section "Common Work Results for HVAC" for joining materials not in this Section.

2.5 SPECIALTY VALVES

A. Appliance Connector Valves: ANSI Z21.15 and IAS listed.

B. Gas Stops: Bronze body with AGA stamp, plug type with bronze plug and flat or square head, ball type with chrome-plated brass ball and lever handle, or butterfly valve with stainless-steel disc and fluorocarbon elastomer seal and lever handle; 2-psig minimum pressure rating.

2.6 UTILITY CONTROLLER – VALVE BOX

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
1. American Gas Safety
2. Isimet

B. Provide a Utility Controller with door panel mounted switches to activate remote solenoids and relays to control the natural gas and electrical convenience outlets at student work stations. The Controller shall be equipped with a key activated safety switch and door panel mounted momentary panic button assembly. Controller shall be integrated with the energy management system and monitored by the building alarm system.

C. Panic button shall be recessed or covered (Not mushroom type) to avoid inadvertent shutdowns.

D. Utility Controller shall comply with Underwriter's Laboratory UL916 Standards. Controller shall have integral printed circuit board with Microprocessor with built-in programming features. Unit to provide low voltage signals for output circuits. The Controller shall be equipped with an enabling key switch that restricts activation of output circuits to the Instructor. Deactivation of output circuits shall not require engagement of enabling key. Controller shall be provided with a door panel mounted momentary panic button assembly.

E. The gas solenoid shall fail closed upon loss of power.

F. Provide a natural gas detector in order to detect raw fuel gas within the classroom; recessed wall mounting with white finish. Mount adjacent to the utility controller.

G. Punchings, piping, fittings and gas valve shall be provided by contractor.

H. Finish: Stainless steel

I. Mounting: Recessed, shall fit into a standard 3-5/8" stud wall.

PART 3 - EXECUTION

3.1 PREPARATION

A. Close equipment shutoff valves before turning off fuel gas to premises or section of piping. Perform leakage test as specified in "Field Quality Control" Article to determine that all equipment is turned off in affected piping section.

B. Comply with ANSI Z223.1, "Prevention of Accidental Ignition" Paragraph.

3.2 PIPING APPLICATIONS

A. Flanges, unions, transition, and special fittings with pressure ratings same as or higher than system pressure rating may be used in applications below, unless otherwise indicated.

B. Fuel Gas Piping: Use the following:

1. NPS 1 and Smaller: steel pipe, malleable-iron threaded fittings, and threaded joints. Option: Corrugated, stainless-steel tubing may be used for runouts at individual appliances.
2. NPS 1-1/4 to NPS 2: Steel pipe, malleable-iron threaded fittings, and threaded joints.

3.3 VALVE APPLICATIONS

A. Appliance Shutoff Valves for Pressure 0.5 psig or Less: Appliance connector valve or gas stop.

3.4 PIPING INSTALLATION

A. Refer to Division 22 Section "Common Work Results for HVAC" for basic piping installation requirements.

1. Drips and Sediment Traps: Install drips at points where condensate may collect. Locate where readily accessible for cleaning and emptying. Construct drips and sediment traps using tee fitting

with bottom outlet plugged or capped. Use minimum-length nipple of 3 pipe diameters, but not less than 3 inches long, and same size as connected pipe. Install with space between bottom of drip and floor for removal of plug or cap.

2. Conceal pipe installations in walls, pipe spaces, utility spaces, above ceilings, unless indicated to be exposed to view.
3. Install fuel gas piping at uniform grade of ¼" per 15 feet.
4. Use eccentric reducer fittings to make reductions in pipe sizes. Install fittings with level side down.
5. Connect branch piping from top or side of horizontal piping.
6. Install unions adjacent to each valve, at final connection to each piece of equipment, and elsewhere as indicated. Unions are not required on flanged devices.
7. Install corrugated, stainless-steel tubing system according to manufacturer's written instructions. Include striker plates to protect tubing from puncture where tubing is restrained and cannot move.
8. Install strainer on inlet of each line pressure regulator and automatic and electrically operated valve.
9. Install vent piping for gas pressure regulators and gas trains, extend outside building, and vent to atmosphere. Terminate vents with turned-down, reducing-elbow fittings with corrosion-resistant insect screens in large end.
10. Refer to Division 23 Section "Common Work Results for HVAC" for basic piping joint construction.

B. Concealed Locations: Except as specified below, install concealed gas piping in airtight conduit constructed of Schedule 40, seamless, black steel pipe with welded joints. Vent conduit to outside and terminate with screened vent cap.

1. Above-Ceiling Locations: Gas piping may be installed in accessible spaces, subject to approval of authorities having jurisdiction, whether or not such spaces are used as plenums. Do not locate valves above ceilings.
2. In Partitions: Do not install concealed piping in solid partitions. Protect tubing from physical damage when installed inside partitions or hollow walls. Exception: Tubing passing through partitions or walls.
3. In Walls: Gas piping with welded joints and protective wrapping specified in "Protective Coating" Article in Part 2 may be installed in masonry walls, subject to approval of authorities having jurisdiction.

3.5 HANGERS AND SUPPORTS

A. Hanger, support, and anchor devices are specified in Division 23 Section "Hangers and Supports."

B. Support gas piping in accordance with NFPA 54. Steel pipe spacing of supports: ½" pipe = 6 feet; ¾" or 1" = 8 feet; 1-1/4" and larger = 10 feet.

3.6 CONNECTIONS

A. Drawings indicate general arrangement of fuel gas piping, fittings, and specialties.

B. Install piping adjacent to appliances to allow service and maintenance.

C. Connect piping to appliances using gas with shutoff valves and unions. Install valve upstream from and within 72 inches of each appliance. Install union downstream from valve.

D. Sediment Traps: Install tee fitting with capped nipple in bottom to form drip, as close as practical to inlet of each appliance using gas.

3.7 FIELD QUALITY CONTROL

A. Inspect, test, and purge piping according to ANSI Z223.1, Part 4 "Inspection, Testing, and Purging," and requirements of authorities having jurisdiction.

B. Repair leaks and defects with new materials and retest system until satisfactory results are obtained.

C. Report test results promptly and in writing to Architect and authorities having jurisdiction.

D. Verify capacities and pressure ratings of valves, and specialties.

E. Verify correct pressure settings for pressure regulators.

F. Verify that specified piping tests are complete.

END OF SECTION 23 11 23

SECTION 23 31 13 - DUCTWORK

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.

B. Related Sections include the following:

1. Division 23 Section "Common Work Results for Mechanical"
2. Division 23 Section "Mechanical Insulation"
3. Division 23 Section "Air Terminals"
4. Division 23 Section "Diffusers, Registers, and Grilles."
5. Division 23 Control Section
6. Division 23 Section "Testing, Adjusting, and Balancing".

1.2 SUMMARY

A. This Section includes metal ducts and accessories for heating, ventilating, and air-conditioning systems.

1.3 SYSTEM DESCRIPTION

A. Drawings show the general layout of ductwork and accessories but do not show all required fittings and offsets that may be necessary to connect ducts to equipment, diffusers, grilles, etc., and to coordinate with other trades. Fabricate ductwork based on field measurements. Provide all necessary fittings and offsets. Coordinate with other trades for space available and relative location of HVAC equipment and accessories on ceiling grid. Duct sizes on the drawings are inside dimensions, which maybe altered by Contractor to other dimensions with the same air handling characteristics where necessary to avoid interferences and clearance difficulties.

B. The contractor must comply with the enclosed specification in its entirety. If on inspections, the engineer finds changes have been made without prior written approval, the contractor will make the applicable changes to comply with this specification, at the contractor’s expense.

C. At the discretion of the engineer, sheet metal gauges, and reinforcing may be randomly checked to verify all duct construction is in compliance.

1.4 SUBMITTALS

A. Ductwork:

1. Material, gage, type of joints, sealing materials, and reinforcing for each duct size range, including sketches or SMACNA plate numbers for joints, method of fabrication and reinforcing.
2. Fabrication, assembly, and installation, including plans, elevations, sections, components, and attachments to other work.
3. Duct layout indicating pressure classifications and sizes on plans.
4. Fittings.

5. Reinforcement and spacing.
6. Seam and joint construction.
7. Penetrations through fire-rated and other partitions.
8. Terminal unit, coil, and related installations.
9. Hangers and supports, including methods for building attachment

B. Ductwork Specialties Product Data; provide for the following:

1. Sealant
2. Duct-mounted access doors and panels.
3. Flexible ducts.
4. Manual-volume dampers: Damper manufacturer's printed application and performance data including pressure, velocity and temperature limitations shall be submitted for approval.

C. Field Test Reports: Indicate and interpret test results for compliance with performance requirements.

D. Record Drawings: Indicate actual routing, fitting details, reinforcement, support, and installed accessories and devices.

1.5 APPLICABLE PUBLICATIONS

A. The publications listed below form a part of this specification to the extent referenced. The publications are referenced in the text by the basic designation only.

B. National Fire Protection Association (NFPA):

1. 90A: Standard for the Installation of Air Conditioning and Ventilating Systems

C. Sheet Metal and Air Conditioning Contractors National Association (SMACNA):

1. 3rd Edition: 2005 HVAC Duct Construction Standards, Metal and Flexible
2. 1st Edition: 1985 HVAC Air Duct Leakage Test Manual

1.6 DELIVERY, STORAGE, AND HANDLING

A. Deliver sealant and fire stopping materials to site in original unopened containers or bundles with labels indicating manufacturer, product name and designation, color, expiration period for use, pot life, curing time, and mixing instructions for multi-component materials.

B. Deliver, store and handle materials according to manufacturer's written recommendations.

C. All ductwork, equipment, and fittings delivered and stored on the job site must be capped to prevent the entry of moisture, construction dust or other debris.

PART 2 - PRODUCTS

2.1 SHEET METAL MATERIALS

A. SMACNA: Gages of materials, fabrication, reinforcement, sealing requirements, installation, and method of supporting ductwork shall be in accordance with the following SMACNA manuals. Conform to the applicable requirements of NFPA 90A, 91, 96, and 101.

B. Galvanized, Sheet Steel, normal service: Lock-forming quality; ASTM A653, G60.

C. Stainless Steel: ASTM A480/A480M, Type 316, sheet form with No. 4 finish for surfaces of ducts exposed to view; and Type 304, sheet form with No. 1 finish for concealed ducts.

D. Reinforcement Shapes and Plates: Galvanized steel reinforcement where installed on galvanized, sheet metal ducts; compatible materials for aluminum and stainless-steel ducts.

E. Tie Rods: Galvanized steel, 1/4-inch minimum diameter for 36-inch length or less; 3/8-inch minimum diameter for lengths longer than 36 inches.

2.2 PVC DUCTS AND FITTINGS

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

1. General Plastics, Inc.
2. GPK Products, Inc.
3. Harvel Plastics, Inc.
4. Kroy Industries, Inc.
5. Northern Pipe Product Inc.; an Otter Tail company.
6. Plastinetics Inc.
7. Spears Manufacturing Company.

B. Duct and Fittings:

1. Round Duct: Comply with cell Classification 12454-B in ASTM D 1784, with external loading properties of ASTM D 2412.
2. Round Fittings: Socket end molded of same material, pressure class, and joining method as duct.
3. Rectangular Fittings: Minimum 0.125-inch-thick flat sheet with heat-formed corners and continuous welded butt joints.

C. Joining Materials: PVC solvent cement complying with ASTM D 2564.

D. Provide corrosion-proof Blast Dampers are for the construction of exhaust ventilation systems. CPVC material compounds used in the manufacture of these duct fittings conform to Type VI, Grade 1 CPVC, Cell Class 23447 as described in ASTM D-1784. Dampers shall be fully adjustable and lockable for balancing. All sizes have a 3/16" thick gate. Maximum service temperature is 200°F. Fittings shall be triple bead welded.

E. Fabrication:

1. Fabricate joints, seams, transitions, reinforcement, elbows, branch connections, and access doors and panels according to SMACNA's "Thermoplastic Duct (PVC) Construction Manual," Chapter 3, "Standards of Construction for PVC Duct Systems."
2. Fabricate 90-degree rectangular mitered elbows to include turning vanes, 90-degree round elbows with a minimum of three segments for 12 inches and smaller and a minimum of five segments for 14 inches and larger.

2.3 RECTANGULAR DUCT FABRICATION

A. General: Fabricate ducts, elbows, transitions, offsets, branch connections, and other construction with sheet steel, according to SMACNA's "HVAC Duct Construction Standards--Metal and Flexible."

Comply with requirements for metal thickness, reinforcing types and intervals, tie-rod applications, and joint types and intervals.

1. Lengths: Fabricate rectangular ducts in lengths appropriate to reinforcement and rigidity class required for pressure classification.
2. Materials: Free from visual imperfections such as pitting, seam marks, roller marks, stains, and discolorations.
3. Maximum allowable deflection for transverse joints and intermediate reinforcements will not exceed 0.250 inch.
4. Longitudinal Seams: Pittsburgh lock shall be used on all longitudinal seams. Snap-lock seams are not acceptable.
5. If SMACNA seal class A or B is specified, the longitudinal seam shall be sealed from the inside.

B. Slide-on Transverse Joint Connectors: Prefabricated slide-on transverse duct connectors and components will be accepted. Duct constructed using prefabricated systems will refer to the manufacturer guidelines for sheet gauge, intermediate reinforcement size and spacing, and proper joint reinforcement(s). Approved connection systems: Ductmate Industries: or W.D.C.I.

C. Cross Breaking or Cross Beading: Cross break or cross bead duct sides 19 inches and larger and 0.0359 inch thick or less, with more than 10 sq. ft. of un-braced panel area, unless ducts are lined. All large ducts must be braced as required to prevent drumming.

D. Fittings per SMACNA acceptable, specific fittings requirements below:

1. Fig. 2-3 Rectangular Elbows: Type RE2 square throat with vanes, Type RE1 radius, or Type RE5 dual radius.
2. Vane support in elbows: Fig 2-4. Turning vanes shall be Harper double wall turning vanes fabricated from the same material as the duct. Mounting rails shall have friction insert tabs that align the vanes automatically. Tab spacing shall be as specified in Figure 2-3 of the 1995 SMACNA Manual, “HVAC Duct Construction Standards, Metal & Flexible” Second Edition standard. Rail systems with non-standard tab spacing shall not be accepted. Due to tensile loading, vanes shall be capable of supporting 250 pounds when secured according to the manufacturer’s instructions.
3. Fig. 2-5 Rectangular Divided Flow Branches: Type 1, Type 2, Type 4A, or 4B.
4. Fig. 2-6 Branch Connections: 45-degree entry, 45-degree lead-in, bell-mouth or spin-in (single diffuser supply only).
5. Fig. 2-7 Offsets and Transitions. Use gradual offsets as shown, 90-degree offsets shall be avoided.
6. Fig 2-9 Duct Coils: Hot water heating coils with transitions and access door as shown.

2.4 ROUND DUCT FABRICATION

A. Fabricate supply ducts of galvanized steel according to SMACNA's "HVAC Duct Construction Standards--Metal and Flexible" latest edition.

B. Round ducts shall be longitudinal Grooved Seam Flat lock (RL-5 seam) at 2-inch wg construction. Snap lock seams *shall not* be used for this project.

C. Round Joints: Interior slip coupling beaded at center and fastened to duct with screws shall be used to join ducts. Seal joint with an approved sealing compound, continuously applied around joint prior to assembling and after fastening, making certain that majority of sealant resides on interior of the joint.

2.5 SEALANT MATERIALS

A. Joint Sealant/Mastic: Shall be flexible, water-based, adhesive sealant designed for use in all pressure duct systems. After curing, it shall be resistant to ultraviolet light and shall prevent the entry of water, air and moisture into the duct system. Sealer shall be UL 723 and UL 181 listed and meet NFPA 90A requirements.

1. Maximum 5 flame spread and 0 smoke-developed (ASTM E-84 Tunnel Test).
2. Generally provide liquid sealant for low clearance slip joints and heavy, permanently elastic, mastic type where clearances are larger.
3. Resistance to mold, mildew and water: Excellent
4. Color: Gray
5. Duct sealant/mastic shall meet requirement for "LEED IEQ Credit 4.1: Low Emitting Materials: Adhesive and Sealant". ITW TACC Miracle Kingco water-based sealants, or approved equal.

B. Flange Gasket: A butyl rubber gasket which complies with UL Standard 181 and 723 testing and meets Mil-C 18969B and TTS-S-001657. This material, in addition to the above, shall not contain vegetable oils, fish oils, or any other type vehicle that will support fungal and/or bacterial growth. Approved: Ductmate 440 Butyl gasket tape.

2.6 HANGERS AND SUPPORTS

A. Building Attachments: Fasteners appropriate for building materials. Provide per SMACNA Fig's. 4-1, 4-2, and 4-3.

1. Sheet Metal Screws, Machine Bolts and Nuts: Same material as duct, unless otherwise specified.
2. C Clamps: Fee & Mason Co.'s 255L with locking nut, and 255S with retaining strap.
3. Metal Deck Ceiling Bolts: B-Line Systems, Inc.'s Fig. B3019.
4. Welding Studs: Erico Fastening Systems, capacitor discharge, low carbon steel, copper flashed.
5. Structural (carbon) Steel Shapes and Steel Plates: ASTM A36, shop primed.
6. Stainless Steel Shapes and Plates: ASTM A276 and ASTM A666.
7. Machine Bolt Expansion Anchors: Non-caulking single unit type: FS FF-S-325, Group II, Type 2, Class 2, Style 1; Non-caulking double unit type: FS FF-S-325, Group II, Type 2, Class 2, Style 2; Self-drilling type: FS FF-S-325, Group III, Types 1 and 2.

B. Hanger Materials: Sheet steel or round, threaded steel rod. Straps and Rod Sizes: Comply with SMACNA for sheet steel width and thickness and for steel rod diameters.

1. Duct Attachments: Strap hangers, angles, trapezes, and rods per SMACNA Fig. 4-4. Wire supports are not permitted.
2. Sheet metal screws, blind rivets, or self-tapping metal screws; compatible with duct materials.
3. Trapeze and Riser Supports: Steel shapes complying with ASTM A36/A36M.

C. Dissimilar Metals: Separate dissimilar metals used for ductwork with 12 oz vinyl coated woven fiberglass duct connector fabric, such as Duro Dyne's Glasseal. No separation is required between screws or rivets and the materials in which they are inserted.

D. Steel Cable End Connections: Cadmium-plated steel assemblies with brackets, swivel, and bolts designed for duct hanger service; with an automatic-locking and clamping device.

2.7 FITTINGS

A. Tees, Laterals, and Conical Tees: Use 45 degree; fabricate to comply with SMACNA's "HVAC Duct Construction Standards--Metal and Flexible," with metal thicknesses specified for longitudinal seam straight duct.

B. Diverging-Flow Fittings: Fabricate with a reduced entrance to branch taps with no excess material projecting from body onto branch tap entrance.

C. Elbows: Diameters 3 through 8 inches shall be two-section die stamped; all others shall be gored construction, maximum 18 degree angle, with all seams continuously welded or standing seam. Coat galvanized areas of fittings damaged by welding with corrosion resistant aluminum paint or galvanized repair compound.

2.8 MANUAL-VOLUME DAMPERS

A. Manual balancing dampers meeting the following specifications shall be furnished and installed on all branch ducts and where shown on plans. Testing and ratings to be in accordance with AMCA Standard 500-D.

B. Single-Blade Rectangular Dampers shall consist of: an 18 ga. galvanized steel frame with 3-1/2 in. depth; blades fabricated from 20 ga. galvanized steel; integral 1/2 in. dia axles. Damper suitable for pressures to 1.0 in. wg, velocities to 2000 fpm and temperatures to 180°F. Basis of design is Greenheck model MBD-10.

C. Multi-Blade Rectangular Dampers shall consist of: a 16 ga. galvanized steel hat channel frame with 5 in. depth; triple V type blades fabricated from 16 ga. galvanized steel; ½ in. dia. plated steel axles; external (out of the airstream) blade-to-blade linkage. Damper suitable for pressures to 4.0 in. w.g. (996 Pa), velocities to 2000 fpm and temperatures to 180°F. Basis of design is Greenheck model MBD15.

D. Round dampers shall consist of: a 20 ga. galvanized steel frame with 6 in. depth; blades fabricated from 20 ga. galvanized steel; 3/8 in. square plated steel axles turning in acetal bearings. Damper suitable for pressures to 1.0 in. wg, velocities to 2000 fpm and temperatures to 180°F. Basis of design is Greenheck model MBDR50.

E. Hood exhaust system dampers shall be 316 stainless steel blastgates; bolt together body to allow disassembly for cleaning. Welded collars or angle ring flanges.

2.9 DUCT-MOUNTED ACCESS DOORS

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

1. Ductmate Industries, Inc.
2. Greenheck Fan Corporation.
3. McGill Air Flow LLC.
4. Nailor Industries Inc.
5. Cesco
6. Buckley

B. Duct-Mounted Access Doors: Fabricate access panels according to SMACNA's "HVAC Duct Construction Standards - Metal and Flexible"; Figures 2-10, "Duct Access Doors and Panels," and 2-11, "Access Panels - Round Duct."

1. Door:

    a. Double wall, rectangular; rated for up to 4.5” static pressure.
    b. Door panel filled with 1" fiberglass insulation; ¾ lb. density.
    c. Hinges and Latches: 1-by-1-inch continuous piano hinge and cam latches.
    d. Fabricate doors airtight and suitable for duct pressure class.

2. Frame: Galvanized sheet steel, with bend-over tabs.
3. Provide 1/8” thick neoprene gaskets.
4. Number of Hinges and Locks: No hinges and two cam locks.

2.10 FLEXIBLE DUCTS

A. General: Comply with UL 181, Class 0 0r 1. Flame Spread: Less than 25; Smoke Developed: Less than 50.

B. All products shall be certified by Greenguard Environmental Institute; independent testing of products for emissions of respirable particles and Volatile Organic Compounds (VOC’s), including formaldehyde and other specific product-related pollutants. Greenguard provides independent, third-party certification of IAQ performance. Certification is based upon criteria used by EPA, OSHA and WHO.

C. Rated Positive Pressure: 10" w.g. per UL-181. Maximum negative pressure: ¾”.

D. Flexible Ducts, Insulated: Factory-fabricated, insulated, round duct, with an outer jacket enclosing 1-1/2-inch-thick (R = 6.0), glass-fiber insulation around a continuous inner liner.

1. Reinforcement: Steel-wire helix encapsulated in inner liner.
2. Outer Jacket: Polyethylene film.
3. Inner Liner: Polyethylene film.

E. Flexible Duct Clamps: Stainless-steel band with cadmium-plated hex screw to tighten band with a worm-gear action, in sizes 3 to 18 inches to suit duct size. Hangers shall be band type, 1” wide minimum.

2.11 LAB SPECIALTIES

A. Airflow Direction Indicator: Provide at main door way to Lab.

1. The product shall be a Baulin-tube® indicator manufactured by Airflow Direction Incorporated (Toll-Free 888-334-4545, or approved equal. The unit shall come with an adhesive backed, laminated 3.5”x3.5” wall label describing the operation of the airflow direction indicator. The model number shall be shown on the plans; negative room visual only application.
2. Intent - Room airflow direction indicator shall indicate the status of the directional airflow into the lab spaces.
3. Reliability - For increased reliability, the status indication shall be via a visual-only primary element that does not utilize any electricity. The visual indicator shall display a degradation of the desired one directional airflow prior to a neutral or reversal of directional airflow.
4. Smoke-Limiting – Per NFPA, room walls shall limit smoke migration which includes any openings in walls. The primary element of the airflow direction indicator shall incorporate a means of stopping airflow through the element when the room door is closed and the room is under proper negative or positive pressure. This shall be accomplished via ADI’s patented endcap design, where the indicating sphere closes-off the tube endcap during proper room pressure.
5. Warranty - The visual components shall carry a lifetime warranty against breakage, i.e. the tube, endcaps, indicating sphere, backplates and clear dome covers.

6. Failsafe Checking - For safety purposes, the indicator shall be installed with a tilt described in the installation documents. The indicator shall display a self-check for failure each time the airlock or door is opened. This is accomplished by the indicating sphere rolling to its failsafe position (corridor for negative rooms, inside room for positive rooms, in the wall for switchable rooms) when the door to the room is opened. The indicating sphere should go back to its proper position (in the room for negative rooms, in the corridor for positive rooms) when the door is closed.
7. Label - Each indicator installed shall have a small, laminated sign provided next to it describing the intent and operation of the indicator.

PART 3 - EXECUTION

3.1 MATERIALS

A. Hangers, accessories, and dampers shall be same material as parent duct.

B. All ducts shall be G60 galvanized steel except as follows:

1. Hood Exhaust (HE):

a. Type 316, stainless-steel sheet. Exposed to View: No. 4 finish; Concealed: No. 1 finish.
b. Pitch 1/8” per foot toward hood drops to allow for drainage and corrosion with drip-proof seams at the hood connection. Duct seams welded liquid-tight.
c. Exhaust duct must have liquid and airtight joints with smooth interior surfaces free of cracks, joints, or ledges.

2. Cables for Stainless-Steel Ducts: Stainless steel complying with ASTM A492.

3.2 DUCT CLASSIFICATIONS AND SEALING

A. Static-Pressure Classifications: Unless otherwise indicated, construct ducts to the following:
1. Supply Ducts: 2-inch wg.
2. Return Ducts: 2-inch wg, negative pressure.
3. General Exhaust Ducts: 2-inch wg, negative pressure.

B. Seam And Joint Sealing

1. General: Seal duct seams and joints according to the duct pressure class indicated and as described in SMACNA's "HVAC Duct Construction Standards--Metal and Flexible."
2. Seal to SMACNA Class A; all joints, longitudinal and transverse seams, and connections in ductwork shall be securely fastened and sealed with welds, gaskets, or duct sealant.

C. Lab Exhaust

1. Provide PVC ducts and fittings to comply with SMACNA's "Thermoplastic Duct (PVC) Construction Manual."

D. Seal externally insulated ducts before insulation installation.

3.3 DUCT INSTALLATION, GENERAL

A. Construct and install each duct system for the specific duct pressure classification indicated.

B. Properly seam, brace, stiffen, support and render ducts mechanically airtight. Adjust ducts to suit job conditions. Dimensions may be changed as approved, if cross sectional area is maintained.

C. Install ducts in lengths not less than 12 feet, unless interrupted by fittings. Install ducts with fewest possible joints.

D. Install fabricated fittings for changes in directions, changes in size and shape, and connections.

E. Install couplings tight to duct wall surface with a minimum of projections into duct.

F. Install ductwork to allow maximum headroom. Install ducts, unless otherwise indicated, vertically and horizontally, parallel and perpendicular to building lines; avoid diagonal runs. Install ducts close to walls, overhead construction, columns, and other structural and permanent enclosure elements of building.

G. Install ducts with a clearance of 1 inch, plus allowance for insulation thickness.

H. Conceal ducts from view in finished spaces. Do not encase horizontal runs in solid partitions, unless specifically indicated.

I. Coordinate layout with suspended ceiling, lighting layouts, and similar finished work.

3.4 DUCT PENETRATIONS

A. Where ducts pass through walls or partitions, the opening in the construction around the duct shall be as follows:

1. Not exceeding a 1” average clearance on all sides.
2. Filled solid with firestopping material as specified in Section 23 05 00.

B. Flexible air ducts or connectors shall not pass through any wall, floor, or ceiling.

3.5 HANGING AND SUPPORTING

A. Install duct with support systems indicated in SMACNA's "HVAC Duct Construction Standards--Metal and Flexible."

1. Support horizontal ducts within 24 inches of each elbow and within 48 inches of each branch intersection.
2. Support horizontal ducts at a maximum interval of 10 feet.
3. Support vertical ducts at a maximum interval of 16 feet and at each floor.
4. Secure upper hanger attachments to structural steel or steel bar joists wherever possible.
5. Do not use drive-on beam clamps, flat bars or bent rods, as upper hanger attachments.
6. Do not attach hangers to pre-cast concrete planks less than 2-3/4 inches thick.
7. Avoid damage to reinforcing members in concrete construction.

8. Metallic fasteners installed with electrically operated or powder driven tools may be used as upper hanger attachments, in accordance with the SMACNA Manual, with the following exceptions:

   a. Do not use powder driven drive pins or expansion nails.
   b. Do not attach powder driven or welded studs to structural steel less than 3/16 inch thick.
   c. Do not support a load, in excess of 250 lbs from any single welded or powder driven stud.
   d. Do not use powder driven fasteners in pre-cast concrete.

9. Install upper attachments to structures with an allowable load not exceeding one-fourth of failure (proof-test) load.

3.6 FLEXIBLE DUCT

A. Provide in accordance with manufacturer's and Air Diffusion Council recommendations.

B. Flexible ducts hall be supported at manufacturer's recommended intervals, but at no greater distance than 5 feet. Maximum permissible sag is ½" per foot of spacing between supports.

C. Install duct fully extended; do not install in the compressed state or use excess lengths.

D. Avoid bending ducts across sharp corners or incidental contact with metal fixtures, pipes, conduits, or hot equipment. Radius at centerline shall not be less than one duct diameter.

E. Hanger or saddle material in contact with the duct shall be at least 1-1/2" wide.

F. Provide at least 2 duct diameters of straight duct at the entrance to register, grilles, and diffusers.

3.7 FUME HOODS AND BIO SAFETY CABINETS

A. Refer to Laboratory Equipment Schedule on plans.

B. Provide duct hookups per manufacturer's instructions.

3.8 AIRFLOW DIRECTION INDICATOR

A. The HVAC system shall be operational with a proper directional minimum differential pressure of 0.01 inches of water column prior to the installation and testing of the indicators.

B. Mount and test the indicators for proper operation. The installation shall be per the manufacturer's installation instructions. Turn over the pitch levels and installation instructions to the Owner during job start-up.

3.9 DUCT ACCESSORIES INSTALLATION

A. Install duct accessories according to applicable details shown in SMACNA's "HVAC Duct Construction Standards - Metal and Flexible".

B. Provide duct transitions, offsets and connections to dampers, coils, and other equipment in accordance with SMACNA Standards

C. Each register, grille, or diffuser shall have a means of air flow adjustment. Provide volume damper in branch duct if not furnished with the RGD.

D. Adjust operable devices for proper action.

E. Perform the following as directed by the controls contractor: Installation of air terminal units.

F. Install duct access panels for access components that require servicing.

1. Install duct access panels to allow access to interior of ducts for cleaning, inspecting, adjusting, and maintaining per equipment manufacturers' requirements.
2. Install access panels on side of duct where adequate clearance is available.
3. Locate panel upstream and/or downstream as recommended by manufacturer.

3.10 FIELD QUALITY CONTROL

A. HVAC systems shall not be operated during construction.

B. Upon completion of installation duct systems and before HVAC system start-up, visually inspect the ductwork proper installation

C. All ductwork shall be provided with temporary enclosures to keep the HVAC system free of dust and construction debris. Confirm that the duct system is free from construction debris. Check all registers, grilles, and diffusers to ensure that they are clean and free from construction debris. If no contaminants are evident through visual inspection, the HVAC system shall be considered clean; however, the Owner reserves the right to further verify system cleanliness through Surface Comparison Testing or the NADCA vacuum test specified in the NADCA standards. If visible contaminants are evident through visual inspection, those portions of the system where contaminants are visible shall be cleaned and subjected to re-inspection for cleanliness. If cleaning is required, the procedures of the National Air Duct Cleaners Association (NADCA) General Specifications for the Cleaning of Commercial HVAC Systems (free download) shall be followed. Costs of this work shall be borne by Division 23.

D. Hood Exhaust ductwork shall be pressure tested. Comply with precautions and procedures listed in the current SMACNA HVAC Air Duct Leakage Test Manual.

1. Connect a blower to the duct specimen through a shutoff valve. Provide a magnehelic gauge or inclined manometer with 0 to 10 inch W.G. range on the duct side of the shutoff valve.
2. Provide temporary seals at all open ends of the duct.
3. Average test pressure shall be 6 inches W.G. Initial pressure shall be 7 inches W.G.
4. All fume duct joints from the fume hood collars to point of connection to existing ductwork shall be tested.
5. To prevent over-pressurizing the ducts, start the blower with the variable inlet damper closed. Controlling pressure carefully, pressurize the duct section to the required level. When the pressure of the duct reaches 7 inches W.G., close the shutoff valve.
6. Using a stopwatch, measure the time elapsed from when the duct is at 7 inches W.G. to 5 inches W.G. Use the formula t=6.23D to determine if the duct passes the test. ("D" is the nominal duct diameter, measured in inches; "t" is the MINIMUM allowable elapsed time, measured in seconds.)
7. If the test fails to meet the allowable rate, make necessary repairs and retest until satisfactory results are obtained. Contact the Owner's Commissioning Representative to witness the test.
8. Complete test reports.

END OF SECTION 23 31 13

SECTION 23 37 13 - DIFFUSERS, REGISTERS, AND GRILLES

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.

B. Related Sections include the following:

1. Division 23 Section "Common Work Results for HVAC"
2. Division 23 Section "Ductwork"
3. Division 23 Section "Testing, Adjusting, and Balancing" for balancing diffusers, registers, and grilles.

1.2 SUMMARY

A. This Section includes ceiling- and wall-mounted diffusers, registers, and grilles.

1.3 SUBMITTALS

A. Each manufacturer shall check noise level ratings for registers and diffusers to insure that the sizes selected will not produce noise to exceed 30 db, "A" scale, measured at occupant level; notify Owner’s representative of problems prior to shop drawing submittal.

B. Pressure drop, airflow and noise criteria selection is based on design equipment. Manufacturers not submitting design makes must provide written certification in front of submittal that equipment submitted has been checked against and performs equal to the design make.

C. Product Data: For each model indicated, include the following:

1. Data Sheet: For each type of air outlet and inlet, and accessory furnished; indicate construction, finish, and mounting details.
2. Performance Data: Include throw and drop, static-pressure drop, and noise ratings for each type of air outlet and inlet.
3. Schedule of diffusers, registers, and grilles indicating drawing designation, room location, quantity, model number, size, and accessories furnished.
4. Assembly Drawing: For each type of air outlet and inlet; indicate materials and methods of assembly of components.

D. Coordinate locations with reflected ceiling plans and wall elevations as applicable.

E. Coordinate mounting frame with associated mounting surface.

1.4 QUALITY ASSURANCE

A. Product Options: Drawings and schedules indicate specific requirements of diffusers, registers, and grilles and are based on the specific requirements of the systems indicated. Other manufacturers'

products with equal performance characteristics may be considered. Refer to Division 1 Section "Substitutions."

B. NFPA Compliance: Install diffusers, registers, and grilles according to NFPA 90A, "Standard for the Installation of Air-Conditioning and Ventilating Systems."

C. Sound pressure levels shall be determined by using AHRI Standard 885-2008 “Procedure for Estimating Occupied Space Sound Levels in the Application of Air Terminals and Outlets”.

PART 2 - PRODUCTS

2.1 GENERAL

A. Diffusers, registers, and grilles are scheduled on Drawings.

B. Mounting type shall match the mounting surface. Coordinate with mounting conditions.

C. Material shall match the specified ductwork. Coordinate with Section 23 31 13 “Ductwork”.

D. Testing: Test performance according to ASHRAE 70, "Method of Testing for Rating the Performance of Air Outlets and Inlets."

E. Grilles shall be finished in White Powder Coat, unless noted otherwise.

F. Manufacturers

1. Price
2. Titus
3. Metal-Aire
4. Anemostat
5. Nailor

2.2 RETURN OR EXHAUST

A. Return/Exhaust Grille, 45-degree deflection

1. Material: aluminum (Price 630 Series)
2. Provide damper as scheduled.
3. Grilles of the sizes indicated on the plans. Grilles shall be 45 degree deflection fixed louver type with blades spaced 3/4" on center. The blades shall run parallel to the long dimension of the grille.

2.3 SUPPLY

A. Flush Face Radial Flow Adjustable Diffuser

1. Supply and install Price FRFDA Flush Face Radial Flow diffuser of the sizes and capacities indicated on the drawings or diffuser schedule.
2. Diffusers shall be designed to handle large volumes of air in confined spaces with maximum comfort and low room air velocities.
3. Diffuser shall be constructed of air deflector blades below an equalization baffle. The entire face of the diffuser shall lay even with the ceiling line, no part of the diffuser shall project below the

ceiling system. Face frame, border and deflector blades components shall be constructed of aluminum. Equalization baffle and plenum may be provided in painted steel.

4. Each diffuser shall be adjustable to supply a precise, repeatable full two-way radial, full one-way radial, two-way horizontal or vertical, non-aspirating, low velocity air pattern. Pattern adjustments must be effected by setting pattern adjustment controllers in predetermined locations above the equalization baffle. Pattern adjustment at the face using movable blades is not acceptable.
5. The diffuser face shall open easily with quarter-turn fasteners and safety cable for damper adjustment and cleaning. The plenum shall be fully accessible for cleaning with no internal baffles or obstructions. Diffusers shall have a B11 Sterile White – Thermal Setting finish which will withstand cleaning with high concentration cleaning solutions and agents.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine areas where diffusers, registers, and grilles are to be installed for compliance with requirements for installation tolerances and other conditions affecting performance of equipment. Do not proceed with installation until unsatisfactory conditions have been corrected.

3.2 INSTALLATION

A. Install diffusers, registers, and grilles level and plumb, according to manufacturer's written instructions, Coordination Drawings, original design, and referenced standards.

B. Drawings indicate general arrangement of ducts, fittings, and accessories. Air outlet and inlet locations have been indicated to achieve design requirements for air volume, noise criteria, airflow pattern, throw, and pressure drop. Make final locations where indicated, as much as practicable. For units installed in lay-in ceiling panels, locate units in the center of the panel. Where architectural features or other items conflict with installation, notify Architect for a determination of final location.

C. Install diffusers, registers, and grilles with airtight connection to ducts.

3.3 ADJUSTING

A. After installation, adjust diffusers, registers, and grilles to air patterns indicated, or as directed, before starting air balancing.

B. Adjustable outlet diffuser: adjust pattern for draft-free air distribution.

C. Adjust diffusers to direct airflow away from fume hoods.

3.4 CLEANING

A. After installation of diffusers, registers, and grilles, inspect exposed finish. Clean exposed surfaces to remove burrs, dirt, and smudges. Replace diffusers, registers, and grilles that have damaged finishes.

END OF SECTION 23 37 13

SECTION 23 82 13 – RADIANT HOT WATER CEILING HEATING UNITS

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.

B. Division 23 Section "Common Work Results for HVAC"

1.2 SUMMARY

A. This Section includes Hydronic heating panels.

1.3 SUBMITTALS

A. Product Data: Include rated capacities, specialties, and accessories for each product indicated.

1.4 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.

1.5 COORDINATION

A. Coordinate layout and installation of radiant heaters and panels and suspension system components with other construction that penetrates ceilings or is supported by them.

PART 2 - PRODUCTS

2.1 HYDRONIC HEATING PANELS

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

1. Sterling Mg. (basis of design)
2. Rosemex Products.
3. Sun-El Corporation.
4. Aerotech
5. Price Industries

B. Description: Modular panels shall be a system of standard sized radiant panels which can be integrated into a suspended ceiling to provide overhead radiant heating. The system shall be designed to used with hot water at various temperatures; insulation blankets with a heat reflecting foil backing shall be utilized to maintain heating efficiency.

C. The panels shall be fabricated from an aluminum sheet to which a heating pipe coil shall be mechanically fastened.

1. Pipe coil: Each panel has its own serpentine pipe coil of 5/8" O.D. tubing.
2. Panels: 0.040" aluminum or 0.027" steel sheet with standard square edges or tegular edge detail.
3. Paint finish: white.
4. Thermal contact strips: Aluminum heat saddle bolted to the back of the panel using steel or aluminum studs which are welded to the panel.
5. Insulation: Provide a minimum of 1" thick foil back fiberglass batt insulation.

D. Modular panels shall be provided to match the ceiling grid. The working weight for the aluminum panels is approximately 1.5 lb/ft2

E. Provide trim panels for trimming end of panels to match room dimensions.

F. Provide factory inter-connectors between adjacent series panels.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine areas to receive radiant heating and cooling units for compliance with requirements for installation tolerances and other conditions affecting performance.

B. Examine roughing-in for hydronic piping connections to verify actual locations before radiant heating and cooling unit installation.

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

3.2 INSTALLATION

A. Install radiant heating units level and plumb.

B. Suspend radiant heaters from structure.

C. Support for Radiant Heating Panels in or on Grid-Type Suspended Ceilings: Use grid as a support element.

1. Install a minimum of four ceiling support system rods or wires for each panel. Locate not more than 6 inches from panel corners.
2. Support Clips: Fasten to panel and to ceiling grid members at or near each panel corner with clips designed for the application.
3. Panels of Sizes Less Than Ceiling Grid: Install as indicated on reflected ceiling plans or center in acoustical panel, and support panels independently with at least two 3/4-inch metal channels spanning and secured to ceiling tees.
4. Install at least one independent (seismic) support rod or wire from structure to a tab on panel. Wire or rod shall have breaking strength of the weight of panel at a safety factor of 3.

3.3 CONNECTIONS

A. Heating mains shall be flushed prior to connection to the radiant panels. After connection, the hydronic system shall be flushed again and then dry pressure tested to isolate any leaks. Any remaining air shall be vented from the system and boiler temperature shall be brought up gradually.

B. Piping installation requirements are specified in Division 23 Section "Hydronic Piping." Drawings indicate general arrangement of piping, fittings, and specialties.

C. Unless otherwise indicated, install shutoff valve and union or flange at each connection.

D. Install piping adjacent to unit to allow service and maintenance.

3.4 FIELD QUALITY CONTROL

A. After installing panels, inspect unit cabinet for damage to finish. Remove paint splatters and other spots, dirt, and debris. Repair damaged finish to match original finish.

END OF SECTION 23 82 13

SECTION 238216 – DUCT MOUNTED HOT WATER HEATING COILS

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.

B. Related Sections include the following:

1. Division 23 Section "Common Work Results for HVAC"

1.2 SUMMARY

A. This Section includes HW heating air coils that are not an integral part of air-handling units.

1.3 SUBMITTALS

A. Product Data: For each type of product indicated. Include construction details, material descriptions, dimensions of individual components and profiles, and finishes for each air coil. Include rated capacity and pressure drop for each air coil.

B. Operation and Maintenance Data: For air coils to include in operation and maintenance manuals.

1.4 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. ASHRAE Compliance: Comply with ASHRAE 33 for methods of testing heating coils.

PART 2 - PRODUCTS

2.1 WATER COILS

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

1. Trane.
2. McQuay
3. Aerofin Corporation.
4. Carrier Corporation.
5. Coil Company, LLC.
6. Dunham-Bush, Inc.

7. Heatcraft Refrigeration Products LLC; Heat Transfer Division.
8. Super Radiator Coils.
9. USA Coil & Air.

B. Performance Ratings: Tested and rated according to ARI 410 and ASHRAE 33.

C. Minimum Working-Pressure/Temperature Ratings: 200 psig, 325 deg F.

D. Source Quality Control: Factory tested to 300 psig.

E. Tubes: ASTM B 743 copper, minimum 0.020 inch thick.

F. Fins: Aluminum, minimum 0.006 inch thick.

G. Headers: Seamless copper tube with brazed joints, prime coated.

H. Frames: Galvanized-steel channel frame, minimum 0.052 inch thick for slip-in mounting.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine ducts, plenums, and casings to receive air coils for compliance with requirements for installation tolerances and other conditions affecting coil performance.

B. Examine roughing-in for piping systems to verify actual locations of piping connections before coil installation.

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

3.2 INSTALLATION

A. Install coils level and plumb.

B. Install coils in metal ducts and casings constructed according to SMACNA's "HVAC Duct Construction Standards, Metal and Flexible."

C. Straighten bent fins on air coils.

D. Clean coils using materials and methods recommended in writing by manufacturers, and clean inside of casings and enclosures to remove dust and debris.

3.3 CONNECTIONS

A. Piping installation requirements are specified in other Division 23 Sections. Drawings indicate general arrangement of piping, fittings, and specialties.

B. Install piping adjacent to coils to allow service and maintenance.

C. Connect water piping with unions and shutoff valves to allow coils to be disconnected without draining piping. Control valves are specified in Division 23 Section "Instrumentation and Control for HVAC," and other piping specialties are specified in Division 23 Section "Hydronic Piping."

END OF SECTION 238216

SECTION 26 01 00 - BASIC ELECTRICAL REQUIREMENTS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. The scope of work for Division 26 shall include the scope indicated on drawings and in the specifications for Division 26, 27, and Division 28.

B. Alternates: Refer to Division 1 to determine extent of, if any, work of this section that will be affected by any alternates if accepted.

C. Furnish all materials, equipment, labor, and supplies and perform all operations necessary to complete the electrical work in accordance with the intent of the drawings and these specifications.

D. Permits, Fees, and Inspections:

1. Secure and pay for all utility backcharges, permits, fees, licenses, inspections, etc., required for the work under Division 26,27, and 28.

2. Schedule and pay for all legally required inspections and cooperate with inspecting officers.

3. Provide Certificates of Inspection and Approval from all regulatory authorities having jurisdiction over the work in Division 26,27, and 28.

E. Drawings:

1. Do not scale the drawings. The general location of the apparatus and the details of the work are shown on the drawings, which form a part of this specification. Exact locations are to be determined at the building as the work progresses, and shall be subject to the Architect/Engineer's approval. Actual field conditions shall govern all dimensions.

2. Anything shown on the drawings and not mentioned in the specifications or vice versa shall be provided as if it were both shown and specified.

3. It is not intended that the drawings shall show every wire, device, fitting, conduit or appliance, but it shall be a requirement to furnish without additional expense, all material and labor necessary to complete the systems in accordance with applicable codes and the best practice of the trade.

PART 2 - EXECUTION

2.1 INSTALLATION

A. General:

1. All work shall be in accordance with the National Electrical Code's requirements as amended to date, with the local electric utility company's rules, the Fire Underwriter's requirements, and all local, state and federal laws and regulations.

2. In general, all wiring in finished areas shall be concealed in walls or above ceilings. Where wiring cannot be concealed due to existing construction, exposed wiring shall be installed in conduit or surface metal raceway. Exposed wiring shall not be installed in finished areas without prior written authorization from the Architect.

3. Conduits shall be of sizes required by the National Electrical Code. Exposed conduits shall be installed with runs parallel or perpendicular to walls and ceiling, with right-angle turns consisting of bends, fittings, or outlet boxes. No wire shall be installed until work that 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.

4. Where conduits, wireways and other electrical raceways pass through fire partitions, fire walls, or floor, install a fire-stop that provides an effective barrier against the spread of fire, smoke and gases. Fire-stop material shall be packed tight and completely fill clearances between raceways and openings. Floor, exterior wall, and roof seals shall also be made watertight.

5. Where raceways puncture roof, coordinate with Division 7.

END OF SECTION 26 01 00

SECTION 26 05 19 - LOW-VOLTAGE ELECTRICAL POWER CONDUCTORS AND CABLES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. This Section includes the following:

1. Building wires and cables rated 600 V and less.
2. Connectors, splices, and terminations rated 600 V and less.

B. Related Sections include the following:

1. Division 26 Section “Conductors and Cables for Electronic Safety and Security” for cabling used for electronic safety and security systems.
2. Division 27 for cabling used for voice and data circuits.

1.3 DEFINITIONS

A. EPDM: Ethylene-propylene-diene terpolymer rubber.

B. NBR: Acrylonitrile-butadiene rubber.

1.4 QUALITY ASSURANCE

A. Testing Agency Qualifications: An independent agency, with the experience and capability to conduct the testing indicated, that is a member company of the International Electrical Testing Association or is a nationally recognized testing laboratory (NRTL) as defined by OSHA in 29 CFR 1910.7, and that is acceptable to authorities having jurisdiction.

B. 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.

C. Comply with NFPA 70.

PART 2 - PRODUCTS

2.1 CONDUCTORS AND CABLES

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

1. Alcan Products Corporation; Alcan Cable Division.
2. American Insulated Wire Corp.; a Leviton Company.
3. General Cable Corporation.
4. Senator Wire & Cable Company.
5. Southwire Company.

B. Aluminum and Copper Conductors: Comply with NEMA WC 70.

C. Conductor Insulation: Comply with NEMA WC 70

D. Multiconductor Cable: Comply with NEMA WC 70 for metal-clad cable, Type MC

E. Power-limited cable: Type CMP for plenum applications, type CMR for non-plenum applications.

2.2 CONNECTORS AND SPLICES

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

1. AFC Cable Systems, Inc.
2. Hubbell Power Systems, Inc.
3. O-Z/Gedney; EGS Electrical Group LLC.
4. 3M; Electrical Products Division.
5. Tyco Electronics Corp.

B. Description: Factory-fabricated connectors and splices of size, ampacity rating, material, type, and class for application and service indicated.

PART 3 - EXECUTION

3.1 CONDUCTOR MATERIAL APPLICATIONS

A. Feeders: Copper for feeders smaller than No. 4 AWG; copper or aluminum for feeders No. 4 AWG and larger. Solid for No. 10 AWG and smaller; stranded for No. 8 AWG and larger.

1. Use copper for all sizes where required by manufacturer’s instructions for equipment supplied by feeders.

B. Branch Circuits: Copper. Solid for No. 10 AWG and smaller; stranded for No. 8 AWG and larger.

3.2 CONDUCTOR INSULATION AND MULTICONDUCTOR CABLE APPLICATIONS AND WIRING METHODS

A. Exposed Feeders: Type THHN-THWN, single conductors in raceway

B. Feeders Concealed in Ceilings, Walls, Partitions, and Crawlspaces: Type THHN-THWN, single conductors in raceway

C. Feeders Concealed in Concrete, below Slabs-on-Grade, and Underground: Type THHN-THWN, single conductors in raceway

D. Exposed Branch Circuits: Type THHN-THWN, single conductors in raceway

E. Branch Circuits Concealed in Ceilings, Walls, and Partitions: Type THHN-THWN, single conductors in raceway or metal-clad cable, Type MC

F. Branch Circuits Concealed in Concrete, below Slabs-on-Grade, and Underground: Type THHN-THWN, single conductors in raceway

G. Cord Drops and Portable Appliance Connections: Type SO, hard service cord with stainless-steel, wire-mesh, strain relief device at terminations to suit application.

H. Class 1 Control Circuits: Type THHN-THWN, in raceway. Type MC cable shall be permitted where concealed in building finishes.

I. Class 2 Control Circuits: Type THHN-THWN, in raceway

3.3 INSTALLATION OF CONDUCTORS AND CABLES

A. Conceal cables in finished walls, ceilings, and floors, unless otherwise indicated.

B. Use manufacturer-approved pulling compound or lubricant where necessary; compound used must not deteriorate conductor or insulation. Do not exceed manufacturer's recommended maximum pulling tensions and sidewall pressure values.

C. Use pulling means, including fish tape, cable, rope, and basket-weave wire/cable grips, that will not damage cables or raceway.

D. Install exposed cables parallel and perpendicular to surfaces of exposed structural members, and follow surface contours where possible.

E. Support cables according to Division 26 Section "Hangers and Supports for Electrical Systems."

F. Identify and color-code conductors and cables according to Division 26 Section "Identification for Electrical Systems."

3.4 CONNECTIONS

A. Tighten electrical connectors and terminals according to manufacturer's published torque-tightening values. If manufacturer's torque values are not indicated, use those specified in UL 486A and UL 486B.

B. Make splices and taps that are compatible with conductor material and that possess equivalent or better mechanical strength and insulation ratings than unspliced conductors.

1. Use oxide inhibitor in each splice and tap conductor for aluminum conductors.

C. Wiring at Outlets: Install conductor at each outlet, with at least **12 inches** of slack.

3.5 SLEEVE AND SLEEVE-SEAL INSTALLATION FOR ELECTRICAL PENETRATIONS

A. Install sleeves and sleeve seals at penetrations of exterior floor and wall assemblies. Comply with requirements in Division 26 Section "Sleeves and Sleeve Seals for Electrical Raceways and Cabling."

3.6 FIRESTOPPING

A. Apply firestopping to electrical penetrations of fire-rated floor and wall assemblies to restore original fire-resistance rating of assembly according to Division 07 Section "Penetration Firestopping."

3.7 FIELD QUALITY CONTROL

A. Perform tests and inspections and prepare test reports.

B. Tests and Inspections:

1. Perform each visual and mechanical inspection and electrical test stated in NETA Acceptance Testing Specification. Certify compliance with test parameters.

C. Test Reports: Prepare a written report to record the following:

1. Test procedures used.
2. Test results that comply with requirements.
3. Test results that do not comply with requirements and corrective action taken to achieve compliance with requirements.

D. Remove and replace malfunctioning units and retest as specified above.

END OF SECTION 26 05 19

SECTION 26 05 26-GROUNDING AND BONDING FOR ELECTRICAL SYSTEMS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. This Section includes methods and materials for grounding systems and equipment.

1.3 SUBMITTALS

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

1.4 QUALITY ASSURANCE

A. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, 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.

PART 2 - PRODUCTS

2.1 CONDUCTORS

A. Insulated Conductors: Copper or tinned-copper wire or cable insulated for 600 V unless otherwise required by applicable Code or authorities having jurisdiction.

B. Bare Copper Conductors:

1. Solid Conductors: ASTM B 3.
2. Stranded Conductors: ASTM B 8.
3. Tinned Conductors: ASTM B 33.
4. Bonding Cable: 28 kcmil, 14 strands of No. 17 AWG conductor, 1/4 inch (6 mm) in diameter.
5. Bonding Conductor: No. 4 or No. 6 AWG, stranded conductor.
6. Bonding Jumper: Copper tape, braided conductors, terminated with copper ferrules; 1-5/8 inches (41 mm) wide and 1/16 inch (1.6 mm) thick.
7. Tinned Bonding Jumper: Tinned-copper tape, braided conductors, terminated with copper ferrules; 1-5/8 inches (41 mm) wide and 1/16 inch (1.6 mm) thick.

C. Grounding Bus: Rectangular bars of annealed copper, 1/4 by 2 inches (6 by 50 mm) in cross section, unless otherwise indicated; with insulators.

2.2 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.

1. Pipe Connectors: Clamp type, sized for pipe.

C. Welded Connectors: Exothermic-welding kits of types recommended by kit manufacturer for materials being joined and installation conditions.

PART 3 - EXECUTION

3.1 APPLICATIONS

A. Conductors: Install solid conductor for No. 10 AWG and smaller, and stranded conductors for No. 8 AWG and larger, unless otherwise indicated.

B. Grounding Bus: Install in electrical and telephone equipment rooms, in rooms housing service equipment, and elsewhere as indicated.

1. Install bus on insulated spacers 1 inch (25 mm), minimum, from wall 6 inches (150 mm) above finished floor, unless otherwise indicated.
2. Where indicated on both sides of doorways, route bus up to top of door frame, across top of doorway, down to specified height above floor, and connect to horizontal bus.

C. Conductor Terminations and Connections:

1. Pipe and Equipment Grounding Conductor Terminations: Bolted connectors.
2. Underground Connections: Welded connectors, except at test wells and as otherwise indicated.
3. Connections to Ground Rods at Test Wells: Bolted connectors.
4. Connections to Structural Steel: Welded connectors.

3.2 EQUIPMENT GROUNDING

A. Install insulated equipment grounding conductors with all feeders and branch circuits.

B. Signal and Communication Equipment: For telephone, alarm, voice and data, and other communication equipment, provide No. 4 AWG minimum insulated grounding conductor in raceway from grounding electrode system to each wiring closet.

1. Wiring Closets: Terminate grounding conductor on a 1/4-by-2-by-12-inch (6-by-50-by-300-mm) grounding bus.

3.3 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.

C. Bonding Interior Metal Ducts: Bond metal air ducts to equipment grounding conductors of associated fans, blowers, electric heaters, and air cleaners. Install bonding jumper to bond across flexible duct connections to achieve continuity.

END OF SECTION 26 05 26

SECTION 26 05 29 - HANGERS AND SUPPORTS FOR ELECTRICAL SYSTEMS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. This Section includes the following:

1. Hangers and supports for electrical equipment and systems.
2. Construction requirements for concrete bases.

B. Related Sections include the following:

1. Division 26 Section "Vibration And Seismic Controls For Electrical Systems" for products and installation requirements necessary for compliance with seismic criteria.

1.3 DEFINITIONS

A. EMT: Electrical metallic tubing.

B. IMC: Intermediate metal conduit.

C. RMC: Rigid metal conduit.

1.4 PERFORMANCE REQUIREMENTS

A. Design supports for multiple raceways capable of supporting combined weight of supported systems and its contents.

B. Design equipment supports capable of supporting combined operating weight of supported equipment and connected systems and components.

C. Rated Strength: Adequate in tension, shear, and pullout force to resist maximum loads calculated or imposed for this Project, with a minimum structural safety factor of 5 times the applied force.

1.5 QUALITY ASSURANCE

A. Welding: Qualify procedures and personnel according to AWS D1.1/D1.1M, "Structural Welding Code - Steel."

B. Comply with NFPA 70.

PART 2 - PRODUCTS

2.1 SUPPORT, ANCHORAGE, AND ATTACHMENT COMPONENTS

A. Steel Slotted Support Systems: Comply with MFMA-4, factory-fabricated components for field assembly.

1. Metallic Coatings: Hot-dip galvanized after fabrication and applied according to MFMA-4.

2. Fittings and Accessories: Products of channel and angle manufacturer and designed for use with those items.
3. Fitting and Accessory Materials: Same as channels and angles
4. Rated Strength: Selected to suit applicable load criteria.

B. Raceway and Cable Supports: As described in NECA 1 and NECA 101.

C. Conduit and Cable Support Devices: steel hangers, clamps, and associated fittings, designed for types and sizes of raceway or cable to be supported.

D. Support for Conductors in Vertical Conduit: Factory-fabricated assembly consisting of threaded body and insulating wedging plug or plugs for non-armored electrical conductors or cables in riser conduits. Plugs shall have number, size, and shape of conductor gripping pieces as required to suit individual conductors or cables supported. Body shall be malleable iron.

E. Structural Steel for Fabricated Supports and Restraints: ASTM A 36/A 36M, steel plates, shapes, and bars; black and galvanized.

F. Mounting, Anchoring, and Attachment Components: Items for fastening electrical items or their supports to building surfaces include the following:

1. Powder-Actuated Fasteners: Threaded-steel stud, for use in hardened portland cement concrete, steel, or wood, with tension, shear, and pullout capacities appropriate for supported loads and building materials where used.

2. Mechanical-Expansion Anchors: Insert-wedge-type, zinc coated steel, for use in hardened portland cement concrete with tension, shear, and pullout capacities appropriate for supported loads and building materials in which used.

3. Concrete Inserts: Steel or malleable-iron, slotted support system units similar to MSS Type 18; complying with MFMA-4 or MSS SP-58.
4. Clamps for Attachment to Steel Structural Elements: MSS SP-58, type suitable for attached structural element.
5. Through Bolts: Structural type, hex head, and high strength. Comply with ASTM A 325.
6. Toggle Bolts: All-steel springhead type.
7. Hanger Rods: Threaded steel.

2.2 FABRICATED METAL EQUIPMENT SUPPORT ASSEMBLIES

A. Description: Welded or bolted, structural-steel shapes, shop or field fabricated to fit dimensions of supported equipment.

B. Materials: Comply with requirements in Division 05 Section "Metal Fabrications" for steel shapes and plates.

PART 3 - EXECUTION

3.1 APPLICATION

A. Comply with NECA 1 and NECA 101 for application of hangers and supports for electrical equipment and systems except if requirements in this Section are stricter.

B. Maximum Support Spacing and Minimum Hanger Rod Size for Raceway: Space supports for EMT, IMC, and RMC as required by NFPA 70. Minimum rod size shall be 1/4 inch (6 mm) in diameter.

C. Multiple Raceways or Cables: Install trapeze-type supports fabricated with steel slotted support system, sized so capacity can be increased by at least 25 percent in future without exceeding specified design load limits.

1. Secure raceways and cables to these supports with two-bolt conduit clamps.

3.2 SUPPORT INSTALLATION

A. Comply with NECA 1 and NECA 101 for installation requirements except as specified in this Article.

B. Strength of Support Assemblies: Where not indicated, select sizes of components so strength will be adequate to carry present and future static loads within specified loading limits. Minimum static design load used for strength determination shall be weight of supported components plus 200 lb (90 kg).

C. Mounting and Anchorage of Surface-Mounted Equipment and Components: Anchor and fasten electrical items and their supports to building structural elements by the following methods unless otherwise indicated by code:

1. To Wood: Fasten with lag screws or through bolts.
2. To New Concrete: Bolt to concrete inserts.
3. To Masonry: Approved toggle-type bolts on hollow masonry units and expansion anchor fasteners on solid masonry units.
4. To Existing Concrete: Expansion anchor fasteners.
5. Instead of expansion anchors, powder-actuated driven threaded studs provided with lock washers and nuts may be used in existing standard-weight concrete 4 inches (100 mm) thick or greater. Do not use for anchorage to lightweight-aggregate concrete or for slabs less than 4 inches (100 mm) thick.
6. To Steel: Welded threaded studs complying with AWS D1.1/D1.1M, with lock washers and nuts.
7. To Light Steel: Sheet metal screws.
8. Items Mounted on Hollow Walls and Nonstructural Building Surfaces: Mount cabinets, panelboards, disconnect switches, control enclosures, pull and junction boxes, transformers, and other devices on slotted-channel racks attached to substrate by means that meet seismic-restraint strength and anchorage requirements.

D. Drill holes for expansion anchors in concrete at locations and to depths that avoid reinforcing bars.

3.3 INSTALLATION OF FABRICATED METAL SUPPORTS

A. Comply with installation requirements in Division 05 Section "Metal Fabrications" for site-fabricated metal supports.

B. Cut, fit, and place miscellaneous metal supports accurately in location, alignment, and elevation to support and anchor electrical materials and equipment.

C. Field Welding: Comply with AWS D1.1/D1.1M.

3.4 PAINTING

A. Touchup: Comply with requirements in Division 09 painting Sections for cleaning and touchup painting of field welds, bolted connections, and abraded areas of shop paint on miscellaneous metal.

B. Galvanized Surfaces: Clean welds, bolted connections, and abraded areas and apply galvanizing-repair paint to comply with ASTM A 780.

END OF SECTION 26 05 29

SECTION 26 05 33 - RACEWAYS AND BOXES FOR ELECTRICAL SYSTEMS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section Includes:

1. Metal conduits, tubing, and fittings.
2. Metal wireways and auxiliary gutters.
3. Surface raceways.
4. Cable trays.
5. Boxes, enclosures, and cabinets.

1.3 DEFINITIONS

A. ARC: Aluminum rigid conduit.

B. GRC: Galvanized rigid steel conduit.

C. IMC: Intermediate metal conduit.

1.4 ACTION SUBMITTALS

A. Product Data: For surface raceways, wireways and fittings, floor boxes, hinged-cover enclosures, and cabinets.

1.5 INFORMATIONAL SUBMITTALS

A. Source quality-control reports.

PART 2 - PRODUCTS

2.1 METAL CONDUITS, TUBING, AND FITTINGS

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. AFC Cable Systems, Inc.
2. Allied Tube & Conduit; a Tyco International Ltd. Co.
3. Anamet Electrical, Inc.

4. Electri-Flex Company.
5. O-Z/Gedney; a brand of EGS Electrical Group.
6. Southwire Company.
7. Thomas & Betts Corporation.
8. Wheatland Tube Company; a division of John Maneely Company.

B. Listing and Labeling: Metal conduits, tubing, and fittings shall be listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.

C. GRC: Comply with ANSI C80.1 and UL 6.

D. ARC: Comply with ANSI C80.5 and UL 6A.

E. IMC: Comply with ANSI C80.6 and UL 1242.

F. EMT: Comply with ANSI C80.3 and UL 797.

G. FMC: Comply with UL 1; zinc-coated steel or aluminum.

H. LFMC: Flexible steel conduit with PVC jacket and complying with UL 360.

I. Fittings for Metal Conduit: Comply with NEMA FB 1 and UL 514B.

1. Conduit Fittings for Hazardous (Classified) Locations: Comply with UL 886 and NFPA 70.
2. Fittings for EMT:

   a. Material: Steel.
   b. Type: Setscrew or compression.

3. Expansion Fittings: PVC or steel to match conduit type, complying with UL 651, rated for environmental conditions where installed, and including flexible external bonding jumper.

2.2 METAL WIREWAYS AND AUXILIARY GUTTERS

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. Cooper B-Line, Inc.
2. Hoffman; a Pentair company.
3. Square D; a brand of Schneider Electric.

B. Description: Sheet metal, complying with UL 870 and NEMA 250, Type 1 unless otherwise indicated, and sized according to NFPA 70.

C. Fittings and Accessories: Include covers, couplings, offsets, elbows, expansion joints, adapters, hold-down straps, end caps, and other fittings to match and mate with wireways as required for complete system.

D. Wireway Covers: Screw-cover type unless otherwise indicated.

E. Finish: Manufacturer's standard enamel finish.

2.3 SURFACE METAL RACEWAYS

A. Listing and Labeling: Surface raceways shall be listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.

B. Surface Metal Raceways: Galvanized steel with snap-on covers complying with UL 5. Manufacturer's standard enamel finish in color selected by Architect.
   a. Basis of design is Wiremold 4000 series.

2.4 CABLE TRAYS

A. General Requirements for Cable Trays

1. Cable Trays and Accessories: Identified as defined in NFPA 70 and marked for intended location, application, and grounding.

   a. Source Limitations: Obtain cable trays and components from single manufacturer.

2. Structural Performance: See individual cable tray types for specific values for the following parameters:

   a. Uniform Load Distribution: Capable of supporting a uniformly distributed load on the indicated support span when supported as a simple span and tested according to NEMA VE 1.
   b. Concentrated Load: A load applied at midpoint of span and centerline of tray.

      1) Load and Safety Factors: Applicable to both side rails and rung capacities.

2.5 WIRE-BASKET CABLE TRAYS

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. Cooper B-Line, Inc.
2. Allied Tube & Conduit; a Tyco International Ltd. Co.
3. Mono-Systems, Inc.
4. MP Husky.

B. Description:

1. Configuration: Wires are formed into a standard 2-by-4-inch (50-by-100-mm) wire mesh pattern with intersecting wires welded together. Mesh sections must have at least one bottom longitudinal wire along entire length of section.
2. Materials: High-strength-steel longitudinal wires with no bends.
3. Safety Provisions: Wire ends along wire-basket sides (flanges) rounded during manufacturing to maintain integrity of cables and installer safety.
4. Sizes:

   a. Straight sections shall be furnished in standard 118-inch (3000-mm) lengths.
   b. Wire-Basket Depth: 2-inch (50-mm) usable loading depth by 12 inches (300 mm) wide.

5. Connector Assemblies: Bolt welded to plate shaped to fit around adjoining tray wires and mating plate. Mechanically joins adjacent tray wires to splice sections together or to create horizontal fittings.
6. Connector Assembly Capacity: Splices located within support span shall not diminish rated loading capacity of cable tray.
7. Hardware and Fasteners: Steel, zinc plated according to ASTM B 633.

2.6 BOXES, ENCLOSURES, AND CABINETS

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. O-Z/Gedney; a brand of EGS Electrical Group.
2. RACO; a Hubbell Company.
3. Thomas & Betts Corporation.
4. Wiremold / Legrand.

B. General Requirements for Boxes, Enclosures, and Cabinets: Boxes, enclosures, and cabinets installed in wet locations shall be listed for use in wet locations.

C. Sheet Metal Outlet and Device Boxes: Comply with NEMA OS 1 and UL 514A.

D. Cast-Metal Outlet and Device Boxes: Comply with NEMA FB 1, aluminum, Type FD, with gasketed cover.

E. Luminaire Outlet Boxes: Nonadjustable, designed for attachment of luminaire weighing 50 lb (23 kg). Outlet boxes designed for attachment of luminaires weighing more than 50 lb (23 kg) shall be listed and marked for the maximum allowable weight.

F. Small Sheet Metal Pull and Junction Boxes: NEMA OS 1.

G. Cast-Metal Access, Pull, and Junction Boxes: Comply with NEMA FB 1 and UL 1773, cast aluminum with gasketed cover.

H. Box extensions used to accommodate new building finishes shall be of same material as recessed box.

I. Device Box Dimensions: 4 inches square by 2-1/8 inches deep (100 mm square by 60 mm deep).

J. Hinged-Cover Enclosures: Comply with UL 50 and NEMA 250, Type 1 with continuous-hinge cover with flush latch unless otherwise indicated.

1. Metal Enclosures: Steel, finished inside and out with manufacturer's standard enamel.
2. Interior Panels: Steel; all sides finished with manufacturer's standard enamel.

K. Cabinets:

1. NEMA 250, Type 1 unless otherwise noted galvanized-steel box with removable interior panel and removable front, finished inside and out with manufacturer's standard enamel.
2. Hinged door in front cover with flush latch and concealed hinge.
3. Key latch to match panelboards.
4. Metal barriers to separate wiring of different systems and voltage.
5. Accessory feet where required for freestanding equipment.

PART 3 - EXECUTION

3.1 RACEWAY APPLICATION

A. Indoors: Apply raceway products as specified below unless otherwise indicated:

1. Exposed, Not Subject to Physical Damage: EMT.
2. Exposed and Subject to Severe Physical Damage: GRC or IMC. Raceway locations include the following:
   a. Loading dock.
   b. Corridors used for traffic of mechanized carts, forklifts, and pallet-handling units.
3. Concealed in Ceilings and Interior Walls and Partitions: EMT.
4. Connection to Vibrating Equipment (Including Transformers and Hydraulic, Pneumatic, Electric Solenoid, or Motor-Driven Equipment): FMC, except use LFMC in damp or wet locations.
5. Damp or Wet Locations: GRC or IMC.
6. Boxes and Enclosures: NEMA 250, Type 1, except use NEMA 250, Type 4 stainless steel in institutional and commercial kitchens and damp or wet locations.

B. Minimum Raceway Size: [**1/2-inch (16-mm)**] [**3/4-inch (21-mm)**] trade size.

C. Raceway Fittings: Compatible with raceways and suitable for use and location.

1. Rigid and Intermediate Steel Conduit: Use threaded rigid steel conduit fittings unless otherwise indicated. Comply with NEMA FB 2.10.
2. PVC Externally Coated, Rigid Steel Conduits: Use only fittings listed for use with this type of conduit. Patch and seal all joints, nicks, and scrapes in PVC coating after installing conduits and fittings. Use sealant recommended by fitting manufacturer and apply in thickness and number of coats recommended by manufacturer.
3. EMT: Use setscrew or compression, steel fittings. Comply with NEMA FB 2.10.
4. Flexible Conduit: Use only fittings listed for use with flexible conduit. Comply with NEMA FB 2.20.

D. Install surface raceways only where indicated on Drawings.

3.2 INSTALLATION

A. Comply with NECA 1 and NECA 101 for installation requirements except where requirements on Drawings or in this article are stricter. Comply with NECA 102 for aluminum conduits. Comply with NFPA 70 limitations for types of raceways allowed in specific occupancies and number of floors.

B. Keep raceways at least 6 inches (150 mm) away from parallel runs of flues and steam or hot-water pipes. Install horizontal raceway runs above water and steam piping.

C. Complete raceway installation before starting conductor installation.

D. Comply with requirements in Section 26 05 29 "Hangers and Supports for Electrical Systems" for hangers and supports.

E. Arrange stub-ups so curved portions of bends are not visible above finished slab.

F. Install no more than the equivalent of three 90-degree bends in any conduit run except for control wiring conduits, for which fewer bends are allowed. Support within 12 inches (300 mm) of changes in direction.

G. Conceal conduit and EMT within finished walls, ceilings, and floors unless otherwise indicated. Install conduits parallel or perpendicular to building lines.

H. Support conduit within 12 inches (300 mm)of enclosures to which attached.

I. Stub-ups to Above Recessed Ceilings:

1. Use EMT, IMC, or RMC for raceways.
2. Use a conduit bushing or insulated fitting to terminate stub-ups not terminated in hubs or in an enclosure.

J. Threaded Conduit Joints, Exposed to Wet, Damp, Corrosive, or Outdoor Conditions: Apply listed compound to threads of raceway and fittings before making up joints. Follow compound manufacturer's written instructions.

K. Terminate threaded conduits into threaded hubs or with locknuts on inside and outside of boxes or cabinets. Install bushings on conduits up to 1-1/4-inch (35mm) trade size and insulated throat metal bushings on 1-1/2-inch (41-mm) trade size and larger conduits terminated with locknuts. Install insulated throat metal grounding bushings on service conduits.

L. Install raceways square to the enclosure and terminate at enclosures with locknuts. Install locknuts hand tight plus 1/4 turn more.

M. Do not rely on locknuts to penetrate nonconductive coatings on enclosures. Remove coatings in the locknut area prior to assembling conduit to enclosure to assure a continuous ground path.

N. Cut conduit perpendicular to the length. For conduits 2-inch (53-mm) trade size and larger, use roll cutter or a guide to make cut straight and perpendicular to the length.

O. Install pull wires in empty raceways. Use polypropylene or monofilament plastic line with not less than 200-lb (90-kg) tensile strength. Leave at least 12 inches (300 mm) of slack at each end of pull wire. Cap underground raceways designated as spare above grade alongside raceways in use.

P. Surface Raceways:

1. Install surface raceway with a minimum 2-inch (50-mm)radius control at bend points.
2. Secure surface raceway with screws or other anchor-type devices at intervals not exceeding 48 inches (1200 mm) and with no less than two supports per straight raceway section. Support surface raceway according to manufacturer's written instructions. Tape and glue are not acceptable support methods.

Q. Install raceway sealing fittings at accessible locations according to NFPA 70 and fill them with listed sealing compound. For concealed raceways, install each fitting in a flush steel box with a blank cover plate having a finish similar to that of adjacent plates or surfaces. Install raceway sealing fittings according to NFPA 70.

R. Install devices to seal raceway interiors at accessible locations. Locate seals so no fittings or boxes are between the seal and the following changes of environments. Seal the interior of all raceways at the following points:

1. Where conduits pass from warm to cold locations, such as boundaries of refrigerated spaces.
2. Where an underground service raceway enters a building or structure.
3. Where otherwise required by NFPA 70.

S. Comply with manufacturer's written instructions for solvent welding RNC and fittings.

T. Expansion-Joint Fittings:

1. Install in each run of aboveground RNC that is located where environmental temperature change may exceed 30 deg F (17 deg C) and that has straight-run length that exceeds 25 feet (7.6 m). Install in each run of aboveground RMC and EMT conduit that is located where environmental temperature change may exceed 100 deg F (55 deg C) and that has straight-run length that exceeds 100 feet (30 m).
2. Install type and quantity of fittings that accommodate temperature change listed for each of the following locations:
   a. Outdoor Locations Not Exposed to Direct Sunlight: 125 deg F (70 deg C) temperature change.
   b. Outdoor Locations Exposed to Direct Sunlight: 155 deg F (86 deg C) temperature change.
   c. Indoor Spaces Connected with Outdoors without Physical Separation: 125 deg F (70 deg C) temperature change.
3. Install fitting(s) that provide expansion and contraction for at least 0.00041 inch per foot of length of straight run per deg F (0.06 mm per meter of length of straight run per deg C) of temperature change for PVC conduits. Install fitting(s) that provide expansion and contraction for at least 0.000078 inch per foot of length of straight run per deg F (0.0115 mm per meter of length of straight run per deg C) of temperature change for metal conduits.
4. Install expansion fittings at all locations where conduits cross building or structure expansion joints.
5. Install each expansion-joint fitting with position, mounting, and piston setting selected according to manufacturer's written instructions for conditions at specific location at time of installation. Install conduit supports to allow for expansion movement.

U. Flexible Conduit Connections: Comply with NEMA RV 3. Use a maximum of 72 inches (1830 mm) of flexible conduit for recessed and semirecessed luminaires, equipment subject to vibration, noise transmission, or movement; and for transformers and motors.

1. Use LFMC in damp or wet locations.

V. CABLE TRAY INSTALLATION

1. Install cable trays according to NEMA VE 2.
2. Install cable trays as a complete system, including fasteners, hold-down clips, support systems, barrier strips, adjustable horizontal and vertical splice plates, elbows, reducers, tees, crosses, cable dropouts, adapters, covers, and bonding.

3. Install cable trays so that the tray is accessible for cable installation and all splices are accessible for inspection and adjustment.
4. Remove burrs and sharp edges from cable trays.
5. Fasten cable tray supports to building structure and install seismic restraints.
6. Design fasteners and supports to carry cable tray, the cables, and a concentrated load of 200 lb (90 kg). Comply with requirements in Section 26 05 29 "Hangers and Supports for Electrical Systems." Comply with seismic-restraint details according to Section 26 05 48 "Vibration and Seismic Controls for Electrical Systems."
7. Place supports so that spans do not exceed maximum spans on schedules and provide clearances shown on Drawings. Install intermediate supports when cable weight exceeds the load-carrying capacity of the tray rungs.
8. Construct supports from channel members, threaded rods, and other appurtenances furnished by cable tray manufacturer. Arrange supports in trapeze or wall-bracket form as required by application.
9. Support bus assembly to prevent twisting from eccentric loading.
10. Locate and install supports according to NEMA VE 2. Do not install more than one cable tray splice between supports.
11. Support wire-basket cable trays with trapeze hangers.
12. Support trapeze hangers for wire-basket trays with 3/8-inch- (10-mm-) diameter rods.
13. Install expansion connectors where cable trays cross building expansion joints and in cable tray runs that exceed dimensions recommended in NEMA VE 2. Space connectors and set gaps according to applicable standard.
14. Make changes in direction and elevation using manufacturer's recommended fittings.
15. Make cable tray connections using manufacturer's recommended fittings.
16. Seal penetrations through fire and smoke barriers. Comply with requirements in Division 07
17. Install cable trays with enough workspace to permit access for installing cables.

W. CABLE TRAY GROUNDING

1. Ground cable trays according to NFPA 70 unless additional grounding is specified. Comply with requirements in Section 26 05 26 "Grounding and Bonding for Electrical Systems."
2. Cable trays with communications cable shall be bonded together with splice plates listed for grounding purposes or with listed bonding jumpers.
3. When using epoxy- or powder-coat painted cable trays as a grounding conductor, completely remove coating at all splice contact points or ground connector attachment. After completing splice-to-grounding bolt attachment, repair the coated surfaces with coating materials recommended by cable tray manufacturer.

X. Mount boxes at heights indicated on Drawings. If mounting heights of boxes are not individually indicated, give priority to ADA requirements. Install boxes with height measured to center of box unless otherwise indicated.

Y. Horizontally separate boxes mounted on opposite sides of walls so they are not in the same vertical channel.

Z. Locate boxes so that cover or plate will not span different building finishes.

AA. Support boxes of three gangs or more from more than one side by spanning two framing members or mounting on brackets specifically designed for the purpose.

BB. Fasten junction and pull boxes to or support from building structure. Do not support boxes by conduits.

3.3 SLEEVE AND SLEEVE-SEAL INSTALLATION FOR ELECTRICAL PENETRATIONS

A. Install sleeves and sleeve seals at penetrations of exterior floor and wall assemblies. Comply with requirements in Section 26 05 44 "Sleeves and Sleeve Seals for Electrical Raceways and Cabling."

3.4 FIRESTOPPING

A. Install firestopping at penetrations of fire-rated floor and wall assemblies. Comply with requirements in Division 07.

3.5 PROTECTION

A. Protect coatings, finishes, and cabinets from damage and deterioration.

1. Repair damage to galvanized finishes with zinc-rich paint recommended by manufacturer.

END OF SECTION 26 05 33

SECTION 26 05 44 - SLEEVES AND SLEEVE SEALS FOR ELECTRICAL RACEWAYS AND CABLING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section Includes:

1. Sleeves for raceway and cable penetration of non-fire-rated construction walls and floors.
2. Sleeve-seal systems.
3. Sleeve-seal fittings.
4. Grout.
5. Silicone sealants.

B. Related Requirements:

1. Division 07 for penetration firestopping installed in fire-resistance-rated walls, horizontal assemblies, and smoke barriers, with and without penetrating items.

1.3 ACTION SUBMITTALS

A. Product Data: For each type of product.

PART 2 - PRODUCTS

2.1 SLEEVES

A. Wall Sleeves:

1. Steel Pipe Sleeves: ASTM A 53/A 53M, Type E, Grade B, Schedule 40, zinc coated, plain ends.
2. Cast-Iron Pipe Sleeves: Cast or fabricated "wall pipe," equivalent to ductile-iron pressure pipe, with plain ends and integral waterstop unless otherwise indicated.

B. Sleeves for Conduits Penetrating Non-Fire-Rated Gypsum Board Assemblies: Galvanized-steel sheet; 0.0239-inch (0.6-mm) minimum thickness; round tube closed with welded longitudinal joint, with tabs for screw-fastening the sleeve to the board.

C. Sleeves for Rectangular Openings:

1. Material: Galvanized sheet steel.
2. Minimum Metal Thickness:

a. For sleeve cross-section rectangle perimeter less than 50 inches (1270 mm) and with no side larger than 16 inches (400 mm), thickness shall be 0.052 inch (1.3 mm).
b. For sleeve cross-section rectangle perimeter 50 inches (1270 mm) or more and one or more sides larger than 16 inches (400 mm), thickness shall be 0.138 inch (3.5 mm).

2.2 SLEEVE-SEAL SYSTEMS

A. Description: Modular sealing device, designed for field assembly, to fill annular space between sleeve and raceway or cable.
1. Subject to compliance with requirements, provide a product by one of the following or approved equal:

a. Advance Products & Systems, Inc.
b. CALPICO, Inc.
c. Metraflex Company (The).
d. Pipeline Seal and Insulator, Inc.
e. Proco Products, Inc.

2. Sealing Elements: EPDM rubber interlocking links shaped to fit surface of pipe. Include type and number required for pipe material and size of pipe.
3. Pressure Plates: Carbon steel
4. Connecting Bolts and Nuts: Carbon steel, with corrosion-resistant coating of length required to secure pressure plates to sealing elements.

2.3 SLEEVE-SEAL FITTINGS

A. Description: Manufactured plastic, sleeve-type, waterstop assembly made for embedding in concrete slab or wall. Unit shall have plastic or rubber waterstop collar with center opening to match piping OD.

2.4 GROUT

A. Description: Nonshrink; recommended for interior and exterior sealing openings in non-fire-rated walls or floors.

B. Standard: ASTM C 1107/C 1107M, Grade B, post-hardening and volume-adjusting, dry, hydraulic-cement grout.

C. Design Mix: 5000-psi (34.5-MPa), 28-day compressive strength.

D. Packaging: Premixed and factory packaged.

2.5 SILICONE SEALANTS

A. Silicone Sealants: Single-component, silicone-based, neutral-curing elastomeric sealants of grade indicated below.

1. Grade: Pourable (self-leveling) formulation for openings in floors and other horizontal surfaces that are not fire rated.
2. Sealant shall comply with the testing and product requirements of the California Department of Health Services' "Standard Practice for the Testing of Volatile Organic Emissions from Various Sources Using Small-Scale Environmental Chambers."

B. Silicone Foams: Multicomponent, silicone-based liquid elastomers that, when mixed, expand and cure in place to produce a flexible, nonshrinking foam.

PART 3 - EXECUTION

3.1 SLEEVE INSTALLATION FOR NON-FIRE-RATED ELECTRICAL PENETRATIONS

A. Comply with NECA 1.

B. Comply with NEMA VE 2 for cable tray and cable penetrations.

C. Sleeves for Conduits Penetrating Above-Grade Non-Fire-Rated Concrete and Masonry-Unit Floors and Walls:

1. Interior Penetrations of Non-Fire-Rated Walls and Floors:

   a. Seal annular space between sleeve and raceway or cable, using joint sealant appropriate for size, depth, and location of joint. Comply with requirements in Division 07 Section "Joint Sealants."
   b. Seal space outside of sleeves with mortar or grout. Pack sealing material solidly between sleeve and wall so no voids remain. Tool exposed surfaces smooth; protect material while curing.

2. Use pipe sleeves unless penetration arrangement requires rectangular sleeved opening.
3. Size pipe sleeves to provide **1/4-inch (6.4-mm)** annular clear space between sleeve and raceway or cable unless sleeve seal is to be installed or unless seismic criteria require different clearance.
4. Install sleeves for wall penetrations unless core-drilled holes or formed openings are used. Install sleeves during erection of walls. Cut sleeves to length for mounting flush with both surfaces of walls. Deburr after cutting.
5. Install sleeves for floor penetrations. Extend sleeves installed in floors **2 inches (50 mm)** above finished floor level. Install sleeves during erection of floors.

D. Sleeves for Conduits Penetrating Non-Fire-Rated Gypsum Board Assemblies:

1. Use circular metal sleeves unless penetration arrangement requires rectangular sleeved opening.
2. Seal space outside of sleeves with approved joint compound for gypsum board assemblies.

E. Roof-Penetration Sleeves: Seal penetration of individual raceways and cables with flexible boot-type flashing units applied in coordination with roofing work.

F. Aboveground, Exterior-Wall Penetrations: Seal penetrations using steel pipe sleeves and mechanical sleeve seals. Select sleeve size to allow for 1-inch (25-mm) annular clear space between pipe and sleeve for installing mechanical sleeve seals.

3.2 SLEEVE-SEAL-SYSTEM INSTALLATION

A. Install sleeve-seal systems in sleeves in exterior concrete walls and slabs-on-grade at raceway entries into building.

B. Install type and number of sealing elements recommended by manufacturer for raceway or cable material and size. Position raceway or cable in center of sleeve. Assemble mechanical sleeve seals and install in

annular space between raceway or cable and sleeve. Tighten bolts against pressure plates that cause sealing elements to expand and make watertight seal.

3.3 SLEEVE-SEAL-FITTING INSTALLATION

A. Install sleeve-seal fittings in new walls and slabs as they are constructed.

B. Assemble fitting components of length to be flush with both surfaces of concrete slabs and walls. Position waterstop flange to be centered in concrete slab or wall.

C. Secure nailing flanges to concrete forms.

D. Using grout, seal the space around outside of sleeve-seal fittings.

END OF SECTION 26 05 44

SECTION 26 05 48 - VIBRATION AND SEISMIC CONTROLS FOR ELECTRICAL SYSTEMS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. This Section includes the following:

1. Isolation pads.
2. Spring isolators.
3. Restrained spring isolators.
4. Channel support systems.
5. Restraint cables.
6. Hanger rod stiffeners.
7. Anchorage bushings and washers.

B. Related Sections include the following:

1. Division 26 Section "Hangers And Supports For Electrical Systems" for commonly used electrical supports and installation requirements.

1.3 DEFINITIONS

A. The IBC: International Building Code.

B. ICC-ES: ICC-Evaluation Service.

C. OSHPD: Office of Statewide Health Planning and Development for the State of California.

1.4 PERFORMANCE REQUIREMENTS

A. Seismic-Restraint Loading:

1. Site Class as Defined in the IBC: A.
2. Assigned Seismic Use Group or Building Category as Defined in the IBC: I.

a. Component Importance Factor: 1.0.
b. Component Response Modification Factor: 1.5
c. Component Amplification Factor: 1.0

3. Design Spectral Response Acceleration at Short Periods 0.2 Second: See structural plans.
4. Design Spectral Response Acceleration at 1.0-Second Period: See Structural plans.

1.5 SUBMITTALS

A. Product Data: For the following:

1. Include rated load, rated deflection, and overload capacity for each vibration isolation device.
2. Illustrate and indicate style, material, strength, fastening provision, and finish for each type and size of seismic-restraint component used.

3. Restrained-Isolation Devices: Include ratings for horizontal, vertical, and combined loads.

B. Field quality-control test reports.

1.6 QUALITY ASSURANCE

A. Testing Agency Qualifications: An independent agency, with the experience and capability to conduct the testing indicated, that is a nationally recognized testing laboratory (NRTL) as defined by OSHA in 29 CFR 1910.7, and that is acceptable to authorities having jurisdiction.

B. Comply with seismic-restraint requirements in the IBC unless requirements in this Section are more stringent.

C. Welding: Qualify procedures and personnel according to AWS D1.1/D1.1M, "Structural Welding Code - Steel."

D. Seismic-restraint devices shall have horizontal and vertical load testing and analysis and shall bear anchorage preapproval OPA number from OSHPD, preapproval by ICC-ES, or preapproval by another agency acceptable to authorities having jurisdiction, showing maximum seismic-restraint ratings. Ratings based on independent testing are preferred to ratings based on calculations. If preapproved ratings are not available, submittals based on independent testing are preferred. Calculations (including combining shear and tensile loads) to support seismic-restraint designs must be signed and sealed by a qualified professional engineer.

E. Comply with NFPA 70.

PART 2 - PRODUCTS

2.1 VIBRATION ISOLATORS

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

1. Ace Mountings Co., Inc.
2. Amber/Booth Company, Inc.
3. California Dynamics Corporation.
4. Isolation Technology, Inc.
5. Kinetics Noise Control.
6. Mason Industries.
7. Vibration Eliminator Co., Inc.
8. Vibration Isolation.
9. Vibration Mountings & Controls, Inc.

B. Spring Isolators Freestanding, laterally stable, open-spring isolators.

1. Outside Spring Diameter: Not less than 80 percent of the compressed height of the spring at rated load.
2. Minimum Additional Travel: 50 percent of the required deflection at rated load.
3. Lateral Stiffness: More than 80 percent of rated vertical stiffness.
4. Overload Capacity: Support 200 percent of rated load, fully compressed, without deformation or failure.
5. Baseplates: Factory drilled for bolting to structure and bonded to 1/4-inch- (6-mm-) thick, rubber isolator pad attached to baseplate underside. Baseplates shall limit floor load to 500 psig (3447 kPa).
6. Top Plate and Adjustment Bolt: Threaded top plate with adjustment bolt and cap screw to fasten and level equipment.

2.2 SEISMIC-RESTRAINT DEVICES

A. Subject to compliance with requirements, provide a product by one of the following or approved equal:

1. Amber/Booth Company, Inc.
2. Cooper B-Line, Inc.; a division of Cooper Industries.
3. Mason Industries.
4. TOLCO Incorporated; a brand of NIBCO INC.
5. Unistrut; Tyco International, Ltd.

B. Restraint Cables: ASTM A 603 galvanized-steel cables with end connections made of steel assemblies with thimbles, brackets, swivels, and bolts designed for restraining cable service; and with a minimum of two clamping bolts for cable engagement.

C. Bushings for Floor-Mounted Equipment Anchor: Neoprene bushings designed for rigid equipment mountings, and matched to type and size of anchors and studs.

D. Bushing Assemblies for Wall-Mounted Equipment Anchorage: Assemblies of neoprene elements and steel sleeves designed for rigid equipment mountings, and matched to type and size of attachment devices.

E. Resilient Isolation Washers and Bushings: One-piece, molded, oil- and water-resistant neoprene, with a flat washer face.

F. Adhesive Anchor: Drilled-in and capsule anchor system containing polyvinyl or urethane methacrylate-based resin and accelerator, or injected polymer or hybrid mortar adhesive. Provide anchor bolts and hardware with zinc-coated steel for interior applications and stainless steel for exterior applications. Select anchor bolts with strength required for anchor and as tested according to ASTM E 488.

2.3 FACTORY FINISHES

A. Finish: Manufacturer's standard paint applied to factory-assembled and -tested equipment before shipping.

1. Powder coating on springs and housings.
2. All hardware shall be galvanized. Hot-dip galvanize metal components for exterior use.
3. Baked enamel or powder coat for metal components on isolators for interior use.
4. Color-code or otherwise mark vibration isolation and seismic-control devices to indicate capacity range.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine areas and equipment to receive seismic-control devices for compliance with requirements for installation tolerances and other conditions affecting performance.

B. Examine roughing-in of reinforcement and cast-in-place anchors to verify actual locations before installation.

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

3.2 APPLICATIONS

A. Multiple Raceways or Cables: Secure raceways and cables to trapeze member with clamps approved for application by.

B. Hanger Rod Stiffeners: Install hanger rod stiffeners where indicated or scheduled on Drawings to receive them and where required to prevent buckling of hanger rods due to seismic forces.

C. Strength of Support and Seismic-Restraint Assemblies: Where not indicated, select sizes of components so strength will be adequate to carry present and future static and seismic loads within specified loading limits.

3.3 SEISMIC-RESTRAINT DEVICE INSTALLATION

A. Equipment and Hanger Restraints:

1. Install restrained isolators on electrical equipment.
2. Install resilient, bolt-isolation washers on equipment anchor bolts where clearance between anchor and adjacent surface exceeds 0.125 inch (3.2 mm).

B. Install bushing assemblies for mounting bolts for wall-mounted equipment, arranged to provide resilient media where equipment or equipment-mounting channels are attached to wall.

C. Attachment to Structure: If specific attachment is not indicated, anchor bracing to structure at flanges of beams, at upper truss chords of bar joists, or at concrete members.

D. Drilled-in Anchors:

1. Identify position of reinforcing steel and other embedded items prior to drilling holes for anchors. Do not damage existing reinforcing or embedded items during coring or drilling. Notify the structural engineer if reinforcing steel or other embedded items are encountered during drilling. Locate and avoid prestressed tendons, electrical and telecommunications conduit, and gas lines.
2. Do not drill holes in concrete or masonry until concrete, mortar, or grout has achieved full design strength.
3. Wedge Anchors: Protect threads from damage during anchor installation. Heavy-duty sleeve anchors shall be installed with sleeve fully engaged in the structural element to which anchor is to be fastened.
4. Adhesive Anchors: Clean holes to remove loose material and drilling dust prior to installation of adhesive. Place adhesive in holes proceeding from the bottom of the hole and progressing toward the surface in such a manner as to avoid introduction of air pockets in the adhesive.

5. Set anchors to manufacturer's recommended torque, using a torque wrench.
6. Install zinc-coated steel anchors for interior and stainless-steel anchors for exterior applications.

3.4 ACCOMMODATION OF DIFFERENTIAL SEISMIC MOTION

A. Install flexible connections in runs of raceways, cables, wireways, cable trays, and busways where they cross seismic joints, where adjacent sections or branches are supported by different structural elements, and where they terminate with connection to equipment that is anchored to a different structural element from the one supporting them as they approach equipment.

3.5 FIELD QUALITY CONTROL

A. Perform tests and inspections.

B. Remove and replace malfunctioning units and retest as specified above.

C. Prepare test and inspection reports.

3.6 ADJUSTING

A. Adjust isolators after isolated equipment is at operating weight.

B. Adjust limit stops on restrained spring isolators to mount equipment at normal operating height. After equipment installation is complete, adjust limit stops so they are out of contact during normal operation.

C. Adjust active height of spring isolators.

D. Adjust restraints to permit free movement of equipment within normal mode of operation.

END OF SECTION 26 05 48

SECTION 26 05 53 - IDENTIFICATION FOR ELECTRICAL SYSTEMS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section Includes:

1. Identification for conductors.
2. Warning labels and signs.
3. Instruction signs.
4. Equipment identification labels.
5. Miscellaneous identification products.

1.3 SUBMITTALS

A. Product Data: For each electrical identification product indicated.

1.4 QUALITY ASSURANCE

A. Comply with ANSI A13.1 and IEEE C2.

B. Comply with NFPA 70.

C. Comply with 29 CFR 1910.144 and 29 CFR 1910.145.

D. Comply with ANSI Z535.4 for safety signs and labels.

E. Adhesive-attached labeling materials, including label stocks, laminating adhesives, and inks used by label printers, shall comply with UL 969.

1.5 COORDINATION

A. Coordinate identification names, abbreviations, colors, and other features with requirements in other Sections requiring identification applications, Drawings, Shop Drawings, manufacturer's wiring diagrams, and the Operation and Maintenance Manual; and with those required by codes, standards, and 29 CFR 1910.145. Use consistent designations throughout Project.

B. Coordinate installation of identifying devices with completion of covering and painting of surfaces where devices are to be applied.

C. Coordinate installation of identifying devices with location of access panels and doors.

D. Install identifying devices before installing acoustical ceilings and similar concealment.

PART 2 - PRODUCTS

2.1 CONDUCTOR IDENTIFICATION MATERIALS

A. Color-Coding Conductor Tape: Colored, self-adhesive vinyl tape not less than 3 mils (0.08 mm) thick by 1 to 2 inches (25 to 50 mm) wide.

B. Self-Adhesive Vinyl Labels: Preprinted, flexible label laminated with a clear, weather- and chemical-resistant coating and matching wraparound adhesive tape for securing ends of legend label.

2.2 WARNING LABELS AND SIGNS

A. Comply with NFPA 70 and 29 CFR 1910.145.

B. Self-Adhesive Warning Labels: Factory-printed, multicolor, pressure-sensitive adhesive labels, configured for display on front cover, door, or other access to equipment unless otherwise indicated.

2.3 INSTRUCTION SIGNS

A. Engraved, laminated acrylic or melamine plastic, minimum 1/16 inch (1.6 mm) thick for signs up to 20 sq. inches (129 sq. cm) and 1/8 inch (3.2 mm) thick for larger sizes.

1. Engraved legend with black letters on white face.
2. Punched or drilled for mechanical fasteners.
3. Framed with mitered acrylic molding and arranged for attachment at applicable equipment.

2.4 EQUIPMENT IDENTIFICATION LABELS

A. Adhesive Film Label: Machine printed, in black, by thermal transfer or equivalent process. Minimum letter height shall be 3/8 inch (10 mm).

B. Stenciled Legend for outdoor installations: In nonfading, waterproof, black ink or paint. Minimum letter height shall be 1 inch (25 mm).

2.5 CABLE TIES

A. General-Purpose Cable Ties: Fungus inert, self extinguishing, one piece, self locking, Type 6/6 nylon.

1. Minimum Width: 3/16 inch (5 mm).
2. Tensile Strength at 73 deg F (23 deg C), According to ASTM D 638: 12,000 psi (82.7 MPa).
3. Temperature Range: Minus 40 to plus 185 deg F (Minus 40 to plus 85 deg C).
4. Color: Black except where used for color-coding.

B. Plenum-Rated Cable Ties: Self extinguishing, UV stabilized, one piece, self locking.

1. Minimum Width: 3/16 inch (5 mm).
2. Tensile Strength at 73 deg F (23 deg C), According to ASTM D 638: 7000 psi (48.2 MPa).
3. UL 94 Flame Rating: 94V-0.
4. Temperature Range: Minus 50 to plus 284 deg F (Minus 46 to plus 140 deg C).
5. Color: Black.

2.6 MISCELLANEOUS IDENTIFICATION PRODUCTS

A. Paint: Comply with requirements in Division 09 painting Sections for paint materials and application requirements. Select paint system applicable for surface material and location (exterior or interior).

B. Fasteners for Labels and Signs: Self-tapping, stainless-steel screws or stainless-steel machine screws with nuts and flat and lock washers.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Verify identity of each item before installing identification products.

B. Location: Install identification materials and devices at locations for most convenient viewing without interference with operation and maintenance of equipment.

C. Apply identification devices to surfaces that require finish after completing finish work.

D. System Identification Color-Coding Bands for Raceways and Cables: Each color-coding band shall completely encircle cable or conduit. Place adjacent bands of two-color markings in contact, side by side. Locate bands at changes in direction, at penetrations of walls and floors, at 50-foot (15-m) maximum intervals in straight runs, and at 25-foot (7.6-m) maximum intervals in congested areas.

E. Aluminum Wraparound Marker Labels and Metal Tags: Secure tight to surface of conductor or cable at a location with high visibility and accessibility.

F. Cable Ties: For attaching tags. Use general-purpose type, except as listed below:

1. Outdoors: UV-stabilized nylon.
2. In Spaces Handling Environmental Air: Plenum rated.

G. Painted Identification: Comply with requirements in Division 09 painting Sections for surface preparation and paint application.

3.2 IDENTIFICATION SCHEDULE

A. Power-Circuit Conductor Identification, 600 V or Less: For conductors in vaults, pull and junction boxes, manholes, and handholes, use color-coding conductor tape to identify the phase.

1. Color-Coding for Phasem Identification, 600 V or Less: Use colors listed below for ungrounded conductors.

    a. Color shall be factory applied.
    b. Colors for 208/120-V Circuits:

        1) Phase A: Black.
        2) Phase B: Red.
        3) Phase C: Blue.

B. Warning Labels for Indoor Cabinets, Boxes, and Enclosures for Power and Lighting: Self-adhesive warning labels

1. Comply with 29 CFR 1910.145.
2. Identify system voltage with black letters on an orange background.
3. Apply to exterior of door, cover, or other access.
4. For equipment with multiple power or control sources, apply to door or cover of equipment including, but not limited to, the following:

    a. Power transfer switches.
    b. Controls with external control power connections.

5. Equipment to Be Labeled:

    a. Panelboards: Typewritten directory of circuits in the location provided by panelboard manufacturer. Panelboard identification shall be engraved melamine label
    b. Enclosures and electrical cabinets.
    c. Access doors and panels for concealed electrical items.
    d. Emergency system boxes and enclosures.
    e. Enclosed switches and enclosed circuit breakers.
    f. Enclosed controllers.
    g. Variable-speed controllers.
    h. Push-button stations.
    i. Power transfer equipment.
    j. Contactors,Remote-controlled switches, dimmer modules, and control devices.

END OF SECTION 26 05 53

SECTION 26 09 23 - LIGHTING CONTROL DEVICES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section Includes:

1. Standalone daylight-harvesting switching controls.
2. Indoor occupancy sensors.

B. Related Requirements:

1. Section 26 27 26 "Wiring Devices" for wall-box dimmers, wall-switch occupancy sensors, and manual light switches.

1.3 ACTION SUBMITTALS

A. Product Data: For each type of product.

B. Shop Drawings: Show installation details for occupancy and light-level sensors.

1. Interconnection diagrams showing field-installed wiring.
2. Include diagrams for power, signal, and control wiring.

1.4 INFORMATIONAL SUBMITTALS

A. Field quality-control reports.

1.5 CLOSEOUT SUBMITTALS

A. Operation and Maintenance Data: For each type of lighting control device to include in emergency, operation, and maintenance manuals.

PART 2 - PRODUCTS

2.1 DAYLIGHT-HARVESTING DIMMING CONTROLS

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. Hubbell Building Automation, Inc. – Basis of Design

2. Cooper Industries, Inc.
3. Leviton Manufacturing Co., Inc.
4. Lithonia Lighting; Acuity Brands Lighting, Inc.

B. System Description: Sensing daylight levels, the system adjusts the indoor electrical lighting levels. As daylight increases, the lights are dimmed.

1. Lighting control set point is based on two lighting conditions:

a. When no daylight is present (target level).
b. When significant daylight is present.

C. Ceiling-Mounted Dimming Controls: Solid-state, light-level sensor unit, with separate controller unit, to detect changes in lighting levels that are perceived by the eye.

1. Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.
2. Sensor Output: 0- to 10-V dc to operate electronic dimming drivers. Sensor is powered by controller unit.
3. Power Pack: Sensor has 24-V dc, Class 2 power source, as defined by NFPA 70.

2.2 INDOOR OCCUPANCY SENSORS

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. Hubbell Building Automation, Inc. – Basis of Design

2. Cooper Industries, Inc.
3. Leviton Manufacturing Co., Inc.
4. Lithonia Lighting; Acuity Brands Lighting, Inc.
5. Philips Lighting Controls.
6. Sensor Switch, Inc.

B. General Requirements for Sensors: Wall- or ceiling-mounted, solid-state indoor occupancy sensors with a separate power pack.

1. Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.

2. Operation: Unless otherwise indicated, turn lights on when coverage area is occupied, and turn them off when unoccupied; with a time delay for turning lights off, adjustable over a minimum range of 1 to 15 minutes.
3. Sensor Output: Contacts rated to operate the connected relay, complying with UL 773A. Sensor is powered from the power pack.
4. Power Pack: Dry contacts rated for 20-A ballast load at 120- and 277-V ac, for 13-A tungsten at 120-V ac, and for 1 hp at 120-V ac. Sensor has 24-V dc, 150-mA, Class 2 power source, as defined by NFPA 70.
5. Mounting:

    a. Sensor: Suitable for mounting in any position on a standard outlet box.
    b. Relay: Externally mounted through a 1/2-inch (13-mm) knockout in a standard electrical enclosure.
    c. Time-Delay and Sensitivity Adjustments: Recessed and concealed behind hinged door.

6. Indicator: Digital display, to show when motion is detected during testing and normal operation of sensor.
7. Bypass Switch: Override the "on" function in case of sensor failure.
8. Automatic Light-Level Sensor: Adjustable from 2 to 200 fc (21.5 to 2152 lux); turn lights off when selected lighting level is present.

C. Dual-Technology Type: Ceiling mounted; detect occupants in coverage area using PIR and ultrasonic detection methods. The particular technology or combination of technologies that control on-off functions is selectable in the field by operating controls on unit.

1. Sensitivity Adjustment: Separate for each sensing technology.
2. Detector Sensitivity: Detect occurrences of 6-inch- (150-mm-) minimum movement of any portion of a human body that presents a target of not less than 36 sq. in. (232 sq. cm), and detect a person of average size and weight moving not less than 12 inches (305 mm) in either a horizontal or a vertical manner at an approximate speed of 12 inches/s (305 mm/s).
3. Detection Coverage (Standard Room): Detect occupancy anywhere within a circular area of 1000 sq. ft. (93 sq. m) when mounted on a 96-inch- (2440-mm-) high ceiling.

2.3 CONDUCTORS AND CABLES

A. Power Wiring to Supply Side of Remote-Control Power Sources: Not smaller than No. 12 AWG. Comply with requirements in Section 26 05 19 "Low-Voltage Electrical Power Conductors and Cables."

B. Classes 2 and 3 Control Cable: Multiconductor cable with stranded-copper conductors not smaller than No. 18 AWG. Comply with requirements in Section 26 05 19 "Low-Voltage Electrical Power Conductors and Cables."

C. Class 1 Control Cable: Multiconductor cable with stranded-copper conductors not smaller thanNo. 14 AWG. Comply with requirements in Section 26 05 19 "Low-Voltage Electrical Power Conductors and Cables."

PART 3 - EXECUTION

3.1 SENSOR INSTALLATION

A. Coordinate layout and installation of ceiling-mounted devices with other construction that penetrates ceilings or is supported by them, including light fixtures, HVAC equipment, smoke detectors, fire-suppression systems, and partition assemblies.

B. Install and aim sensors in locations to achieve not less than 90 percent coverage of areas indicated. Do not exceed coverage limits specified in manufacturer's written instructions.

3.2 WIRING INSTALLATION

A. Wiring Method: Comply with Section 26 05 19 "Low-Voltage Electrical Power Conductors and Cables." Minimum conduit size is 1/2 inch (13 mm).

B. Wiring within Enclosures: Comply with NECA 1. Separate power-limited and nonpower-limited conductors according to conductor manufacturer's written instructions.

C. Size conductors according to lighting control device manufacturer's written instructions unless otherwise indicated.

D. Splices, Taps, and Terminations: Make connections only on numbered terminal strips in junction, pull, and outlet boxes; terminal cabinets; and equipment enclosures.

3.3 IDENTIFICATION

A. Identify components and power and control wiring according to Section 26 05 53 "Identification for Electrical Systems."

1. Identify controlled circuits in lighting contactors.
2. Identify circuits and luminaires controlled by photoelectric and occupancy sensors at daylight harvesting controller.

3.4 FIELD QUALITY CONTROL

A. Manufacturer's Field Service: For daylight harvesting controls, Engage a factory-authorized service representative to test and inspect components, assemblies, and equipment installations, including connections.

B. Perform the following tests and inspections.

1. Operational Test: After installing switches and sensors, and after electrical circuitry has been energized, start units to confirm proper unit operation.
2. Test and adjust controls and safeties. Replace damaged and malfunctioning controls and equipment.

C. Lighting control devices will be considered defective if they do not pass tests and inspections.

D. Prepare test and inspection reports.

3.5 ADJUSTING

A. Occupancy Adjustments: When requested within 12 months from date of Substantial Completion, provide on-site assistance in adjusting sensors to suit actual occupied conditions. Provide up to two visits to Project during other-than-normal occupancy hours for this purpose.

1. For occupancy and motion sensors, verify operation at outer limits of detector range. Set time delay to suit Owner's operations.
2. For daylighting controls, adjust set points and deadband controls to suit Owner's operations.

3.6 DEMONSTRATION

A. Coordinate demonstration of products specified in this Section with demonstration requirements for low-voltage, programmable lighting control systems specified in Section 26 09 43.13 "Addressable-Fixture Lighting Controls" and Section 26 09 43.23 "Relay-Based Lighting Controls."

B. Engage a factory-authorized service representative to train Owner's maintenance personnel to adjust, operate, and maintain lighting control devices.

END OF SECTION 26 09 23

SECTION 26 22 00 - LOW-VOLTAGE TRANSFORMERS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. This Section includes the following types of dry-type transformers rated 600 V and less, with capacities up to 1000 kVA:

1. Distribution transformers.
2. Buck-boost transformers.

1.3 ACTION SUBMITTALS

A. Product Data: Include rated nameplate data, capacities, weights, dimensions, minimum clearances, installed devices and features, and performance for each type and size of transformer indicated.

B. Shop Drawings: Detail equipment assemblies and indicate dimensions, weights, loads, required clearances, method of field assembly, components, and location and size of each field connection.

1. Wiring Diagrams: Power, signal, and control wiring.

1.4 INFORMATIONAL SUBMITTALS

A. Manufacturer Seismic Qualification Certification: Submit certification that transformers, accessories, and components will withstand seismic forces defined in Section 26 05 48 "Vibration and Seismic Controls for Electrical Systems." Include the following:

1. Basis for Certification: Indicate whether withstand certification is based on actual test of assembled components or on calculation.

a. The term "withstand" means "the unit will remain in place without separation of any parts from the device when subjected to the seismic forces specified and the unit will be fully operational after the seismic event."

2. Dimensioned Outline Drawings of Equipment Unit: Identify center of gravity and locate and describe mounting and anchorage provisions.
3. Detailed description of equipment anchorage devices on which the certification is based and their installation requirements.

B. Source quality-control test reports.

C. Field quality-control test reports.

1.5 CLOSEOUT SUBMITTALS

A. Operation and Maintenance Data: For transformers to include in emergency, operation, and maintenance manuals.

1.6 QUALITY ASSURANCE

A. Source Limitations: Obtain each transformer type through one source from a single manufacturer.

B. 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.

C. Comply with IEEE C57.12.91, "Test Code for Dry-Type Distribution and Power Transformers."

1.7 DELIVERY, STORAGE, AND HANDLING

A. Temporary Heating: Apply temporary heat according to manufacturer's written instructions within the enclosure of each ventilated-type unit, throughout periods during which equipment is not energized and when transformer is not in a space that is continuously under normal control of temperature and humidity.

1.8 COORDINATION

A. Coordinate size and location of concrete bases with actual transformer provided. Cast anchor-bolt inserts into bases. Concrete, reinforcement, and formwork requirements are specified with concrete.

B. Coordinate installation of wall-mounting and structure-hanging supports with actual transformer provided.

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. ACME Electric Corporation; Power Distribution Products Division.
2. Eaton Electrical Inc.; Cutler-Hammer Products.
3. General Electric Company.
4. Siemens Energy & Automation, Inc.
5. Sola/Hevi-Duty.
6. Square D; Schneider Electric.

2.2 GENERAL TRANSFORMER REQUIREMENTS

A. Description: Factory-assembled and -tested, air-cooled units for 60-Hz service.

B. Cores: Grain-oriented, non-aging silicon steel.

C. Coils: Continuous windings without splices except for taps.

1. Internal Coil Connections: Brazed or pressure type.
2. Coil Material: Aluminum.

2.3 DISTRIBUTION TRANSFORMERS

A. Comply with NEMA ST 20, and list and label as complying with UL 1561.

B. Provide transformers that are constructed to withstand seismic forces specified in Section 26 05 48 "Vibration and Seismic Controls for Electrical Systems."

C. Cores: One leg per phase.

D. Enclosure: Ventilated, NEMA 250, Type 2 unless otherwise noted.

1. Core and coil shall be encapsulated within resin compound, sealing out moisture and air.

E. Transformer Enclosure Finish: Comply with NEMA 250.

1. Finish Color: Gray

F. Taps for Transformers Smaller Than 3 kVA: None

G. Taps for Transformers 7.5 to 24 kVA: One 5 percent tap above and one 5 percent tap below normal full capacity.

H. Taps for Transformers 25 kVA and Larger: Two 2.5 percent taps above and two 2.5 percent taps below normal full capacity.

I. Insulation Class: 220 deg C, UL-component-recognized insulation system with a maximum of 150 deg C rise above 40 deg C ambient temperature.

J. Energy Efficiency for Transformers Rated 15 kVA and Larger:

1. Complying with NEMA TP 1, Class 1 efficiency levels.
2. Tested according to NEMA TP 2.

K. K-Factor Rating: Transformers indicated to be K-factor rated shall comply with UL 1561 requirements for nonsinusoidal load current-handling capability to the degree defined by designated K-factor.

1. Unit shall not overheat when carrying full-load current with harmonic distortion corresponding to designated K-factor.
2. Indicate value of K-factor on transformer nameplate.

L. Electrostatic Shielding: Each winding shall have an independent, single, full-width copper electrostatic shield arranged to minimize interwinding capacitance.

1. Arrange coil leads and terminal strips to minimize capacitive coupling between input and output terminals.
2. Include special terminal for grounding the shield.

3. Shield Effectiveness:

a. Capacitance between Primary and Secondary Windings: Not to exceed 33 picofarads over a frequency range of 20 Hz to 1 MHz.
b. Common-Mode Noise Attenuation: Minimum of minus 120 dBA at 0.5 to 1.5 kHz; minimum of minus 65 dBA at 1.5 to 100 kHz.
c. Normal-Mode Noise Attenuation: Minimum of minus 52 dBA at 1.5 to 10 kHz.

M. Wall Brackets: Manufacturer's standard brackets.

N. Low-Sound-Level Requirements: Maximum sound levels, when factory tested according to IEEE C57.12.91, as follows:

1. 9 kVA and Less: 37dBA.
2. 30 to 50 kVA: 42dBA.
3. 51 to 150 kVA: 47dBA.
4. 151 to 300 kVA: 52dBA.

2.4 BUCK-BOOST TRANSFORMERS

A. Description: Self-cooled, two-winding dry type, rated for continuous duty and with wiring terminals suitable for connection as autotransformer. Transformers shall comply with NEMA ST 1 and shall be listed and labeled as complying with UL 506 or UL 1561.

B. Enclosure: Ventilated, NEMA 250, Type 2.

1. Finish Color: Gray

2.5 IDENTIFICATION DEVICES

A. Nameplates: Engraved, laminated-plastic or metal nameplate for each transformer, mounted with corrosion-resistant screws. Nameplates and label products are specified in Section 26 05 53 "Identification for Electrical Systems."

2.6 SOURCE QUALITY CONTROL

A. Test and inspect transformers according to IEEE C57.12.91.

B. Factory Sound-Level Tests: Conduct sound-level tests on equipment for this Project.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine conditions for compliance with enclosure- and ambient-temperature requirements for each transformer.

B. Verify that field measurements are as needed to maintain working clearances required by NFPA 70 and manufacturer's written instructions.

C. Examine walls, floors, roofs, and concrete bases for suitable mounting conditions where transformers will be installed.

D. Verify that ground connections are in place and requirements in Section 26 05 26 "Grounding and Bonding for Electrical Systems" have been met. Maximum ground resistance shall be 5 ohms at location of transformer.

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

3.2 INSTALLATION

A. Install wall-mounting transformers level and plumb with wall brackets fabricated by transformer manufacturer.

1. Brace wall-mounting transformers as specified in Section 26 05 48 "Vibration and Seismic Controls for Electrical Systems."

B. Construct concrete bases and anchor floor-mounting transformers according to manufacturer's written instructions, seismic codes applicable to Project, and requirements in Section 26 05 29 "Hangers and Supports for Electrical Systems."

3.3 CONNECTIONS

A. Ground equipment according to Section 26 05 26 "Grounding and Bonding for Electrical Systems."

B. Connect wiring according to Section 26 05 19 "Low-Voltage Electrical Power Conductors and Cables."

3.4 FIELD QUALITY CONTROL

A. Perform tests and inspections and prepare test reports.

B. Tests and Inspections:

1. Perform each visual and mechanical inspection and electrical test stated in NETA Acceptance Testing Specification. Certify compliance with test parameters.

C. Remove and replace units that do not pass tests or inspections and retest as specified above.

D. Test Labeling: On completion of satisfactory testing of each unit, attach a dated and signed "Satisfactory Test" label to tested component.

3.5 ADJUSTING

A. Record transformer secondary voltage at each unit for at least 48 hours of typical occupancy period. Adjust transformer taps to provide optimum voltage conditions at secondary terminals. Optimum is defined as not exceeding nameplate voltage plus 10 percent and not being lower than nameplate voltage minus 3 percent at maximum load conditions. Submit recording and tap settings as test results.

B. Connect buck-boost transformers to provide nameplate voltage of equipment being served, plus or minus 5 percent, at secondary terminals.

C. Output Settings Report: Prepare a written report recording output voltages and tap settings.

3.6 CLEANING

A. Vacuum dirt and debris; do not use compressed air to assist in cleaning.

END OF SECTION 26 22 00

SECTION 26 24 16 - PANELBOARDS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section Includes:

1. Lighting and appliance branch-circuit panelboards.

1.3 DEFINITIONS

A. SVR: Suppressed voltage rating.

B. TVSS: Transient voltage surge suppressor.

1.4 SUBMITTALS

A. Product Data: For each type of panelboard, switching and overcurrent protective device, transient voltage suppression device, accessory, and component indicated. Include dimensions and manufacturers' technical data on features, performance, electrical characteristics, ratings, and finishes.

B. Shop Drawings: For each panelboard and related equipment.

1. Include dimensioned plans, elevations, sections, and details. Show tabulations of installed devices, equipment features, and ratings.
2. Detail enclosure types and details for types other than NEMA 250, Type 1.
3. Detail bus configuration, current, and voltage ratings.
4. Short-circuit current rating of panelboards and overcurrent protective devices.
5. Include evidence of NRTL listing for series rating of installed devices.
6. Detail features, characteristics, ratings, and factory settings of individual overcurrent protective devices and auxiliary components.
7. Include wiring diagrams for power, signal, and control wiring.
8. Include time-current coordination curves for each type and rating of overcurrent protective device included in panelboards. Submit on translucent log-log graft paper; include selectable ranges for each type of overcurrent protective device.

C. Field Quality-Control Reports:

1. Test procedures used.
2. Test results that comply with requirements.
3. Results of failed tests and corrective action taken to achieve test results that comply with requirements.

D. Panelboard Schedules: For installation in panelboards. Submit final versions after load balancing.

E. Operation and Maintenance Data: For panelboards and components to include in emergency, operation, and maintenance manuals. In addition to items specified in Division 01 Section "Operation and Maintenance Data," include the following:

1. Manufacturer's written instructions for testing and adjusting overcurrent protective devices.
2. Time-current curves, including selectable ranges for each type of overcurrent protective device that allows adjustments.

1.5 QUALITY ASSURANCE

A. Testing Agency Qualifications: Member company of NETA or an NRTL.

1. Testing Agency's Field Supervisor: Currently certified by NETA to supervise on-site testing.

B. Source Limitations: Obtain panelboards, overcurrent protective devices, components, and accessories from single source from single manufacturer.

C. Product Selection for Restricted Space: Drawings indicate maximum dimensions for panelboards including clearances between panelboards and adjacent surfaces and other items. Comply with indicated maximum dimensions.

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

E. Comply with NEMA PB 1.

F. Comply with NFPA 70.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Remove loose packing and flammable materials from inside panelboards; install temporary electric heating (250 W per panelboard) to prevent condensation.

B. Handle and prepare panelboards for installation according to NEMA PB 1.

1.7 PROJECT CONDITIONS

A. Environmental Limitations:

1. Do not deliver or install panelboards until spaces are enclosed and weathertight, wet work in spaces is complete and dry, work above panelboards is complete, and temporary HVAC system is operating and maintaining ambient temperature and humidity conditions at occupancy levels during the remainder of the construction period.
2. Rate equipment for continuous operation under the following conditions unless otherwise indicated:

a. Ambient Temperature: Not exceeding 23 deg F (minus 5 deg C) to plus 104 deg F (plus 40 deg C).
b. Altitude: Not exceeding 6600 feet (2000 m).

B. Service Conditions: NEMA PB 1, usual service conditions, as follows:

1. Ambient temperatures within limits specified.
2. Altitude not exceeding 6600 feet (2000 m).

1.8 COORDINATION

A. Coordinate layout and installation of panelboards and components with other construction that penetrates walls or is supported by them, including electrical and other types of equipment, raceways, piping, encumbrances to workspace clearance requirements, and adjacent surfaces. Maintain required workspace clearances and required clearances for equipment access doors and panels.

1.9 WARRANTY

A. Special Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace transient voltage suppression devices that fail in materials or workmanship within specified warranty period.

1. Warranty Period: Five years from date of Substantial Completion.

1.10 EXTRA MATERIALS

A. Furnish extra materials that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.

1. Keys: Two spares for each type of panelboard cabinet lock.
2. Circuit Breakers: As scheduled
3. Fuses for Fused Switches: Equal to 10 percent of quantity installed for each size and type, but no fewer than three of each size and type.
4. Fuses for Fused Power-Circuit Devices: Equal to 10 percent of quantity installed for each size and type, but no fewer than three of each size and type.

PART 2 - PRODUCTS

2.1 GENERAL REQUIREMENTS FOR PANELBOARDS

A. Fabricate and test panelboards according to IEEE 344 to withstand seismic forces defined in Division 26 Section "Vibration and Seismic Controls for Electrical Systems."

B. Enclosures: Flush- and surface-mounted cabinets as scheduled.

1. Rated for environmental conditions at installed location.

a. Indoor Dry and Clean Locations: NEMA 250, Type 1.
b. Outdoor Locations: NEMA 250, Type 3R.
c. Wash-Down Areas: NEMA 250, Type 4X, stainless steel.

2. Hinged Front Cover: Entire front trim hinged to box and with standard door within hinged trim cover.

3. Finishes:

    a. Panels and Trim: Steel and galvanized steel, factory finished immediately after cleaning and pretreating with manufacturer's standard two-coat, baked-on finish consisting of prime coat and thermosetting topcoat.
    b. Back Boxes: Galvanized steel or same finish as panels and trim.

4. Directory Card: Inside panelboard door, mounted in transparent card holder.

C. Incoming Mains Location: Top or bottom to match incoming feeder..

D. Phase, Neutral, and Ground Buses:

1. Material: Tin-plated aluminum.
2. Equipment Ground Bus: Adequate for feeder and branch-circuit equipment grounding conductors; bonded to box.
3. Extra-Capacity Neutral Bus: Neutral bus rated 200 percent of phase bus and UL listed as suitable for nonlinear loads.

E. Conductor Connectors: Suitable for use with conductor material and sizes.

1. Material: Tin-plated aluminum.
2. Main and Neutral Lugs: Mechanical type.
3. Ground Lugs and Bus-Configured Terminators: Mechanical type.
4. Feed-Through Lugs: Mechanical type, suitable for use with conductor material. Locate at opposite end of bus from incoming lugs or main device.
5. Subfeed (Double) Lugs: Mechanical type suitable for use with conductor material. Locate at same end of bus as incoming lugs or main device.
6. Gutter-Tap Lugs: Mechanical type suitable for use with conductor material. Locate at same end of bus as incoming lugs or main device.
7. Extra-Capacity Neutral Lugs: Rated 200 percent of phase lugs mounted on extra-capacity neutral bus.

F. Service Equipment Label: NRTL labeled for use as service equipment for panelboards or load centers with one or more main service disconnecting and overcurrent protective devices.

G. Future Devices: Mounting brackets, bus connections, filler plates, and necessary appurtenances required for future installation of devices.

H. Panelboard Short-Circuit Current Rating: Fully rated to interrupt symmetrical short-circuit current available at terminals.

2.2 LIGHTING AND APPLIANCE BRANCH-CIRCUIT PANELBOARDS

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. Eaton Electrical Inc.; Cutler-Hammer Business Unit.
2. General Electric Company; GE Consumer & Industrial - Electrical Distribution.
3. Siemens Energy & Automation, Inc.
4. Square D; a brand of Schneider Electric.

B. Panelboards: NEMA PB 1, lighting and appliance branch-circuit type.

C. Mains: as indicated on schedules. Provide sub feed lugs where indicated.

D. Branch Overcurrent Protective Devices: Bolt-on circuit breakers, replaceable without disturbing adjacent units.

E. Contactors in Main Bus: NEMA ICS 2, Class A, electrically held, general-purpose controller, with same short-circuit interrupting rating as panelboard.

1. Internal Control-Power Source: Control-power transformer, with fused primary and secondary terminals, connected to main bus ahead of contactor connection.

F. Doors: Concealed hinges; secured with flush latch with tumbler lock; keyed alike.

G. Column-Type Panelboards: Narrow gutter extension, with cover, to overhead junction box equipped with ground and neutral terminal buses.

2.3 DISCONNECTING AND OVERCURRENT PROTECTIVE DEVICES

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. Eaton Electrical Inc.; Cutler-Hammer Business Unit.
2. General Electric Company; GE Consumer & Industrial - Electrical Distribution.
3. Siemens Energy & Automation, Inc.
4. Square D; a brand of Schneider Electric.

B. Molded-Case Circuit Breaker (MCCB): Comply with UL 489, with interrupting capacity to meet available fault currents.

1. Thermal-Magnetic Circuit Breakers: Inverse time-current element for low-level overloads, and instantaneous magnetic trip element for short circuits. Adjustable magnetic trip setting for circuit-breaker frame sizes 250 A and larger.
2. Adjustable Instantaneous-Trip Circuit Breakers: Magnetic trip element with front-mounted, field-adjustable trip setting.
3. Electronic trip circuit breakers with rms sensing; field-replaceable rating plug or field-replicable electronic trip; and the following field-adjustable settings:

    a. Instantaneous trip.
    b. Long- and short-time pickup levels.
    c. Long- and short-time time adjustments.
    d. Ground-fault pickup level, time delay, and I^2t response.

4. Current-Limiting Circuit Breakers: Frame sizes 400 A and smaller; let-through ratings less than NEMA FU 1, RK-5.
5. GFCI Circuit Breakers: Single- and two-pole configurations with Class A ground-fault protection (6-mA trip).
6. Arc-Fault Circuit Interrupter (AFCI) Circuit Breakers: Comply with UL 1699; 120/240-V, single-pole configuration.
7. Molded-Case Circuit-Breaker (MCCB) Features and Accessories:

    a. Standard frame sizes, trip ratings, and number of poles.
    b. Lugs: Compression style, suitable for number, size, trip ratings, and conductor materials.

c. Application Listing: Appropriate for application; Type SWD for switching fluorescent lighting loads; Type HID for feeding fluorescent and high-intensity discharge (HID) lighting circuits.
d. Shunt Trip: trip coil energized from separate circuit, set to trip at 55 percent of rated voltage.
e. Undervoltage Trip: Set to operate at 35 to 75 percent of rated voltage without intentional time delay.
f. Auxiliary Contacts: One SPDT switch with "a" and "b" contacts; "a" contacts mimic circuit-breaker contacts and "b" contacts operate in reverse of circuit-breaker contacts.
g. Alarm Switch: Single-pole, normally open contact that actuates only when circuit breaker trips.
h. Multipole units enclosed in a single housing or factory assembled to operate as a single unit.
i. Handle Padlocking Device: Fixed attachment, for locking circuit-breaker handle in on position.
j. Handle Clamp: Loose attachment, for holding circuit-breaker handle in on position.

2.4 PANELBOARD SUPPRESSORS – **provide integral mounted for panel PP31**

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. Current Technology; a subsidiary of Danahar Corporation.
2. Eaton Electrical Inc.; Cutler-Hammer Business Unit.
3. General Electric Company; GE Consumer & Industrial - Electrical Distribution.
4. Liebert Corporation.
5. Siemens Energy & Automation, Inc.
6. Square D; a brand of Schneider Electric.

B. Surge Protection Device: IEEE C62.41-compliant, integrally mounted, solid-state, parallel-connected, non-modular type, with sine-wave tracking suppression and filtering modules, UL 1449, second edition, short-circuit current rating matching or exceeding the panelboard short-circuit rating, and with the following features and accessories:

1. Accessories:

a. LED indicator lights for power and protection status.
b. Audible alarm, with silencing switch, to indicate when protection has failed.
c. One set of dry contacts rated at 5 A and 250-V ac, for remote monitoring of protection status.

2.5 ACCESSORY COMPONENTS AND FEATURES

A. Accessory Set: Include tools and miscellaneous items required for overcurrent protective device test, inspection, maintenance, and operation.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Receive, inspect, handle, and store panelboards according to NECA 407.

B. Examine panelboards before installation. Reject panelboards that are damaged or rusted or have been subjected to water saturation.

C. Examine elements and surfaces to receive panelboards for compliance with installation tolerances and other conditions affecting performance of the Work.

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

3.2 INSTALLATION

A. Comply with mounting and anchoring requirements specified in Division 26 Section "Vibration and Seismic Controls for Electrical Systems."

B. Mount top of trim 90 inches (2286 mm) above finished floor unless otherwise indicated.

C. Mount panelboard cabinet plumb and rigid without distortion of box. Mount recessed panelboards with fronts uniformly flush with wall finish and mating with back box.

D. Install overcurrent protective devices and controllers not already factory installed.

1. Set field-adjustable, circuit-breaker trip ranges.

E. Install filler plates in unused spaces.

F. Stub four 1-inch (27-GRC) empty conduits from panelboard into accessible ceiling space or space designated to be ceiling space in the future. Stub four 1-inch (27-GRC) empty conduits into raised floor space or below slab not on grade.

G. Arrange conductors in gutters into groups and bundle and wrap with wire ties.

H. Comply with NECA 1.

3.3 IDENTIFICATION

A. Identify field-installed conductors, interconnecting wiring, and components; provide warning signs complying with Division 26 Section "Identification for Electrical Systems."

B. Create a directory to indicate installed circuit loads; incorporate Owner's final room designations. Obtain approval before installing. Use a computer or typewriter to create directory; handwritten directories are not acceptable.

C. Panelboard Nameplates: Label each panelboard with a nameplate complying with requirements for identification specified in Division 26 Section "Identification for Electrical Systems."

D. Device Nameplates: Label each branch circuit device in distribution panelboards with a nameplate complying with requirements for identification specified in Division 26 Section "Identification for Electrical Systems."

3.4 FIELD QUALITY CONTROL

A. Perform tests and inspections.

1. Manufacturer's Field Service: Engage a factory-authorized service representative to inspect components, assemblies, and equipment installations, including connections, and to assist in testing.

B. Tests and Inspections:

1. Perform each visual and mechanical inspection and electrical test stated in NETA Acceptance Testing Specification. Certify compliance with test parameters.
2. Correct malfunctioning units on-site, where possible, and retest to demonstrate compliance; otherwise, replace with new units and retest.

C. Panelboards will be considered defective if they do not pass tests and inspections.

D. Prepare test and inspection reports, including a certified report that identifies panelboards included and that describes scanning results. Include notation of deficiencies detected, remedial action taken, and observations after remedial action.

3.5 ADJUSTING

A. Adjust moving parts and operable component to function smoothly, and lubricate as recommended by manufacturer.

B. Set field-adjustable circuit-breaker trip ranges**.**

END OF SECTION 26 24 16

SECTION 26 27 26 - WIRING DEVICES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. This Section includes the following:

1. Receptacles, receptacles with integral GFCI, and associated device plates.
2. Twist-locking receptacles.
3. Snap switches and wall-box dimmers.
4. Cord and plug sets.

1.3 DEFINITIONS

A. GFCI: Ground-fault circuit interrupter.

B. Pigtail: Short lead used to connect a device to a branch-circuit conductor.

1.4 SUBMITTALS

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

B. Shop Drawings: List of legends and description of materials.

C. Samples: One for each type of device and wall plate specified, in each color specified.

D. Field quality-control test reports.

E. Operation and Maintenance Data: For wiring devices to include in all manufacturers' packing label warnings and instruction manuals that include labeling conditions.

1.5 QUALITY ASSURANCE

A. Source Limitations: Obtain each type of wiring device and associated wall plate through one source from a single manufacturer. Insofar as they are available, obtain all wiring devices and associated wall plates from a single manufacturer and one source.

B. 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.

C. Comply with NFPA 70.

1.6 COORDINATION

A. Receptacles for Owner-Furnished Equipment: Match plug configurations.

1. Cord and Plug Sets: Match equipment requirements.

1.7 EXTRA MATERIALS

A. Furnish extra materials described in subparagraphs below that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.

PART 2 - PRODUCTS

2.1 STRAIGHT BLADE RECEPTACLES

A. Convenience Duplex Receptacles, 125 V, 20 A: Comply with NEMA WD 1, NEMA WD 6 configuration 5-20R, and UL 498.

2.2 GFCI RECEPTACLES

A. General Description: Straight blade, non-feed-through type. Comply with NEMA WD 1, NEMA WD 6, UL 498, and UL 943, Class A, and include indicator light that is lighted when device is tripped.

B. Duplex GFCI Convenience Duplex Receptacles, 125 V, 20 A:

2.3 TWIST-LOCKING RECEPTACLES

A. Single Convenience Receptacles, 125 V, 20 A: Comply with NEMA WD 1, NEMA WD 6 configuration L5-20R, and UL 498. Provide other configurations where indicated on plans.

2.4 CORD AND PLUG SETS

A. Description: Match voltage and current ratings and number of conductors to requirements of equipment being connected.

1. Cord: Rubber-insulated, stranded-copper conductors, with Type SOW-A jacket; with green-insulated grounding conductor and equipment-rating ampacity plus a minimum of 30 percent.
2. Plug: Nylon body and integral cable-clamping jaws. Match cord and receptacle type for connection.

2.5 SNAP SWITCHES must match the push button switches provided with the daylight harvesting controls and with the wall mounted occupancy switches.

A. Comply with NEMA WD 1 and UL 20

B. Switches, 120/277 V, 20 A – single or two pole, three way or 4 way as indicated on plans.

C. Pilot Light Switches, 20 A:

1. Description: Single pole, with neon-lighted handle, illuminated when switch is "ON."

2.6 WALL PLATES

A. Single and combination types to match corresponding wiring devices.

1. Plate-Securing Screws: Metal with head color to match plate finish.
2. Material for Finished and unfinished Spaces: Brushed stainless steel.
3. Material for Damp Locations: Thermoplastic with spring-loaded lift cover, and listed and labeled for use in "wet locations."

B. Wet-Location, Weatherproof : NEMA 250, complying with type 3R enclosure

2.7 FINISHES

A. Color: Wiring device catalog numbers in Section Text do not designate device color.

1. Wiring Devices : White, unless otherwise indicated or required by NFPA 70 or device listing.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Comply with NECA 1, including the mounting heights listed in that standard, unless otherwise noted.

B. Coordination with Other Trades:

1. Take steps to insure that devices and their boxes are protected. Do not place wall finish materials over device boxes and do not cut holes for boxes with routers that are guided by riding against outside of the boxes.
2. Keep outlet boxes free of plaster, drywall joint compound, mortar, cement, concrete, dust, paint, and other material that may contaminate the raceway system, conductors, and cables.
3. Install device boxes in brick or block walls so that the cover plate does not cross a joint unless the joint is troweled flush with the face of the wall.
4. Install wiring devices after all wall preparation, including painting, is complete.

C. Conductors:

1. Do not strip insulation from conductors until just before they are spliced or terminated on devices.
2. Strip insulation evenly around the conductor using tools designed for the purpose. Avoid scoring or nicking of solid wire or cutting strands from stranded wire.
3. The length of free conductors at outlets for devices shall meet provisions of NFPA 70, Article 300, without pigtails.
4. Existing Conductors:

a. Cut back and pigtail, or replace all damaged conductors.
b. Straighten conductors that remain and remove corrosion and foreign matter.
c. Pigtailing existing conductors is permitted provided the outlet box is large enough.

D. Device Installation:

1. Replace all devices that have been in temporary use during construction or that show signs that they were installed before building finishing operations were complete.
2. Keep each wiring device in its package or otherwise protected until it is time to connect conductors.
3. Do not remove surface protection, such as plastic film and smudge covers, until the last possible moment.
4. Connect devices to branch circuits using pigtails that are not less than 6 inches (152 mm) in length.
5. When there is a choice, use side wiring with binding-head screw terminals. Wrap solid conductor tightly clockwise, 2/3 to 3/4 of the way around terminal screw.
6. Use a torque screwdriver when a torque is recommended or required by the manufacturer.
7. When conductors larger than No. 12 AWG are installed on 15- or 20-A circuits, splice No. 12 AWG pigtails for device connections.
8. Tighten unused terminal screws on the device.
9. When mounting into metal boxes, remove the fiber or plastic washers used to hold device mounting screws in yokes, allowing metal-to-metal contact.

E. Receptacle Orientation:

1. Install ground pin of vertically mounted receptacles up, and on horizontally mounted receptacles to the right.
2. Install hospital-grade receptacles in patient-care areas with the ground pin or neutral blade at the top.

F. Device Plates: Do not use oversized or extra-deep plates. Repair wall finishes and remount outlet boxes when standard device plates do not fit flush or do not cover rough wall opening.

G. Arrangement of Devices: Unless otherwise indicated, mount flush, with long dimension vertical and with grounding terminal of receptacles on top. Group adjacent switches under single, multigang wall plates.

H. Adjust locations of floor service outlets and service poles to suit arrangement of partitions and furnishings.

3.2 IDENTIFICATION

A. Comply with Division 26 Section "Identification for Electrical Systems."

1. Receptacles: Identify panelboard and circuit number from which served. Provide machine-printed adhesive labels on wall plates.

3.3 FIELD QUALITY CONTROL

A. Perform tests and inspections and prepare test reports.
1. Test Instruments: Use instruments that comply with UL 1436.
2. Test Instrument for Convenience Receptacles: Digital wiring analyzer with digital readout or illuminated LED indicators of measurement.

B. Tests for Convenience Receptacles:

1. Line Voltage: Acceptable range is 105 to 132 V.
2. Percent Voltage Drop under 15-A Load: A value of 6 percent or higher is not acceptable.

3. Ground Impedance: Values of up to 2 ohms are acceptable.
4. GFCI Trip: Test for tripping values specified in UL 1436 and UL 943.
5. Using the test plug, verify that the device and its outlet box are securely mounted.
6. The tests shall be diagnostic, indicating damaged conductors, high resistance at the circuit breaker, poor connections, inadequate fault current path, defective devices, or similar problems. Correct circuit conditions, remove malfunctioning units and replace with new ones, and retest as specified above.

END OF SECTION 26 27 26

SECTION 26 28 13 - FUSES

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 QUALITY ASSURANCE

A. Source Limitations: Obtain fuses, for use within a specific product or circuit, from single source from single manufacturer.

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

C. Comply with NEMA FU 1 for cartridge fuses.

D. Comply with NFPA 70.

E. Comply with UL 248-11 for plug fuses.

1.3 PROJECT CONDITIONS

A. Where ambient temperature to which fuses are directly exposed is less than 40 deg F (5 deg C) or more than 100 deg F (38 deg C), apply manufacturer's ambient temperature adjustment factors to fuse ratings.

1.4 COORDINATION

A. Coordinate fuse ratings with utilization equipment nameplate limitations of maximum fuse size and with system short-circuit current levels.

1.5 EXTRA MATERIALS

A. Furnish extra materials that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.

1. Fuses: Equal to 10 percent of quantity installed for each size and type, but no fewer than 2 of each size and type.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Manufacturers: Subject to compliance with requirements, provided products by one of the following or approved equal:

1. Cooper Bussmann, Inc.
2. Edison Fuse, Inc.
3. Ferraz Shawmut, Inc.
4. Littelfuse, Inc.

2.2 CARTRIDGE FUSES

A. Characteristics: NEMA FU 1, nonrenewable cartridge fuses with voltage ratings consistent with circuit voltages.

2.3 PLUG FUSES

A. Characteristics: UL 248-11, nonrenewable plug fuses; 125-V ac.

2.4 PLUG-FUSE ADAPTERS

A. Characteristics: Adapters for using Type S, rejection-base plug fuses in Edison-base fuseholders or sockets; ampere ratings matching fuse ratings; irremovable once installed.

2.5 SPARE-FUSE CABINET

A. Characteristics: Wall-mounted steel unit with full-length, recessed piano-hinged door and key-coded cam lock and pull.

1. Size: Adequate for storage of spare fuses specified with 15 percent spare capacity minimum.
2. Finish: Gray, baked enamel.
3. Identification: "SPARE FUSES" in 1-1/2-inch- (38-mm-) high letters on exterior of door.
4. Fuse Pullers: For each size of fuse, where applicable and available, from fuse manufacturer.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine fuses before installation. Reject fuses that are moisture damaged or physically damaged.

B. Examine holders to receive fuses for compliance with installation tolerances and other conditions affecting performance, such as rejection features.

C. Examine utilization equipment nameplates and installation instructions. Install fuses of sizes and with characteristics appropriate for each piece of equipment.

D. Evaluate ambient temperatures to determine if fuse rating adjustment factors must be applied to fuse ratings.

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

3.2 FUSE APPLICATIONS

A. Cartridge Fuses:

1. Service Entrance and Feeders: Class L, fast acting
2. Motor Branch Circuits and other branch circuits: Class RK1, time delay.
3. Control Circuits: Class CC, fast acting.

B. Plug Fuses:

1. Motor Branch Circuits and other branch circuits: **Edison-base type, dual**-element time delay.

3.3 INSTALLATION

A. Install fuses in fusible devices. Arrange fuses so rating information is readable without removing fuse.

B. Install plug-fuse adapters in Edison-base fuseholders and sockets. Ensure that adapters are irremovable once installed.

C. Install spare-fuse cabinet(s).

3.4 IDENTIFICATION

A. Install labels complying with requirements for identification specified in Division 26 Section "Identification for Electrical Systems" and indicating fuse replacement information on inside door of each fused switch and adjacent to each fuse block, socket, and holder.

END OF SECTION 26 28 13

SECTION 26 28 16 - ENCLOSED SWITCHES AND CIRCUIT BREAKERS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section Includes:

1. Fusible switches.
2. Nonfusible switches.
3. Molded-case switches.
4. Enclosures.

1.3 DEFINITIONS

A. NC: Normally closed.

B. NO: Normally open.

C. SPDT: Single pole, double throw.

1.4 PERFORMANCE REQUIREMENTS

A. Seismic Performance: Enclosed switches and circuit breakers shall withstand the effects of earthquake motions determined according to ASCE/SEI 7.

1. The term "withstand" means "the unit will remain in place without separation of any parts from the device when subjected to the seismic forces specified and the unit will be fully operational after the seismic event."

1.5 SUBMITTALS

A. Product Data: For each type of enclosed switch, circuit breaker, accessory, and component indicated. Include dimensioned elevations, sections, weights, and manufacturers' technical data on features, performance, electrical characteristics, ratings, accessories, and finishes.

1. Enclosure types and details for types other than NEMA 250, Type 1.
2. Current and voltage ratings.
3. Short-circuit current ratings (interrupting and withstand, as appropriate).
4. Include evidence of NRTL listing for series rating of installed devices.
5. Detail features, characteristics, ratings, and factory settings of individual overcurrent protective devices, accessories, and auxiliary components.

B. Shop Drawings: For enclosed switches and circuit breakers. Include plans, elevations, sections, details, and attachments to other work.

1. Wiring Diagrams: For power, signal, and control wiring.

C. Operation and Maintenance Data: For enclosed switches and circuit breakers to include in emergency, operation, and maintenance manuals. In addition to items specified in Division 01 Section "Operation and Maintenance Data," include the following:

1. Manufacturer's written instructions for testing and adjusting enclosed switches and circuit breakers.

1.6 QUALITY ASSURANCE

A. Testing Agency Qualifications: Member company of NETA or an NRTL.

1. Testing Agency's Field Supervisor: Currently certified by NETA to supervise on-site testing.

B. Source Limitations: Obtain enclosed switches and circuit breakers, overcurrent protective devices, components, and accessories, within same product category, from single source from single manufacturer.

C. Product Selection for Restricted Space: Drawings indicate maximum dimensions for enclosed switches and circuit breakers, including clearances between enclosures, and adjacent surfaces and other items. Comply with indicated maximum dimensions.

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

E. Comply with NFPA 70.

1.7 PROJECT CONDITIONS

A. Environmental Limitations: Rate equipment for continuous operation under the following conditions unless otherwise indicated:

1. Ambient Temperature: Not less than minus 22 deg F (minus 30 deg C) and not exceeding 104 deg F (40 deg C).
2. Altitude: Not exceeding 6600 feet (2010 m).

1.8 COORDINATION

A. Coordinate layout and installation of switches, circuit breakers, and components with equipment served and adjacent surfaces. Maintain required workspace clearances and required clearances for equipment access doors and panels.

1.9 EXTRA MATERIALS

A. Furnish extra materials that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.

1. Fuses: Equal to 10 percent of quantity installed for each size and type, but no fewer than 3 of each size and type.
2. Fuse Pullers: two for each size and type.

PART 2 - PRODUCTS

2.1 FUSIBLE SWITCHES

A. Basis-of-Design Product: Subject to compliance with requirements, provide product by one of the following or approved equal:

1. Eaton Electrical Inc.; Cutler-Hammer Business Unit.
2. General Electric Company; GE Consumer & Industrial - Electrical Distribution.
3. Siemens Energy & Automation, Inc.
4. Square D; a brand of Schneider Electric.

B. Type HD, Heavy Duty, Single Throw, 240-V ac, 1200 A and Smaller: UL 98 and NEMA KS 1, horsepower rated, with clips or bolt pads to accommodate fuses, lockable handle with capability to accept three padlocks, and interlocked with cover in closed position.

C. Accessories:

1. Equipment Ground Kit: Internally mounted and labeled for copper and aluminum ground conductors.
2. Neutral Kit: Internally mounted; insulated, capable of being grounded and bonded; labeled for copper and aluminum neutral conductors.
3. Class R Fuse Kit: Provides rejection of other fuse types when Class R fuses are specified.
4. Auxiliary Contact Kit: One NO/NC (Form "C") auxiliary contact(s), arranged to activate before switch blades open.
5. Lugs: Mechanical type, suitable for number, size, and conductor material.

2.2 NONFUSIBLE SWITCHES

A. Type HD, Heavy Duty, Single Throw, 240 V ac, 1200 A and Smaller: UL 98 and NEMA KS 1, horsepower rated, lockable handle with capability to accept three padlocks, and interlocked with cover in closed position.

B. Accessories:

1. Equipment Ground Kit: Internally mounted and labeled for copper and aluminum ground conductors.
2. Neutral Kit: Internally mounted; insulated, capable of being grounded and bonded; labeled for copper and aluminum neutral conductors.

3. Auxiliary Contact Kit: One NO/NC (Form "C") auxiliary contact(s), arranged to activate before switch blades open.
4. Lugs: Mechanical type, suitable for number, size, and conductor material.

2.3 ENCLOSURES

A. Enclosed Switches and Circuit Breakers: NEMA AB 1, NEMA KS 1, NEMA 250, and UL 50, to comply with environmental conditions at installed location.

1. Indoor, Dry and Clean Locations: NEMA 250, Type 1
2. Outdoor Locations: NEMA 250, Type 3R
3. Other Wet or Damp, Indoor Locations: NEMA 250, Type 4X
4. Indoor Locations Subject to Dust, Falling Dirt, and Dripping Noncorrosive Liquids: NEMA 250, Type 12.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine elements and surfaces to receive enclosed switches and circuit breakers for compliance with installation tolerances and other conditions affecting performance of the Work.

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

3.2 INSTALLATION

A. Install individual wall-mounted switches and circuit breakers with tops at uniform height unless otherwise indicated.

B. Comply with mounting and anchoring requirements specified in Division 26 Section "Vibration and Seismic Controls for Electrical Systems."

C. Install fuses in fusible devices.

D. Comply with NECA 1.

3.3 IDENTIFICATION

A. Comply with requirements in Division 26 Section "Identification for Electrical Systems."

1. Identify field-installed conductors, interconnecting wiring, and components; provide warning signs.
2. Label each enclosure with engraved metal or laminated-plastic nameplate.

3.4 FIELD QUALITY CONTROL

A. Perform tests and inspections.

B. Acceptance Testing Preparation:

1. Test insulation resistance for each enclosed switch and circuit breaker, component, connecting supply, feeder, and control circuit.
2. Test continuity of each circuit.

3. Test and adjust controls, remote monitoring, and safeties. Replace damaged and malfunctioning controls and equipment.

C. Enclosed switches and circuit breakers will be considered defective if they do not pass tests and inspections.

D. Prepare test and inspection reports, including a certified report that identifies enclosed switches and circuit breakers and that describes scanning results. Include notation of deficiencies detected, remedial action taken, and observations after remedial action.

3.5 ADJUSTING

A. Adjust moving parts and operable components to function smoothly, and lubricate as recommended by manufacturer.

END OF SECTION 26 28 16

SECTION 26 29 13 - ENCLOSED CONTROLLERS

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 the following enclosed controllers rated 600 V and less:

1. Full-voltage manual.
2. Full-voltage magnetic.

1.3 DEFINITIONS

A. CPT: Control power transformer.

B. MCCB: Molded-case circuit breaker.

C. MCP: Motor circuit protector.

D. N.C.: Normally closed.

E. N.O.: Normally open.

F. OCPD: Overcurrent protective device.

G. SCR: Silicon-controlled rectifier.

1.4 SUBMITTALS

A. Product Data: For each type of enclosed controller. Include manufacturer's technical data on features, performance, electrical characteristics, ratings, and enclosure types and finishes.

B. Shop Drawings: For each enclosed controller. Include dimensioned plans, elevations, sections, details, and required clearances and service spaces around controller enclosures.

1. Show tabulations of the following:

a. Each installed unit's type and details.
b. Factory-installed devices.
c. Nameplate legends.
d. Short-circuit current rating of integrated unit.

2. Wiring Diagrams: For power, signal, and control wiring.

C. Field quality-control reports.

D. Operation and Maintenance Data: For enclosed controllers to include in emergency, operation, and maintenance manuals. In addition to items specified in Division 01 Section "Operation and Maintenance Data," include the following:

1. Routine maintenance requirements for enclosed controllers and installed components.
2. Manufacturer's written instructions for setting field-adjustable overload relays.
3. Manufacturer's written instructions for testing, adjusting, and reprogramming reduced-voltage solid-state controllers.

E. Load-Current and Overload-Relay Heater List: Compile after motors have been installed, and arrange to demonstrate that selection of heaters suits actual motor nameplate full-load currents.

1.5 QUALITY ASSURANCE

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

B. Comply with NFPA 70.

1.6 PROJECT CONDITIONS

A. Environmental Limitations: Rate equipment for continuous operation under the following conditions unless otherwise indicated:

1. Ambient Temperature: Not less than minus 22 deg F (minus 30 deg C) and not exceeding 104 deg F (40 deg C).
2. Altitude: Not exceeding 6600 feet (2010 m).

1.7 EXTRA MATERIALS

A. Furnish extra materials that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.

1. Fuses for Fused Switches and Control Power Fuses: Equal to 10 percent of quantity installed for each size and type, but no fewer than 2 of each size and type.
2. Indicating Lights: two of each type and color installed.
3. Auxiliary Contacts: Furnish one spare(s) for each size and type of magnetic controller installed.
4. Power Contacts: Furnish three spares for each size and type of magnetic contactor installed.

PART 2 - PRODUCTS

2.1 FULL-VOLTAGE CONTROLLERS

A. General Requirements for Full-Voltage Controllers: Comply with NEMA ICS 2, general purpose, Class A.

B. Motor-Starting Switches: "Quick-make, quick-break" toggle or push-button action; marked to show whether unit is off or on.

1. Surface mounting.
2. **Red** pilot light.

C. Fractional Horsepower Manual Controllers: "Quick-make, quick-break" toggle or push-button action; marked to show whether unit is off, on, or tripped.

1. Overload Relays: Inverse-time-current characteristics; NEMA ICS 2, Class 10 tripping characteristics; heaters matched to nameplate full-load current of actual protected motor; external reset push button bimetallic type.
2. Surface mounting.
3. Red pilot light.

D. Magnetic Controllers: Full voltage, across the line, electrically held.

1. Contactor Coils: Pressure-encapsulated type with coil transient suppressors.

    a. Operating Voltage: Depending on contactor NEMA size and line-voltage rating, manufacturer's standard matching control power or line voltage.

2. Power Contacts: Totally enclosed, double-break, silver-cadmium oxide; assembled to allow inspection and replacement without disturbing line or load wiring.
3. Control Circuits: 24 V ac; obtained from integral CPT, with primary and secondary fuses, with CPT of sufficient capacity to operate integral devices and remotely located pilot, indicating, and control devices.

    a. CPT Spare Capacity: 50 VA.

4. Melting Alloy Overload Relays:

    a. Inverse-time-current characteristic.
    b. Class 10 tripping characteristic.
    c. Heaters in each phase matched to nameplate full-load current of actual protected motor and with appropriate adjustment for duty cycle.
    d. Ambient compensated.
    e. Automatic resetting.

5. Solid-State Overload Relay:

    a. Switch or dial selectable for motor running overload protection.
    b. Sensors in each phase.
    c. Class 10 tripping characteristic selected to protect motor against voltage and current unbalance and single phasing.

6. N.C or N.O., isolated overload alarm contact.
7. External overload reset push button.

E. Combination Magnetic Controller: Factory-assembled combination of magnetic controller, OCPD, and disconnecting means.

1. Fusible Disconnecting Means:

a. NEMA KS 1, heavy-duty, horsepower-rated, fusible switch with clips or bolt pads to accommodate Class J fuses.
b. Lockable Handle: Accepts three padlocks and interlocks with cover in closed position.
c. Auxiliary Contacts: N.O./N.C., arranged to activate before switch blades open.

2. Nonfusible Disconnecting Means:

a. NEMA KS 1, heavy-duty, horsepower-rated, nonfusible switch.
b. Lockable Handle: Accepts three padlocks and interlocks with cover in closed position.
c. Auxiliary Contacts: N.O./N.C., arranged to activate before switch blades open.

2.2 ENCLOSURES

A. Enclosed Controllers: NEMA ICS 6, to comply with environmental conditions at installed location.

1. Dry and Clean Indoor Locations: Type 1.
2. Outdoor Locations: Type 3R.
3. Other Wet or Damp Indoor Locations: Type 4X.

2.3 ACCESSORIES

A. General Requirements for Control Circuit and Pilot Devices: NEMA ICS 5; factory installed in controller enclosure cover unless otherwise indicated.

1. Push Buttons, Pilot Lights, and Selector Switches: Heavy-duty, oiltight type.

a. Push Buttons: Covered types; maintained as indicated.
b. Pilot Lights: LED types; colors as indicated.
c. Selector Switches: Rotary type.

B. N.C./ N.O. auxiliary contact(s).

C. Control Relays: Auxiliary and adjustable time-delay relays.

D. Phase-Failure, Phase-Reversal, and Undervoltage and Overvoltage Relays: Solid-state sensing circuit with isolated output contacts for hard-wired connections. Provide adjustable undervoltage, overvoltage, and time-delay settings.

E. Cover gaskets for Type 1 enclosures.

F. Terminals for connecting power factor correction capacitors to the line side of overload relays.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine areas and surfaces to receive enclosed controllers, with Installer present, for compliance with requirements and other conditions affecting performance of the Work.

B. Examine enclosed controllers before installation. Reject enclosed controllers that are wet, moisture damaged, or mold damaged.

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

3.2 INSTALLATION

A. Wall-Mounted Controllers: Install enclosed controllers on walls with tops at uniform height unless otherwise indicated, and by bolting units to wall or mounting on lightweight structural-steel channels bolted to wall. For controllers not at walls, provide freestanding racks complying with Division 26 Section "Hangers and Supports for Electrical Systems."

B. Seismic Bracing: Comply with requirements specified in Division 26 Section "Vibration and Seismic Controls for Electrical Systems."

C. Install fuses in each fusible-switch enclosed controller.

D. Comply with NECA 1.

3.3 IDENTIFICATION

A. Identify enclosed controllers, components, and control wiring. Comply with requirements for identification specified in Division 26 Section "Identification for Electrical Systems."

1. Identify field-installed conductors, interconnecting wiring, and components; provide warning signs.
2. Label each enclosure with engraved nameplate.

3.4 CONTROL WIRING INSTALLATION

A. Install wiring between enclosed controllers and remote devices. Comply with requirements in Division 26 Section "Control-Voltage Electrical Power Cables."

B. Bundle, train, and support wiring in enclosures.

C. Connect selector switches and other automatic-control selection devices where applicable.

3.5 FIELD QUALITY CONTROL

A. Tests and Inspections:

1. Inspect controllers, wiring, components, connections, and equipment installation.
2. Test insulation resistance for each enclosed-controller element, component, connecting motor supply, feeder, and control circuits.
3. Test continuity of each circuit.
4. Verify that voltages at controller locations are within plus or minus 10 percent of motor nameplate rated voltages.
5. Test each motor for proper phase rotation.
6. Perform each electrical test and visual and mechanical inspection stated in NETA Acceptance Testing Specification. Certify compliance with test parameters.
7. Correct malfunctioning units on-site, where possible, and retest to demonstrate compliance; otherwise, replace with new units and retest.

B. Enclosed controllers will be considered defective if they do not pass tests and inspections.

3.6 ADJUSTING

A. Set field-adjustable switches, auxiliary relays, time-delay relays, timers, and overload-relay pickup and trip ranges.

B. Adjust overload-relay heaters or settings if power factor correction capacitors are connected to the load side of the overload relays.

C. Adjust the trip settings of MCPs and thermal-magnetic circuit breakers with adjustable instantaneous trip elements. Initially adjust to six times the motor nameplate full-load ampere ratings and attempt to start motors several times, allowing for motor cooldown between starts. If tripping occurs on motor inrush, adjust settings in increments until motors start without tripping. Do not exceed eight times the motor full-load amperes (or 11 times for NEMA Premium Efficient motors if required). Where these maximum settings do not allow starting of a motor.

3.7 DEMONSTRATION

A. Train Owner's maintenance personnel to adjust, operate, and maintain enclosed controllers.

END OF SECTION 26 29 13

SECTION 26 51 19 - LED INTERIOR LIGHTING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section Includes:

1. Interior solid-state luminaires that use LED technology.
2. Lighting fixture supports.

B. Related Requirements:

1. Section 26 09 23"Lighting Control Devices" for automatic control of lighting, including photoelectric relays, occupancy sensors, and multipole lighting relays and contactors.

1.3 DEFINITIONS

A. CCT: Correlated color temperature.

B. CRI: Color Rendering Index.

C. Fixture: See "Luminaire."

D. IP: International Protection or Ingress Protection Rating.

E. LED: Light-emitting diode.

F. Lumen: Measured output of lamp and luminaire, or both.

G. Luminaire: Complete lighting unit, including lamp, reflector, and housing.

1.4 ACTION SUBMITTALS

A. Product Data: For each type of product.

1. Arrange in order of luminaire designation.
2. Include data on features, accessories, and finishes.
3. Include physical description and dimensions of luminaires.
4. Include life, output (lumens, CCT, and CRI), and energy efficiency data.

5. Photometric data and adjustment factors based on laboratory tests IES LM-79 and IES LM-80.

    a. Manufacturers' Certified Data: Photometric data certified by manufacturer's laboratory with a current accreditation under the National Voluntary Laboratory Accreditation Program for Energy Efficient Lighting Products.

B. Samples for Verification: As requested by Architect.

1. Include Samples of luminaires and accessories to verify finish selection.

C. Product Schedule: For luminaires and lamps. Use same designations indicated on Drawings.

1.5 CLOSEOUT SUBMITTALS

A. Operation and Maintenance Data: For luminaires and lighting systems to include in operation and maintenance manuals.

1. Provide a list of all lamp module types used on Project; use ANSI and manufacturers' codes.

1.6 QUALITY ASSURANCE

A. Luminaire Photometric Data Testing Laboratory Qualifications: Luminaire manufacturer's laboratory that is accredited under the NVLAP for Energy Efficient Lighting Products.

B. Provide luminaires from a single manufacturer for each luminaire type.

C. Each luminaire type shall be binned within a three-step MacAdam Ellipse to ensure color consistency among luminaires.

1.7 DELIVERY, STORAGE, AND HANDLING

A. Protect finishes of exposed surfaces by applying a strippable, temporary protective covering before shipping.

PART 2 - PRODUCTS

2.1 LUMINAIRE REQUIREMENTS

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

B. NRTL Compliance: Luminaires for hazardous locations shall be listed and labeled for indicated class and division of hazard by an NRTL.

C. Recessed Fixtures: Comply with NEMA LE 4.

D. CRI of minimum 70. CCT as scheduled on the drawings.

E. Rated lamp life of 50,000 hours.

F. Lamps dimmable from 100 percent to 0 percent of maximum light output where dimming control is indicated on the drawings.

G. Internal driver or remote driver as applicable for each scheduled luminaire.

H. Nominal Operating Voltage: As scheduled on the drawings. .

1. Lens Thickness: At least 0.125 inch (3.175 mm) minimum unless otherwise indicated.

2.2 MATERIALS

A. Metal Parts:

1. Free of burrs and sharp corners and edges.
2. Sheet metal components shall be steel unless otherwise indicated.
3. Form and support to prevent warping and sagging.

B. Doors, Frames, and Other Internal Access: Smooth operating, free of light leakage under operating conditions, and designed to permit relamping without use of tools. Designed to prevent doors, frames, lenses, diffusers, and other components from falling accidentally during relamping and when secured in operating position.

C. Diffusers and Globes:

1. Acrylic Diffusers: One hundred percent virgin acrylic plastic, with high resistance to yellowing and other changes due to aging, exposure to heat, and UV radiation.
2. Glass: Annealed crystal glass unless otherwise indicated.
3. Lens Thickness: At least 0.125 inch (3.175 mm) minimum unless otherwise indicated.

D. Factory-Applied Labels: Comply with UL 1598. Include recommended lamps. Locate labels where they will be readily visible to service personnel, but not seen from normal viewing angles when lamps are in place.

1. Label shall include the following lamp characteristics:

a. "USE ONLY" and include specific lamp type.
b. Lamp diameter, shape, size, wattage, and coating.
c. CCT and CRI for all luminaires.

2.3 METAL FINISHES

A. Variations in finishes are unacceptable in the same piece. Variations in finishes of adjoining components are acceptable if they are within the range of approved Samples and if they can be and are assembled or installed to minimize contrast.

2.4 LUMINAIRE FIXTURE SUPPORT COMPONENTS

A. Comply with requirements in Section 26 05 29 "Hangers and Supports for Electrical Systems" for channel and angle iron supports and nonmetallic channel and angle supports.

B. Stem Hangers: 1/2-inch (13-mm) steel tubing with swivel ball fittings and ceiling canopy. Finish shall match luminaire.

C. Wires: ASTM A 641/A 641M, Class 3, soft temper, zinc-coated steel, 12 gage (2.68 mm) minimum.

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 luminaire to verify actual locations of luminaire and electrical connections before fixture installation. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 TEMPORARY LIGHTING

A. If approved by the Architect, use selected permanent luminaires for temporary lighting. When construction is sufficiently complete, clean luminaires used for temporary lighting and install new lamps.

3.3 INSTALLATION

A. Comply with NECA 1.

B. Install luminaires level, plumb, and square with ceilings and walls unless otherwise indicated.

C. Install lamps in each luminaire.

D. Supports:

1. Sized and rated for luminaire weight.
2. Able to maintain luminaire position after cleaning and relamping.
3. Provide support for luminaire without causing deflection of ceiling or wall.
4. Luminaire mounting devices shall be capable of supporting a horizontal force of 100 percent of luminaire weight and vertical force of 400 percent of luminaire weight.

E. Ceiling-Grid-Mounted Luminaire Supports: Use grid as a support element.

1. Install ceiling support system rods or wires, independent of the ceiling suspension devices, for each luminaire. Locate not more than 6 inches (150 mm) from luminaire corners.
2. Support Clips: Fasten to luminaires and to ceiling grid members at or near each luminaire corner with clips that are UL listed for the application.
3. Luminaires of Sizes Less Than Ceiling Grid: Install as indicated on reflected ceiling plans or center in acoustical panel, and support luminaires independently with at least two metal channels spanning and secured to ceiling tees.
4. Install at least one independent support rod or wire from structure to a tab on luminaire. Wire or rod shall have breaking strength of the luminaire weight at a safety factor of 3.

F. Flush-Mounted Luminaire Support:

1. Secured to outlet box.
2. Attached to ceiling structural members at four points equally spaced around circumference of luminaire.
3. Trim ring flush with finished surface.

G. Wall-Mounted Luminaire Support:

1. Attached to structural members in walls
2. Attached to a minimum 20 gauge backing plate attached to wall structural members
3. Attached using through bolts and backing plates on either side of wall.
4. Do not attach luminaires directly to gypsum board.

H. Suspended Luminaire Support:

1. Pendants and Rods: Where longer than 48 inches (1200 mm), brace to limit swinging.
2. Stem-Mounted, Single-Unit Luminaires: Suspend with twin-stem hangers. Support with approved outlet box and accessories that hold stem and provide damping of luminaire oscillations. Support outlet box vertically to building structure using approved devices.
3. Continuous Rows of Luminaires: Use tubing or cord for wiring at one point and wire support for suspension for each unit length of luminaire chassis, including one at each end.
4. Do not use ceiling grid as support for pendant luminaires. Connect support wires or rods to building structure.

I. Comply with requirements in Section 26 05 19 "Low-Voltage Electrical Power Conductors and Cables" for wiring connections.

3.4 IDENTIFICATION

A. Identify system components, wiring, cabling, and terminals. Comply with requirements for identification specified in Section 26 05 53 "Identification for Electrical Systems."

3.5 FIELD QUALITY CONTROL

A. Perform the following tests and inspections:

1. Operational Test: After installing luminaires, switches, and accessories, and after electrical circuitry has been energized, test units to confirm proper operation.
2. Test for Emergency Lighting: Interrupt normal power supply to demonstrate proper operation. Verify transfer from normal power to emergency power and retransfer to normal.

B. Luminaire will be considered defective if it does not pass operation tests and inspections.

3.6 STARTUP SERVICE

A. Comply with requirements for startup specified in Section 26 09 43 "Network Lighting Controls."

END OF SECTION 26 51 19

SECTION 26 52 19 - EMERGENCY AND EXIT LIGHTING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section Includes:

1. Exit signs.
2. Emergency lighting units.
3. Luminaire supports.

1.3 DEFINITIONS

A. CCT: Correlated color temperature.

B. CRI: Color Rendering Index.

C. Fixture: See "Luminaire" Paragraph.

D. Lumen: Measured output of lamp and luminaire, or both.

E. Luminaire: Complete lighting unit, including lamp, reflector, and housing.

1.4 ACTION SUBMITTALS

A. Product Data: For each type of emergency lighting unit, exit sign, and emergency lighting support.

1. Include data on features, accessories, and finishes.
2. Include physical description of the unit and dimensions.
3. Battery and charger for light units.
4. Include life, output of luminaire (lumens, CCT, and CRI), and energy-efficiency data.

1.5 CLOSEOUT SUBMITTALS

A. Operation and Maintenance Data: For luminaires and lighting systems to include in emergency, operation, and maintenance manuals.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Protect finishes of exposed surfaces by applying a strippable, temporary protective covering before shipping.

PART 2 - PRODUCTS

2.1 GENERAL REQUIREMENTS FOR EMERGENCY LIGHTING

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

B. NRTL Compliance: Fabricate and label emergency lighting units, exit signs, and batteries to comply with UL 924.

C. Comply with NFPA 70 and NFPA 101.

D. Comply with NEMA LE 4 for recessed luminaires.

E. Comply with UL 1598 for fluorescent luminaires.

F. Lamp Base: Comply with ANSI C81.61.

G. Emergency Lighting Unit:

1. Emergency Lighting Unit: as indicated on Luminaire Schedule and Drawings.
2. Wall or ceiling mount as indicated with universal junction box adaptor.
3. UV stable thermoplastic housing, rated for damp locations unless otherwise noted.
4. Krypton or LED lamp heads as indicated on the drawings.
5. Internal emergency power unit.

H. Remote Emergency Lighting Units:

1. Emergency Lighting Unit: as indicated on Luminaire Schedule and Drawings.
2. Wall or ceiling mount as indicated with universal junction box adaptor.
3. UV stable thermoplastic housing, rated for damp locations unless otherwise noted.
4. One or two Krypton or LED lamp heads as indicated on the drawings.
5. External emergency power unit.

2.2 EXIT SIGNS

A. General Requirements for Exit Signs: Comply with UL 924; for sign colors, visibility, luminance, and lettering size, comply with authorities having jurisdiction.

B. Internally Lighted Signs:

1. Operating at nominal voltage of 120 V ac.
2. Lamps for AC Operation: LEDs; 50,000 hours minimum rated lamp life.
3. Self-Powered Exit Signs (Battery Type): Internal emergency power unit.

2.3 MATERIALS

A. Metal Parts:

1. Free of burrs and sharp corners and edges.
2. Sheet metal components shall be steel unless otherwise indicated.
3. Form and support to prevent warping and sagging.

B. Doors, Frames, and Other Internal Access:

1. Smooth operating, free of light leakage under operating conditions.
2. Designed to permit relamping without use of tools.
3. Designed to prevent doors, frames, lenses, diffusers, and other components from falling accidentally during relamping and when secured in operating position.

2.4 METAL FINISHES

A. Appearance of Finished Work: Noticeable variations in same piece are not acceptable. Variations in appearance of adjoining components are acceptable if they are within the range of approved Samples and are assembled or installed to minimize contrast.

2.5 LUMINAIRE SUPPORT COMPONENTS

A. Comply with requirements in Section 26 05 29 "Hangers and Supports for Electrical Systems" for channel and angle iron supports and nonmetallic channel and angle supports.

B. Support Wires: ASTM A 641/A 641M, Class 3, soft temper, zinc-coated steel, 12 gage (2.68 mm).

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements for conditions affecting performance of luminaires.

B. Examine roughing-in for luminaire to verify actual locations of luminaire and electrical connections before luminaire installation.

C. Examine walls, floors, roofs, and ceilings for suitable conditions where emergency lighting luminaires will be installed.

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

3.2 INSTALLATION

A. Comply with NECA 1.

B. Install luminaires level, plumb, and square with ceilings and walls unless otherwise indicated.

C. Install lamps in each luminaire.

D. Supports:

1. Sized and rated for luminaire and emergency power unit weight.
2. Able to maintain luminaire position when testing emergency power unit.

3. Provide support for luminaire and emergency power unit without causing deflection of ceiling or wall.
4. Luminaire-mounting devices shall be capable of supporting a horizontal force of 100 percent of luminaire and emergency power unit weight and vertical force of 400 percent of luminaire weight.

E. Wall-Mounted Luminaire Support:

1. Attached to structural members in walls.
2. Do not attach luminaires directly to gypsum board.

F. Suspended Luminaire Support:

1. Pendants and Rods: Where longer than 48 inches (1200 mm), brace to limit swinging.
2. Stem-Mounted, Single-Unit Luminaires: Suspend with twin-stem hangers. Support with approved outlet box and accessories that hold stem and provide damping of luminaire oscillations. Support outlet box vertically to building structure using approved devices.
3. Do not use ceiling grid as support for pendant luminaires. Connect support wires or rods to building structure.

G. Ceiling Grid Mounted Luminaires:

1. Secure to any required outlet box.
2. Secure emergency power unit using approved fasteners in a minimum of four locations, spaced near corners of emergency power unit.
3. Use approved devices and support components to connect luminaire to ceiling grid and building structure in a minimum of four locations, spaced near corners of luminaire.

3.3 IDENTIFICATION

A. Identify system components, wiring, cabling, and terminals. Comply with requirements for identification specified in Section 26 05 53 "Identification for Electrical Systems."

3.4 FIELD QUALITY CONTROL

A. Perform the following tests and inspections:

1. Test for Emergency Lighting: Interrupt power supply to demonstrate proper operation. Verify transfer from normal power to battery power and retransfer to normal.

B. Luminaire will be considered defective if it does not pass operation tests and inspections.

3.5 STARTUP SERVICE

A. Perform startup service:

1. Charge emergency power units and batteries minimum of one hour and depress switch to conduct short-duration test.
2. Charge emergency power units and batteries minimum of 24 hours and conduct one-hour discharge test.

END OF SECTION 26 52 19

SECTION 27 00 00 - COMMUNICATIONS

PART 1 - GENERAL

1.1 DESCRIPTION

A. The Contractor shall provide Inside Plant (ISP) pathways, which may include accessible utility corridors, finished and exposed metal cable tray or ladder, enclosed conduit, duct, or raceway including pull ropes to allow the installation of cable. Junction boxes shall be provided to allow installation of termination jacks at each station. The Contractor shall provide equipment backboards and wire management supports.

B. Cabling and terminations for voice and data will be provided by the Owner.

C. The design of all pathways and hardware shall allow for a 50% growth in capacity.

D. Particular consideration is to be given to the restoration of penetrated fire and smoke stop partitions and floor slabs to their original condition or to current fire code standards, whichever is greater.

E. The Contractor shall furnish shop drawings and other technical data in order to illustrate to US:IT Department the intended method of installation. These shall define material type, path and concealment methods, as well as distribution cable quantities. This information will be submitted prior to starting any portion of work and is subject to the approval of ***US:IT department***.

1.2 Definitions

A. Inside Plant (ISP) is defined as intra-building distribution of cable media such as riser cable both fiber and copper coax, station cable, station jack hardware, Intra building Distribution Frame (IDF) terminals, sleeves, conduit, raceways, distribution frame hardware, etc. All other physical plant such as grounding, power, conduit, and raceway not considered OSP are part of the ISP.

B. Outside Plant (OSP) are all facilities used to support inter-building connections, including (but not limited to) copper, fiber and coaxial cable, splices, terminators, pairs protection, grounding systems, ducts, conduits, manholes, and all related outside infrastructure. Also included are Main Distribution Frames (MDF) and Building Distribution Frames (BDF).

C. Voice Cable – Cabling, which carries Telecommunications System signals, either integrated voice/data or voice only signals, i.e. voice riser, voice station cable.

D. Data Cable – Cabling, which carries data communications signals, i.e. data riser, data station cable, data fiber.

E. Video Cable – Cabling, which carries video or TV communications signals, i.e. video riser, video station cable, video coax.

1.3 References

A. All work shall meet all applicable codes and standards.

1. National Fire Protective Assoc. (NFPA) 70.
2. Building Industry Consulting Service International (BICSI) Standards.
3. National Electrical Manufacturers Assoc. (NEMA) Standards.
4. Electronics Industry Assoc./Telecom. Industry Assoc. (EIA/TIA).
5. US:IT requirements.

PART 2 - PRODUCTS

2.1 Configuration and Specifications for ISP

A. A minimum of twelve inches is required between all phone/data services and any electrical circuits. This is a US:IT requirement.

B. There must be a 50% growth factor built in on all conduit runs used for Voice, Data and Video jacks. Minimum conduit for station runs will be 1" trade size conduit with proper fittings. A 1" NMT non-metallic tubing properly installed meeting all NMT requirements of NEC/BISCI and the University of Maine is also acceptable. A pull string needs to be installed in all conduits used for ISP cabling.

C. Open Ceiling – All conduits will be installed above the tray or back to the proper IDF/BDF.

D. Suspended Ceiling – All conduits will be stubbed above the ceiling or back to proper IDF/BDF. Install B-Line cable tray in all corridors providing a continuous pathway back to the proper BDF/IDF.

E. All old cables are to be removed as required by the NEC.

2.2 Cable Routing

A. Pathway materials may include:

1. Finished and exposed metal cable tray, ladder, or raceway.
2. Enclosed conduit or wireway through walls or ceiling plenums.
3. Sleeves and conduit.
4. Other materials as the contractor may require.

B. Provide B-Line – Part # FT2X12X10. Must be mounted no more than 12" above suspended ceiling, or 8' 6" in open corridors. A usable pull string is to be left in each cable tray on completion of cable installation.

C. All raceway installed to be used for CAT6 installation must meet all BICSI standards as well as ANSI/TIA/EIA standards.

D. Velcro required to tie and support cables.

E. All raceways for IT shall be properly sized for **Panduit** or 1" conduit.

F. All jack locations should run straight back to the equipment rooms or cable trays in their own raceway.

G. Pull strings are to be installed at the time of construction in all conduits.

2.3 Wireless Networking Requirements

A. One (1) 1" conduit run to each location for networking cables.

B. Conduits will terminate either at BDF, IDF or above the cable trays with CAT6 data cable being installed.

C. All ANSI/TIA and NEC codes or requirements must be met.

PART 3 - EXECUTION

3.1 Inside Plant (ISP) Pathway Installation

A. The cable will be less than 280 feet from station jack to distribution frame termination.

B. All cable paths that will be used for Category 6 cable installation must meet all applicable codes, BICSI and ANSI/TIA/EIA standards.

C. The following concealment methods are acceptable:

1. Pathways shall be concealed above drop ceilings and located to avoid lighting fixtures and all electrical conduit and raceway.
2. Utility corridors and rooms: Concealment not required; avoid receptacles and all electrical conduit/raceways.
3. Raceway shall be installed where indicated and when required to run on the surface of a wall.

END OF SECTION 27 00 00

SECTION 28 05 13-CONDUCTORS AND CABLES FOR ELECTRONIC SAFETY AND SECURITY

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section Includes:

1. RS-232 cabling.
2. RS-485 cabling.
3. Fire alarm wire and cable.
4. Identification products.

1.3 DEFINITIONS

A. BICSI: Building Industry Consulting Service International.

B. EMI: Electromagnetic interference.

C. IDC: Insulation displacement connector.

D. Low Voltage: As defined in NFPA 70 for circuits and equipment operating at less than 50 V or for remote-control and signaling power-limited circuits.

E. Open Cabling: Passing telecommunications cabling through open space (e.g., between the studs of a wall cavity).

F. RCDD: Registered Communications Distribution Designer.

1.4 PERFORMANCE REQUIREMENTS

A. Seismic Performance: Pathways shall withstand the effects of earthquake motions determined according to ASCE/SEI 7.

1. The term "withstand" means "the unit will remain in place without separation of any parts from the device when subjected to the seismic forces specified and the unit will be fully operational after the seismic event."

1.5 SUBMITTALS

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

B. Qualification Data: For qualified layout technician, installation supervisor, and field inspector.

C. Seismic Qualification Certificates: For pathways, accessories, and components, from manufacturer.

1. Basis for Certification: Indicate whether withstand certification is based on actual test of assembled components or on calculation.
2. Dimensioned Outline Drawings of Equipment Unit: Identify center of gravity and locate and describe mounting and anchorage provisions.
3. Detailed description of equipment anchorage devices on which the certification is based and their installation requirements.

D. Field quality-control reports.

E. Operation and Maintenance Data: For wire and cable to include in operation and maintenance manuals. In addition to items specified in Division 01, include the following:

1. Allowable pulling tension of cable.
2. Cable connectors and terminations recommended by the manufacturer.

1.6 QUALITY ASSURANCE

A. Testing Agency Qualifications: An NRTL.

1. Testing Agency's Field Supervisor: Currently certified by BICSI as an RCDD to supervise on-site testing.

B. Surface-Burning Characteristics: As determined by testing identical products according to ASTM E 84 by a qualified testing agency. Identify products with appropriate markings of applicable testing agency.

1. Flame-Spread Index: 25 or less.
2. Smoke-Developed Index: 50 or less.

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

1.7 PROJECT CONDITIONS

A. Do not install conductors and cables that are wet, moisture damaged, or mold damaged.

1. Indications that wire and cables are wet or moisture damaged include, but are not limited to, discoloration and sagging of factory packing materials.

B. Environmental Limitations: Do not deliver or install UTP, optical fiber, and coaxial cables and connecting materials until wet work in spaces is complete and dry, and temporary HVAC system is operating and maintaining ambient temperature and humidity conditions at occupancy levels during the remainder of the construction period.

PART 2 - PRODUCTS

2.1 PATHWAYS

A. Conduit and Boxes: Comply with requirements in Division 26 Section "Raceway and Boxes for Electrical Systems."

B. Outlet boxes shall be no smaller than 2 inches (50 mm) wide, 3 inches (75 mm) high, and 2-1/2 inches (64 mm) deep.

2.2 RS-232 CABLE

A. Standard Cable: NFPA 70, Type CMR.

1. Paired, 2 pairs, No. 22 AWG, stranded (7x30) tinned copper conductors.
2. Polypropylene insulation.
3. Individual aluminum foil-polyester tape shielded pairs with 100 percent shield coverage.
4. PVC jacket.
5. Pairs are cabled on common axis with No. 24 AWG, stranded (7x32) tinned copper drain wire.
6. Flame Resistance: Comply with UL 1581.

B. Plenum-Rated Cable: NFPA 70, Type CMP.

1. Paired, 2 pairs, No. 22 AWG, stranded (7x30) tinned copper conductors.
2. Plastic insulation.
3. Individual aluminum foil-polyester tape shielded pairs with 100 percent shield coverage.
4. Plastic jacket.
5. Pairs are cabled on common axis with No. 24 AWG, stranded (7x32) tinned copper drain wire.
6. Flame Resistance: Comply with NFPA 262.

2.3 RS-485 CABLE

A. Standard Cable: NFPA 70, Type CMR.

1. Paired, 2 pairs, twisted, No. 22 AWG, stranded (7x30) tinned copper conductors.
2. PVC insulation.
3. Unshielded.
4. PVC jacket.
5. Flame Resistance: Comply with UL 1581.

B. Plenum-Rated Cable: NFPA 70, Type CMP.

1. Paired, 2 pairs, No. 22 AWG, stranded (7x30) tinned copper conductors.
2. Fluorinated ethylene propylene insulation.
3. Unshielded.
4. Fluorinated ethylene propylene jacket.
5. Flame Resistance: NFPA 262, Flame Test.

2.4 FIRE ALARM WIRE AND CABLE

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. Comtran Corporation.
2. Draka Cableteq USA.
3. Genesis Cable Products; Honeywell International, Inc.
4. Rockbestos-Suprenant Cable Corp.
5. West Penn Wire; a brand of Belden Inc.

B. General Wire and Cable Requirements: NRTL listed and labeled as complying with NFPA 70, Article 760.

C. Signaling Line Circuits: Size as recommended by system manufacturer, but not less than No. 16 AWG. Use twisted, shielded pair where recommended by system manufacturer.

1. Circuit Integrity Cable: Twisted shielded pair, NFPA 70, Article 760, Classification CI, for power-limited fire alarm signal service Type FPL. NRTL listed and labeled as complying with UL 1424 and UL 2196 for a 2-hour rating.

2.

D. Non-Power-Limited Circuits: Solid-copper conductors with 600-V rated, 75 deg C, color-coded insulation.

1. Low-Voltage Circuits: No. 16 AWG, minimum.
2. Line-Voltage Circuits: No. 12 AWG, minimum.
3. Multiconductor Armored Cable: NFPA 70, Type MC, copper conductors, Type TFN/THHN conductor insulation, copper drain wire, copper armor with red identifier stripe, NTRL listed for fire alarm and cable tray installation, plenum rated, and complying with requirements in UL 2196 for a 2-hour rating.

2.5 IDENTIFICATION PRODUCTS

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. Brady Corporation.
2. HellermannTyton.
3. Kroy LLC.
4. PANDUIT CORP.

B. Comply with UL 969 for a system of labeling materials, including label stocks, laminating adhesives, and inks used by label printers.

C. Comply with requirements in Division 26 Section "Identification for Electrical Systems."

PART 3 - EXECUTION

3.1 INSTALLATION OF PATHWAYS

A. Comply with TIA-569-B for pull-box sizing and length of conduit and number of bends between pull points.

B. Comply with requirements in Division 26 Section "Raceway and Boxes for Electrical Systems." for installation of conduits and wireways.

C. Install manufactured conduit sweeps and long-radius elbows whenever possible.

3.2 INSTALLATION OF HANGERS AND SUPPORTS

A. Comply with requirements in Division 26 Section "Hangers and Supports for Electrical Systems." for installation of supports for pathways, conductors and cables.

3.3 WIRING METHOD

A. Install wiring in metal raceways and wireways. Conceal raceway except in unfinished spaces and as indicated. Minimum conduit size shall be ½ inch. Control and data transmission wiring shall not share conduit with other building wiring systems.

B. Install wiring in raceways except in accessible indoor ceiling spaces and in interior hollow gypsum board partitions where cable may be used. Conceal raceways and wiring except in unfinished spaces and as indicated. Minimum conduit size shall be ½ inch. Control and data transmission wiring shall not share conduit with other building wiring systems.

C. Wiring within Enclosures: Bundle, lace, and train conductors to terminal points. Use lacing bars and distribution spools. Separate power-limited and non-power-limited conductors as recommended in writing by manufacturer. Install conductors parallel with or at right angles to sides and back of enclosure. Connect conductors that are terminated, spliced, or interrupted in any enclosure associated with intrusion system to terminal blocks. Mark each terminal according to system's wiring diagrams. Make all connections with approved crimp-on terminal spade lugs, pressure-type terminal blocks, or plug connectors.

3.4 INSTALLATION OF CONDUCTORS AND CABLES

A. Comply with NECA 1.

B. Conductors: Size according to system manufacturer's written instructions unless otherwise indicated.

C. General Requirements for Cabling:

1. Do not install bruised, kinked, scored, deformed, or abraded cable. Do not splice cable between termination, tap, or junction points. Remove and discard cable if damaged during installation and replace it with new cable.
2. Cold-Weather Installation: Bring cable to room temperature before dereeling. Heat lamps shall not be used for heating.
3. Pulling Cable: Comply with BICSI ITSIM, Ch. 4, "Pulling Cable." Monitor cable pull tensions.

D. Open-Cable Installation:

1. Suspend copper cable not in a wireway or pathway a minimum of 8 inches (200 mm) above ceilings by cable supports not more than 60 inches (1525 mm) apart.
2. Cable shall not be run through structural members or in contact with pipes, ducts, or other potentially damaging items.

3.5 FIRE ALARM WIRING INSTALLATION

A. Comply with NECA 1 and NFPA 72.

B. Wiring Method:

1. Cables and raceways used for fire alarm circuits, and equipment control wiring associated with the fire alarm system, may not contain any other wire or cable.
2. Fire-Rated Cables: Use of 2-hour, fire-rated fire alarm cables, NFPA 70, Types MI and CI, is permitted.
3. Signaling Line Circuits: Power-limited fire alarm cables shall not be installed in the same cable or raceway as signaling line circuits.

C. Wiring within Enclosures: Separate power-limited and non-power-limited conductors as recommended by manufacturer. Install conductors parallel with or at right angles to sides and back of the enclosure. Bundle, lace, and train conductors to terminal points with no excess. Connect conductors that are terminated, spliced, or interrupted in any enclosure associated with the fire alarm system to terminal blocks. Mark each terminal according to the system's wiring diagrams. Make all connections with approved crimp-on terminal spade lugs, pressure-type terminal blocks, or plug connectors.

D. Cable Taps: Use numbered terminal strips in junction, pull, and outlet boxes, cabinets, or equipment enclosures where circuit connections are made.

E. Color-Coding: Color-code fire alarm conductors differently from the normal building power wiring. Use one color-code for alarm circuit wiring and another for supervisory circuits. Color-code audible alarm-indicating circuits differently from alarm-initiating circuits. Use different colors for visible alarm-indicating devices. Paint fire alarm system junction boxes and covers red.

F. Risers: Install at least two vertical cable risers to serve the fire alarm system. Separate risers in close proximity to each other with a minimum one-hour-rated wall, so the loss of one riser does not prevent the receipt or transmission of signals from other floors or zones.

G. Wiring to Remote Alarm Transmitting Device: 1-inch (25-mm) conduit between the fire alarm control panel and the transmitter. Install number of conductors and electrical supervision for connecting wiring as needed to suit monitoring function.

3.6 POWER AND CONTROL-CIRCUIT CONDUCTORS

A. 120-V Power Wiring: Install according to Division 26 Section "Low-Voltage Electrical Power Conductors and Cables" unless otherwise indicated.

B. Minimum Conductor Sizes:

1. Class 1 remote-control and signal circuits, No. 14 AWG.
2. Class 2 low-energy, remote-control and signal circuits, No. 16 AWG.
3. Class 3 low-energy, remote-control, alarm and signal circuits, No. 12 AWG.

3.7 CONNECTIONS

A. Comply with requirements in Division 28 Section "Perimeter Security Systems" for connecting, terminating, and identifying wires and cables.

B. Comply with requirements in Division 28 Section "Intrusion Detection" for connecting, terminating, and identifying wires and cables.

C. Comply with requirements in Division 28 Section "Access Control" for connecting, terminating, and identifying wires and cables.

D. Comply with requirements in Division 28 Section "Video Surveillance" for connecting, terminating, and identifying wires and cables.

E. Comply with requirements in Division 28 Section "Digital Addressable Fire-Alarm System" for connecting, terminating, and identifying wires and cables.

3.8 FIRESTOPPING

A. Comply with requirements in Division 07.

B. Comply with TIA-569-B, "Firestopping" Annex A.

C. Comply with BICSI TDMM, "Firestopping Systems" Article.

3.9 GROUNDING

A. For low-voltage wiring and cabling, comply with requirements in Division 26 Section "Grounding and Bonding for Electrical Systems."

3.10 IDENTIFICATION

A. Identify system components, wiring, and cabling complying with TIA/EIA-606-A. Comply with requirements for identification specified in Division 26 Section "Identification for Electrical Systems."

3.11 FIELD QUALITY CONTROL

A. Perform tests and inspections.

B. Tests and Inspections:
1. Visually inspect cable placement, cable termination, grounding and bonding, equipment and patch cords, and labeling of all components.
2. Test cabling for DC loop resistance, shorts, opens, intermittent faults, and polarity between conductors.

C. Document data for each measurement. Print data for submittals in a summary report that is formatted using Table 10.1 in BICSI TDMM as a guide, or transfer the data from the instrument to the computer, save as text files, print, and submit.

D. Cabling will be considered defective if it does not pass tests and inspections.

E. Prepare test and inspection reports.

END OF SECTION 28 05 13

SECTION 28 31 11-DIGITAL, ADDRESSABLE FIRE-ALARM SYSTEM

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section Includes:

1. Manual fire-alarm boxes.
2. System smoke detectors.
3. Notification appliances.
4. Addressable interface device.

1.3 DEFINITIONS

A. LED: Light-emitting diode.

B. NICET: National Institute for Certification in Engineering Technologies.

1.4 EXISTING SYSTEM DESCRIPTION

A. Non-coded, addressable system, with multiplexed signal transmission, dedicated to fire-alarm service only.

B. Existing fire alarm system shall remain in service during contruction and be extended to renovated/construction areas. Provide all required devices, controllers, etc. to connect all devices shown on plans.

1.5 PERFORMANCE REQUIREMENTS

A. Seismic Performance: Fire-alarm control unit and raceways shall withstand the effects of earthquake motions determined according to SEI/ASCE 7.

1. The term "withstand" means "the unit will remain in place without separation of any parts from the device when subjected to the seismic forces specified and the unit will be fully operational after the seismic event.

1.6 SUBMITTALS

A. General Submittal Requirements:

1. Submittals shall be approved by authorities having jurisdiction prior to submitting them to Architect.
2. Shop Drawings shall be prepared by persons with the following qualifications:

a. Trained and certified by manufacturer in fire-alarm system design.
b. NICET-certified fire-alarm technician.
c. Licensed or certified by authorities having jurisdiction.

B. Product Data: For each type of product indicated.

C. Shop Drawings: For fire-alarm system. Include plans, elevations, sections, details, and attachments to other work.

1. Comply with recommendations in the "Documentation" Section of the "Fundamentals of Fire Alarm Systems" Chapter in NFPA 72.
2. Include voltage drop calculations for notification appliance circuits.
3. Include battery-size calculations.
4. Include performance parameters and installation details for each detector, verifying that each detector is listed for complete range of air velocity, temperature, and humidity possible when air-handling system is operating.
5. Include plans, sections, and elevations of heating, ventilating, and air-conditioning ducts, drawn to scale and coordinating installation of duct smoke detectors and access to them. Show critical dimensions that relate to placement and support of sampling tubes, detector housing, and remote status and alarm indicators. Locate detectors according to manufacturer's written recommendations.
6. Include floor plans to indicate final outlet locations showing address of each addressable device. Show size and route of cable and conduits.

D. Seismic Qualification Certificates: For fire-alarm control unit, accessories, and components, from manufacturer.

1. Basis for Certification: Indicate whether withstand certification is based on actual test of assembled components or on calculation.
2. Dimensioned Outline Drawings of Equipment Unit: Identify center of gravity and locate and describe mounting and anchorage provisions.
3. Detailed description of equipment anchorage devices on which the certification is based and their installation requirements.

E. Operation and Maintenance Data: For fire-alarm systems and components to include in emergency, operation, and maintenance manuals. In addition to items specified in Division 01 Section "Operation and Maintenance Data," include the following:

1. Comply with the "Records" Section of the "Inspection, Testing and Maintenance" Chapter in NFPA 72.
2. Provide "Record of Completion Documents" according to NFPA 72 article "Permanent Records" in the "Records" Section of the "Inspection, Testing and Maintenance" Chapter.
3. Record copy of site-specific software.

4. Provide "Maintenance, Inspection and Testing Records" according to NFPA 72 article of the same name and include the following:

    a. Frequency of testing of installed components.
    b. Frequency of inspection of installed components.
    c. Requirements and recommendations related to results of maintenance.
    d. Manufacturer's user training manuals.

5. Manufacturer's required maintenance related to system warranty requirements.
6. Abbreviated operating instructions for mounting at fire-alarm control unit.
7. Copy of NFPA 25.

F. Software and Firmware Operational Documentation:

1. Software operating and upgrade manuals.
2. Program Software Backup: On magnetic media or compact disk, complete with data files.
3. Device address list.
4. Printout of software application and graphic screens.

1.7 QUALITY ASSURANCE

A. Installer Qualifications: Personnel shall be trained and certified by manufacturer for installation of units required for this Project.

B. Source Limitations for Fire-Alarm System and Components: Obtain fire-alarm system from single source from single manufacturer. Components shall be compatible with, and operate as, an extension of existing system.

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

D. NFPA Certification: Obtain certification according to NFPA 72 by a UL-listed alarm company.

1.8 PROJECT CONDITIONS

A. Interruption of Existing Fire-Alarm Service: Do not interrupt fire-alarm service to facilities occupied by Owner or others unless permitted under the following conditions and then only after arranging to provide temporary guard service according to requirements indicated:

1. Do not proceed with interruption of fire-alarm service without Owner’s written permission.

1.9 SEQUENCING AND SCHEDULING

A. Existing Fire-Alarm Equipment: Maintain existing equipment fully operational until new equipment has been tested and accepted. As new equipment is installed, label it "NOT IN SERVICE" until it is accepted. Remove labels from new equipment when put into service and label existing fire-alarm equipment "NOT IN SERVICE" until removed from the building.

B. Equipment Removal: After acceptance of new fire-alarm system components, remove existing disconnected fire-alarm components and wiring.

1.10 SOFTWARE SERVICE AGREEMENT

A. Comply with UL 864.

B. Technical Support: Beginning with Substantial Completion, provide software support for 2 years.

C. Upgrade Service: Update software to latest version at Project completion. Install and program software upgrades that become available within 2 years from date of Substantial Completion. Upgrading software shall include operating system. Upgrade shall include new or revised licenses for use of software.

1. Provide 30 days' notice to Owner to allow scheduling and access to system and to allow Owner to upgrade computer equipment if necessary.

PART 2 - PRODUCTS

A. Fire-alarm signal initiation shall be by one or more of the following devices:

1. Manual stations.
2. Heat detectors.
3. Smoke detectors.
4. Duct smoke detectors.
5. Verified automatic alarm operation of smoke detectors.
6. Automatic sprinkler system water flow.
7. Fire-extinguishing system operation.

B. Fire-alarm signal shall initiate the following actions:

1. Continuously operate alarm notification appliances.
2. Identify alarm at fire-alarm control unit and remote annunciators.
3. Transmit an alarm signal to the remote alarm receiving station.
4. Release fire and smoke doors held open by magnetic door holders.
5. Activate voice/alarm communication system.
6. Switch heating, ventilating, and air-conditioning equipment controls to fire-alarm mode.
7. Activate stairwell and elevator-shaft pressurization systems.
8. Close smoke dampers in air ducts of designated air-conditioning duct systems.
9. Activate emergency shutoffs for gas and fuel supplies.
10. Record events in the system memory.
11. Record events by the system printer.

C. Supervisory signal initiation shall be by one or more of the following devices and actions:

1. Valve supervisory switch.

D. System trouble signal initiation shall be by one or more of the following devices and actions:

1. Open circuits, shorts, and grounds in designated circuits.
2. Opening, tampering with, or removing alarm-initiating and supervisory signal-initiating devices.
3. Loss of primary power at fire-alarm control unit.
4. Ground or a single break in fire-alarm control unit internal circuits.
5. Abnormal ac voltage at fire-alarm control unit.
6. Break in standby battery circuitry.
7. Failure of battery charging.
8. Abnormal position of any switch at fire-alarm control unit or annunciator.
9. Low-air-pressure switch operation on a dry-pipe or preaction sprinkler system.

E. System Trouble and Supervisory Signal Actions: Initiate notification appliance and annunciate at fire-alarm control unit and remote annunciators. Record the event on system printer.

F. Smoke-Alarm Verification:

1. Initiate audible and visible indication of an "alarm-verification" signal at fire-alarm control unit.
2. Activate an NRTL-listed and -approved "alarm-verification" sequence at fire-alarm control unit and detector.
3. Record events by the system printer.
4. Sound general alarm if the alarm is verified.
5. Cancel fire-alarm control unit indication and system reset if the alarm is not verified.

G. Door Controls: Door hold-open devices that are controlled by smoke detectors at doors in smoke barrier walls shall be connected to fire-alarm system.

H. Remote Smoke-Detector Sensitivity Adjustment: Controls shall select specific addressable smoke detectors for adjustment, display their current status and sensitivity settings, and change those settings. Allow controls to be used to program repetitive, time-scheduled, and automated changes in sensitivity of specific detector groups. Record sensitivity adjustments and sensitivity-adjustment schedule changes in system memory, and print out the final adjusted values on system printer.

I. Transmission to Remote Alarm Receiving Station: Automatically transmit alarm, supervisory, and trouble signals to a remote alarm station.

J. Primary Power: 24-V dc obtained from 120-V ac service and a power-supply module. Initiating devices, notification appliances, signaling lines, and trouble signals shall be powered by 24-V dc source.

1. Alarm current draw of entire fire-alarm system shall not exceed 80 percent of the power-supply module rating.

2.2 MANUAL FIRE-ALARM BOXES

A. General Requirements for Manual Fire-Alarm Boxes: Comply with UL 38. Boxes shall be finished in red with molded, raised-letter operating instructions in contrasting color; shall show visible indication of operation; and shall be mounted on recessed outlet box. If indicated as surface mounted, provide manufacturer's surface back box.

1. Single- or dual-action mechanism to match existing, pull-lever type; with integral addressable module arranged to communicate manual-station status (normal, alarm, or trouble) to fire-alarm control unit.
2. Station Reset: Key- or wrench-operated switch.

2.3 SYSTEM SMOKE DETECTORS

A. General Requirements for System Smoke Detectors:

1. Comply with UL 268; operating at 24-V dc, nominal.
2. Detectors shall be four-wire type.
3. Integral Addressable Module: Arranged to communicate detector status (normal, alarm, or trouble) to fire-alarm control unit.
4. Base Mounting: Detector and associated electronic components shall be mounted in a twist-lock module that connects to a fixed base. Provide terminals in the fixed base for connection to building wiring.

5. Self-Restoring: Detectors do not require resetting or readjustment after actuation to restore them to normal operation.
6. Integral Visual-Indicating Light: LED type indicating detector has operated and power-on status.
7. Remote Control: Unless otherwise indicated, detectors shall be analog-addressable type, individually monitored at fire-alarm control unit for calibration, sensitivity, and alarm condition and individually adjustable for sensitivity by fire-alarm control unit.

    a. Rate-of-rise temperature characteristic shall be selectable at fire-alarm control unit for 15 or 20 deg F (8 or 11 deg C) per minute.
    b. Fixed-temperature sensing shall be independent of rate-of-rise sensing and shall be settable at fire-alarm control unit to operate at 135 or 155 deg F (57 or 68 deg C).
    c. Provide multiple levels of detection sensitivity for each sensor.

B. Photoelectric Smoke Detectors:

1. Detector address shall be accessible from fire-alarm control unit and shall be able to identify the detector's location within the system and its sensitivity setting.
2. An operator at fire-alarm control unit, having the designated access level, shall be able to manually access the following for each detector:

    a. Primary status.
    b. Device type.
    c. Present average value.
    d. Present sensitivity selected.
    e. Sensor range (normal, dirty, etc.).

2.4 NOTIFICATION APPLIANCES

A. General Requirements for Notification Appliances: Connected to notification appliance signal circuits, zoned as indicated, equipped for mounting as indicated and with screw terminals for system connections.

1. Combination Devices: Factory-integrated audible and visible devices in a single-mounting assembly, equipped for mounting as indicated and with screw terminals for system connections.

B. Visible Notification Appliances: Xenon strobe lights comply with UL 1971, with clear or nominal white polycarbonate lens mounted on an aluminum faceplate. The word "FIRE" is engraved in minimum 1-inch- (25-mm-) high letters on the lens.

1. Rated Light Output:

    a. 15/30/75/110 cd, selectable in the field.

2. Mounting: Wall mounted unless otherwise indicated.
3. For units with guards to prevent physical damage, light output ratings shall be determined with guards in place.
4. Flashing shall be in a temporal pattern, synchronized with other units.
5. Strobe Leads: Factory connected to screw terminals.
6. Mounting Faceplate: Factory finished, red.

C. Voice/Tone Notification Appliances

1. Appliances shall comply with UL 1480 and shall be listed and labeled by an NRTL.
2. High-Range Units: Rated 2 to 15 W.
3. Low-Range Units: Rated 1 to 2 W.

4. Mounting: Flush.
5. Matching Transformers: Tap range matched to acoustical environment of speaker location.

2.5 ADDRESSABLE INTERFACE DEVICE

A. Description: Microelectronic monitor module, NRTL listed for use in providing a system address for alarm-initiating devices for wired applications with normally open contacts.

B. Integral Relay: Capable of providing a direct signal to elevator controller to initiate elevator recall and to circuit-breaker shunt trip for power shutdown.

PART 3 - EXECUTION

3.1 EQUIPMENT INSTALLATION

A. Comply with NFPA 72 for installation of fire-alarm equipment.

B. Connecting to Existing Equipment: Verify that existing fire-alarm system is operational before making changes or connections.

1. Connect new equipment to existing control panel in existing part of the building.
2. Connect new equipment to existing monitoring equipment at the supervising station.
3. Expand, modify, and supplement existing equipment as necessary to extend existing functions to the new points. New components shall be capable of merging with existing configuration without degrading the performance of either system.

C. Smoke- or Heat-Detector Spacing:

1. Comply with NFPA 72, "Smoke-Sensing Fire Detectors" Section in the "Initiating Devices" Chapter, for smoke-detector spacing.
2. Comply with NFPA 72, "Heat-Sensing Fire Detectors" Section in the "Initiating Devices" Chapter, for heat-detector spacing.
3. Smooth ceiling spacing shall not exceed 30 feet (9 m).
4. Spacing of detectors for irregular areas, for irregular ceiling construction, and for high ceiling areas shall be determined according to Appendix A in NFPA 72.
5. HVAC: Locate detectors not closer than 3 feet (1 m) from air-supply diffuser or return-air opening.
6. Lighting Fixtures: Locate detectors not closer than 12 inches (300 mm) from any part of a lighting fixture.

D. Audible Alarm-Indicating Devices: Install not less than 6 inches (150 mm) below the ceiling. Install bells and horns on flush-mounted back boxes with the device-operating mechanism concealed behind a grille.

E. Visible Alarm-Indicating Devices: Install adjacent to each alarm bell or alarm horn and at least 6 inches (150 mm) below the ceiling.

3.2 CONNECTIONS

A. For fire-protection systems related to doors in fire-rated walls and partitions and to doors in smoke partitions, comply with requirements in Division 08 Section "Door Hardware." Connect hardware and devices to fire-alarm system.

1. Verify that hardware and devices are NRTL listed for use with fire-alarm system in this Section before making connections.

B. Make addressable connections with a supervised interface device to the following devices and systems. Install the interface device less than 3 feet (1 m) from the device controlled. Make an addressable confirmation connection when such feedback is available at the device or system being controlled.

1. Smoke dampers in air ducts of designated air-conditioning duct systems.
2. Alarm-initiating connection to activate emergency shutoffs for gas and fuel supplies.
3. Supervisory connections at valve supervisory switches.

3.3 IDENTIFICATION

A. Identify system components, wiring, cabling, and terminals. Comply with requirements for identification specified in Division 26 Section "Identification for Electrical Systems."

3.4 FIELD QUALITY CONTROL

A. Perform tests and inspections.

1. Manufacturer's Field Service: Engage a factory-authorized service representative to inspect components, assemblies, and equipment installations, including connections, and to assist in testing.

B. Tests and Inspections:

1. Visual Inspection: Conduct visual inspection prior to testing.

a. Inspection shall be based on completed Record Drawings and system documentation that is required by NFPA 72 in its "Completion Documents, Preparation" Table in the "Documentation" Section of the "Fundamentals of Fire Alarm Systems" Chapter.
b. Comply with "Visual Inspection Frequencies" Table in the "Inspection" Section of the "Inspection, Testing and Maintenance" Chapter in NFPA 72; retain the "Initial/Reacceptance" column and list only the installed components.

2. System Testing: Comply with "Test Methods" Table in the "Testing" Section of the "Inspection, Testing and Maintenance" Chapter in NFPA 72.
3. Test audible appliances for the public operating mode according to manufacturer's written instructions. Perform the test using a portable sound-level meter complying with Type 2 requirements in ANSI S1.4.
4. Test visible appliances for the public operating mode according to manufacturer's written instructions.
5. Factory-authorized service representative shall prepare the "Fire Alarm System Record of Completion" in the "Documentation" Section of the "Fundamentals of Fire Alarm Systems" Chapter in NFPA 72 and the "Inspection and Testing Form" in the "Records" Section of the "Inspection, Testing and Maintenance" Chapter in NFPA 72.

C. Reacceptance Testing: Perform reacceptance testing to verify the proper operation of added or replaced devices and appliances.

D. Fire-alarm system will be considered defective if it does not pass tests and inspections.

E. Prepare test and inspection reports.

F. Maintenance Test and Inspection: Perform tests and inspections listed for weekly, monthly, quarterly, and semiannual periods. Use forms developed for initial tests and inspections.

G. Annual Test and Inspection: One year after date of Substantial Completion, test fire-alarm system complying with visual and testing inspection requirements in NFPA 72. Use forms developed for initial tests and inspections.

END OF SECTION 28 31 11